DATA REPORT
SCOR DISCOVERER EXPEDITION
MAY 1970

MEASUREMENTS
OF
PHOTOSYNTHESIS
AVAILABLE RADIANT FLUX
AND
SUPPORTING OCEANOGRAPHIC DATA

CHAIRMAN SCOR WORKING GROUP 15

VOLUME II

Section G through Appendix

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S. C. O. R. DISCOVERER EXPEDITION
3 May-5 June, 1970

SCRIPPS SPECTRORADIOMETER DATA

R. C. Smith

During the S. C. O. R. Working Group 15 DISCOVERER Expedition, the Scripps Spectroradiometer was used to measure down- and upwelling spectral irradiance. The optical, mechanical, and electrical design features of the Scripps underwater spectroradiometer, as well as a full discussion of the techniques employed for absolute calibration, are discussed in detail elsewhere (Tyler and Smith; 1966 and 1970). The remarks below are confined to instrument calibration and performance as they apply to the S. C. O. R. DISCOVERER Expedition and the subsequent analysis of data obtained by the Scripps Spectroradiometer on that expedition.

Calibration

The Scripps Spectroradiometer was calibrated against a standard of spectral irradiance before, during, and after the DISCOVERER Expedition. The pre-expedition calibration took place 26 to 28 March, 1970. During the expedition the instrument was calibrated against a standard of spectral irradiance (on 28 May 1970, immediately following Station No. 17). The post-expedition calibration against the spectral standard was made on 20 November 1970.

Table I presents the results of these three calibrations. The first column gives the wavelength setting of the spectroradiometer in nanometers. The second, third, and fifth columns give the calibration voltages for the March, May, and November calibrations, respectively. The fourth and sixth columns give the percentage change of the calibration voltages for the May and November data from the March calibration.

The calibration data in Table I were obtained using a working standard (Lamp I) prepared by calibration against the Visibility Laboratory standard of spectral irradiance. (Lamp 1011, obtained from the Eppley Laboratory). The spectral irradiance of Lamp 1011 (Stair, Schneider and Jackson, 1963) is based upon the spectral radiance of a black body, as defined by Planck's equation, and has been determined through comparison with (1) the NBS standards of spectral irradiance, (2) the NBS standards of luminous intensity, and (3) the NBS standards of total irradiance. The maximum uncertainty for Lamp 1011 was estimated by Stair, et al. to range from about 5% at the shortest wavelengths in the ultraviolet to about 3% with visible and infrared. Great care was taken in calibrating the working standard (Lamp I) so as not to increase this uncertainty. Thus, the absolute accuracy of working standard Lamp I, used for instrument calibration on the DISCOVERER Expedition, is estimated to range from ±8% (350-400 nm) to ±3% (400-750 nm).

The Scripps Spectroradiometer was also calibrated with the laboratory standard Lamp 1011 and with another laboratory working standard (Lamp X) before and after the DISCOVERER Expedition. The results of these calibrations agree within ±1% with those reported for Lamp I. Thus, we are confident that Lamp I maintained its stated accuracy for all the results reported in Table I.

The data presented in Table I indicate that the average output voltage of the Scripps Spectroradiometer dropped by an average of 5% between the March and May calibrations and by an average of 11% between the March and November calibrations. Inspection of column four shows that the change between the March and May calibrations is within the stated accuracy of the standard lamp at most wavelengths.

For a variety of reasons it was decided to use the March calibration to compute the calibration factors for the data reduction of the DISCOVERER spectroradiometer data. First, the March calibration was the most exhaustive since three standards of spectral irradiance (Lamps 1011, X, and I) were used. Second, the March calibration was carried out at the Visibility Laboratory, using equipments specifically constructed for the optical calibration of instruments. Third, March and May calibrations spanned the time during which most of the data was accumulated, while the November calibration followed the return shipment of the spectroradiometer from East to West coast of the U. S.

From Table I it is estimated that the absolute uncertainty in the calibration of the Scripps Spectroradiometer is not much more than a few percent greater than the estimated uncertainties given for the standard lamp; that it ranges from ±10% (350-400 nm) to ±6% (400-750 nm). Further, from a careful analysis of possible systematic errors, one can assume that there is a greater chance that the reported spectral irradiance values will be systematically a few percent high rather than low.

The systematic error in the above-water irradiance values (marked 0.0 meters) is expected to be greater than the systematic error in the underwater values. This is because the irradiance collector has a better cosine response in water than in air and because an additional neutral density screen must be placed over the collector when it is used in air under full sunlight. However, under the conditions for which the in-air irradiance values were obtained (clear skies and small zenith angle), this increase in systematic error should be relatively small.

The depth transducer in the Scripps Spectroradiometer was also calibrated before and after the DISCOVERER cruise. The two calibrations of the depth transducer repeated to within ±5 cm over the depth range of zero to one hundred meters. There are "zero-offset" errors which may be as large as ±10 cm. The estimated absolute accuracy of the depth transducer is ±0.1 m which is small compared to our ability to maintain the instrument at a specific depth in the water column. Depths given in the data report are an average of the depth observations which are made periodically during a spectral span. The accuracy of the reported depth is thus dependent upon environmental conditions (sea state, wind, and currents) and varies from station to station.

Data and Analysis

Down- and upwelling spectral irradiance were measured using the Scripps Spectroradiometer. The average bandwidth (full width at half-maximum) of the instrument was 5.6 nm. The instrument was used for two modes of operation; the first, for measuring irradiance across the full spectrum. In this mode each data point records the average value of the spectral irradiance for a 10 second interval of time. A single spectral scan takes from 10 to 20 minutes at each depth. In the second mode, the instrument was set at the wavelength of maximum transmittance for the ocean water under investigation and irradiance was measured as a function of depth. A set of measurements of this latter kind could be completed in about 30 minutes.

Early in the cruise a Danish quantum meter was attached to the Scripps Spectroradiometer. Thus, for most of the stations, there are simultaneous spectral irradiance measurements and measurements of total quanta at the same location in the water column.

The spectral irradiance data have been analyzed in two different ways, depending upon environmental conditions. There were days during which the on-deck downwelling irradiance did not change by much more than ±20% during the time the underwater data was being obtained. For these days, the voltages obtained have been simply multiplied by the calibration factors and the results are therefore the real values for the day. There were other days during which the on-deck downwelling irradiance varied by as much as a factor of ten while the underwater readings were being obtained. For these days the underwater readings have been normalized to the maximum reading of the deck monitoring equipment (a spherical-irradiance collector) for the day.

This normalization yields spectral irradiance data which is independent of changes in surface lighting. In essence, this data describes the spectral properties of the water at the moment of maximum solar irradiance for the day. In practice this was always within an hour or so of solar noon.

Operating procedure with the Scripps Spectroradiometer is to begin a spectral scan at 450 nm, and continue to 750 nm where the wavelength cam ends. The scan then immediately starts again at 350 nm and is continued past 500 nm. The overlap in the recording between 450 to 500 nm is deliberate and is an indication of environmental variability during the scan. Thus, for the "clear weather data" at Stations 1, 2, 3, 4, 18, 19, 21, and 23, the reported results (tables and curves) show two values in the central region of the spectrum. For the variable-weather data encountered at Stations 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, and 22, spectral scans were usually repeated two or three times at each depth. The data were normalized using the on-deck measurements and the various scans averaged to give a single "average" spectral curve for that depth. Hence, in the data, overlapping spectral values in the middle of the spectrum indicate clear weather and absolute values, whereas when no overlapping is shown, a normalized and averaged value is indicated. To make the best use of available time, the clear weather data were taken every 10 nm,

except in the middle of the spectrum where they were taken every 5 nm, whereas in variable weather, data were taken only every 20 nm.

At Station 21 variable cloudiness prevailed the first half of the day. The second half was relatively clear with steady lighting. The spectral irradiance data for this station have been analyzed with and without sun normalization. Careful inspection of the two sets of data gives a good indication of the effect of the sun normalization procedure.

The extra significant figures in the data tables are given to accommodate computer printout procedures. Relative precision of measurement is governed principally by environmental variability and varies from station to station. Under calm, steady conditions the relative precision is plus or minus one or two percent. Under variable conditions, even after normalization, errors may be as large as a factor of two. The number of significant figures was carried to allow calculation of other optical properties without introducing round-off errors. Judgment must thus be exercised in assigning the number of significant figures to further computations.

The total quanta (number of photons/(cm^2 sec)) and the total power ($\mu watt/cm^2$) have been obtained by integrating the spectral irradiance curves from 350 to 750 nm. The data are presented either as absolute values or as relative values normalized to the maximum solar irradiance for the day under consideration. The diffuse attenuation coefficients for irradiance (both for quanta and energy) are also given in the table. Again, more figures are given than are significant.

In the tables of data, the wavelength 596 nm appears twice. This is because a minus-blue filter is introduced to eliminate overlapping spectral orders. The spectral transmittance of this filter is taken into account during the calibration procedure.

REFERENCES

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Tyler, J. E. and R. C. Smith. 1966. Submersible spectroradiometer. J. Opt. Soc. Am. 56: 1390-1396.

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Table I

SCRIPPS SPECTRORADIOMETER

CALIBRATIONS RELATING TO DISCOVERER CRUISE

LAMP I (TABULATED IN VOLTS)

λ (nm)	March	May	% Change from Mar.	Nov.	% Change from Mar.
357	.0185	.0147	20.5	.0149	19.5
362	.0341	.0333	2.3	.0304	10.9
367	.0597	.051	14.6	.0429	28.1
371	.0884	.080	9.5	.0706	20.1
376	.1275	.1157	9.3	.1017	20.2
381	.1727	.1597	7.5	.1392	19.4
386	.2379	.223	6.3	.1944	18.3
391	.3255	.303	6.9	.2691	17.3
396	.4309	.4073	5.5	.3645	15.4
401	.5581	.531	4.9	.4797	14.0
406	.6644	.634	4.6	.5710	14.1
411	.8016	.768	4.2	.6936	13.5
416	.9536	.918	3.7	.8290	13.1
420	1.135	1.094	3.5	.992	12.6
425	1.331	1.291	3.0	1.168	12.2
430	1.550	1.505	2.9	1.363	12.1
435	1.773	1.724	2.8	1.563	11.8
440	1.997	1.952	2.3	1.769	11.4
445	2.229	2.182	2.1	1.977	11.3
450	2.473	2.397	3.1	2.190	11.4
455	2.671	2.654	1.0	2.379	10.9
459	2.888	2.838	1.7	2 579	10.7
464	3.107	3.060	1.5	2.772	10.8
469	3.319	3.250	2.1	2.955	10.9
474	3.522	3.446	2.2	3.132	11.1
479	3.725	3.639	2.3	3.318	10.9
484	3.912	3.834	2.0	3.497	10.6
488	4.094	4.001	2.3	3.657	10.7
493	4.264	4.167	2.3	3.804	10.8
498	4.379	4.259	2.7	3.911	10.7
503	4.578	4.430	3.2	4.098	10.5
508	4.700	4.550	3.2	4.220	10.2
513	4.812	4.647	3.4	4.316	10.3

λ (nm)	March	May	% Change from Mar.	Nov.	% Change from Mar.
518	4.899	4.733	3.4	4.392	10.3
523	4.968	4.785	3.7	4.450	10.4
527	4.988	4.831	3.1	4.490	9.9
532	5.055	4.862	3.8	4.525	10.5
537	4.990	4.821	3.4	4.520	9.4
542	5.057	4.852	4.1	4.539	10.2
547	4.966	4.793	3.5	4.486	9.7
552	4.951	4.724	4.6	4.435	10.4
557	4.690	4.499	4.1	4.221	10.0
561	4.777	4.518	5.4	4.246	11.1
566	4.850	4.615	4.8	4.337	10.6
571	4.854	4.615	4.9	4.351	10.4
576	4.759	4.533	4.7	4.282	10.0
581	4.633	4.396	5.1	4.165	10.1
586	4.505	4.232	6.1	4.046	10.2
591	4.315	4.118	4.5	3.896	9.7
596	4.157	3.956	4.8	3.765	9.4
596	2.558	2.385	6.8	2.388	6.6
601	3.080	2.829	8.1	2.659	13.7
605	3.180	2.964	6.8	2.877	9.5
610	3.181	3.013	5.3	2.874	9.6
615	3.151	2.987	5.2	2.858	9.3
620	3.075	2.851	7.3	2.742	10.8
624	2.987	2.789	6.6	2.679	10.3
629	2.901	2.658	8.4	2.563	11.6
634	2.791	2.612	6.4	2.537	9.1
639	2.679	2.433	9.2	2.432	9.2
644	2.487	2.272	8.6	2.195	11.7
649	2.366	2.202	6.9	2.101	11.2
654	2.274	2.133	6.2	1.995	12.3
658	2.174	2.012	7.4	1.886	13.2
663	1.971	1.873	4.9	1.766	10.4
668	1.884	1.803	4.3	1.666	11.6
673	1.792	1.686	5.9	1.561	12.9
678	1.638	1.578	3.7	1.459	10.9
683	1.594	1.447	9.2	1.348	15.4
687	1.455	1.332	8.5	1.254	13.8
692	1.339	1.192	11.0	1.206	9.9
697	1.191	1.142	4.1	1.144	3.9
702	1.067	1.030	3.5	1.045	2.1
707	1.026	.943	8.1	.9543	6.9
712	0.865	.763	11.8	.8574	0.9
716	.8034	.756	5.9	.7688	4.3
721	.6723	.650	3.3	.6796	-1.1
726	.5855	.582	0.6	.5981	-2.2
731	.5721	.504	11.9	.5322	6.9
736	.4583	.451	1.6	.4685	-2.2

Spectral Region	Average % Change Over the Spectral Region	
	May	Nov.
357-401	8.7	18.3
406-450	3.2	12.4
455-498	2.0	10.8
503-547	3.5	10.1
552-596	5.1	9.9
601-644	7.2	10.5
649-692	6.8	12.2
697-736	5.6	3.4
	5.3	10.9

S.C.O.R. DISCOVERER EXPEDITION

MAY 1970

Weather comments (by Ray Smith) taken from spectroradiometer tapes. Comments are listed below by station number and sun time. An asterisk indicates a summary opinion of the weather for that day.

Station 3	Time
*Variable clouds during some data	
High cirrus clouds	1300
Clouds	1328
Approximately uniform high cirrus clouds plus variable low clouds	1343

Station 4	Time
Variable clouds	1232
Cloud - more clouds	1255
Sun on bow of ship	1322

Station 6	Time
*Constantly changing cloud cover not good spectral irradiance data, strong current, large wire angle, highly variable clouds, rough sea	1256

Station 8	Time
*Fog and variable skies all day	
6-foot swells, fog and variable skies	1250
Oil on water surface (broken hydrolic line to winch)	1344

Station 9	Time
*Variable high fog all day	
Heavy diffuse overcase	1555

Station 10	Time
*Variable fog and haze all day large wire angle, much swell, much up and down with spectroradiometer	1240
Rough seas, spectroradiometer much up and down	1404

Station 11	Time
*Very bad conditions, full sun to dark clouds, intermittent strong wind, large wire angle, 2-meter swell	

Station 12	Time
*2-meter swell, large wire angle variation in depth, mostly sunny with some scattered clouds increasing in afternoon	
Large swells, depth much up and down	1255

Station 13	Time
*Clear sunny skies, changed to intermittent clouds, to heavy overcast	
Clear sunny skies	1225
Cloud?	1237
Clouds	1243
Thin haze forming	1248
Clouds and fog	1250
Clouds thicker	1302
Sky completely overcast	1345
Back to fog	1350
Complete overcast	1415

Station 14	Time
*Fog and haze with intermittent clearing, high fog and haze, intermittent sun	1225
Fog and haze, intermittent sun	1232

Station 15	Time
*Cloudy skies with a few experiments run under clear skies	
High clouds and haze, variable	1243
Wait for sun, cloud, sun down 1/3	1414

Station 16	Time
*Clear sunny skies then thin high haze	
Cloud	1232
High thin haze	1350
Thin high haze	1440
Clouds	1510

Station 17	Time
*Scattered clouds to complete overcast during most of runs	
Hazed clouds	1250

Station 18	Time
*Clear sunny skies	
Clear sunny skies	1232
Good sun	1245
High haze	1252
Thin high haze, some variability	1302
Sun off bow, spectroradiometer in shadow of ship, must turn ship	1345

Station 19	Time
*Clear sunny skies, calm sea	
Very thin high haze, clouds on horizon	1038
All else clear, calm seas	

Station 21	Time
*Variable skies at first--clear skies with some scattered clouds, later	
Sunny skies with clouds	1045
Cloud	1048
Sun back	1050
Bad sun	1052
1-2m swell	1100
Good sun since 1103	1120
Clear skies	1130
Cloud	1212
Thin high haze	1228
Cloud	1229
Cloud gone	1230
Good sky since 1241	1245
Clouds when recording at 400 nanometers	1257
Unsteady sun	1303
Steady sun	1328
Clouds	1417

Station 22	Time
Sun bad	1235
Sun down	1242
Thin high clouds	1247
Sun steady so far	1305
Sun down to 1/4	1310
Clouds over sun	1340

Station 23	Time
*Mostly clear skies--some scattered clouds	
Scattered clouds passing in front of sun	0912

Station 23 (cont.)	Time
Cloud	0915
Cloud	0927
Clear skies	1035
Unsteady sun	1055
Good skies again	1056
Cloud	1125
Cloud	1139

SCOR
DISCOVERER EXPEDITION MAY,JUNE 1970

TOTAL QUANTA IS IN (PHOTONS/CM**2-SEC)
TOTAL POWER IS IN (MICROWATTS/CM**2)

STATION NUMBER	DEPTH (METERS)	TOTAL QUANTA	TOTAL POWER	FLUX FLOW	TIME START-END	QUANTA K(Q)	POWER K(P)
1	0.0	1.428E 17	5.310E 04	DOWN	1100-1115		
	0.0	1.488E 17	5.513E 04	DOWN	1115-1128	0.0910	0.0797
	10.7	5.621E 16	2.350E 04	DOWN	1311-1330	0.0480	0.0467
	30.0	2.226E 16	9.537E 03	DOWN	1334-1347	0.0517	0.0517
	59.6	4.825E 15	2.063E 03	DOWN	1357-1408	0.0511	0.0511
	89.1	1.070E 15	4.566E 02	DOWN	1417-1430		
2	9.2	5.659E 16	2.394E 04	DOWN	1235-1251	0.0239	0.0228
	19.0	4.475E 16	1.915E 04	DOWN	1254-1310	0.0437	0.0423
	28.1	3.007E 16	1.303E 04	DOWN	1312-1326	0.0511	0.0510
	56.3	7.114E 15	3.093E 03	DOWN	1332-1345	0.0517	0.0520
	87.0	1.454E 15	6.261E 02	DOWN	1351-1407		
3	85.4	1.767E 15	7.595E 02	DOWN	1258-1310	0.0482	0.0485
	57.4	6.824E 15	2.953E 03	DOWN	1312-1324	0.0346	0.0344
	28.9	1.829E 16	7.872E 03	DOWN	1326-1343		
4	81.2	2.108E 15	9.019E 02	DOWN	1209-1221	0.0514	0.0516
	54.9	8.156E 15	3.508E 03	DOWN	1225-1240	0.0431	0.0429
	29.2	2.466E 16	1.056E 04	DOWN	1245-1301	0.0368	0.0357
	19.4	3.536E 16	1.499E 04	DOWN	1304-1318	0.0488	0.0473
	9.9	5.620E 16	2.350E 04	DOWN	1322-1346		
	9.9	5.401E 16	2.240E 04	DOWN	1335-1350		
8	72.3	1.861E 14	7.540E 01	DOWN	1240-1250	0.0607	0.0601
	61.7	3.541E 14	1.426E 02	DOWN	1252-1307	0.0641	0.0642
	45.6	9.933E 14	4.007E 02	DOWN	1309-1325	0.0922	0.0918
	30.1	4.150E 15	1.663E 03	DOWN	1327-1344	0.0988	0.0997
	11.1	2.710E 16	1.106E 04	DOWN	1345-1405	0.1323	0.1252
	0.0	1.177E 17	4.437E 04	DOWN	1443-1500		

SCOR
DISCOVERER EXPEDITION MAY,JUNE 1970

TOTAL QUANTA IS IN (PHOTONS/CM**2-SEC)
TOTAL POWER IS IN (MICROWATTS/CM**2)

STATION NUMBER	DEPTH (METERS)	TOTAL QUANTA	TOTAL POWER	FLUX FLOW	TIME START-END	QUANTA K(Q)	POWER K(P)
9	77.0	6.934E 13	2.775E 01	DOWN	1232-1247	0.0362	0.0358
	62.3	1.161E 14	4.695E 01	DOWN	1250-1303	0.0634	0.0629
	46.1	3.296E 14	1.300E 02	DOWN	1305-1320	0.1400	0.1412
	29.1	3.564E 15	1.435E 03	DOWN	1322-1338	0.1301	0.1317
	20.1	1.149E 16	4.694E 03	DOWN	1340-1400	0.0956	0.0957
	10.5	2.879E 16	1.176E 04	DOWN	1401-1413		
10	6.1	3.242E 16	1.331E 04	DOWN	1240-1302	0.0799	0.0779
	15.6	1.518E 16	6.352E 03	DOWN	1305-1325	0.0633	0.0629
	29.2	6.417E 15	2.701E 03	DOWN	1328-1345	0.0678	0.0675
	45.1	2.165E 15	9.229E 02	DOWN	1347-1404	0.0761	0.0770
	61.8	6.129E 14	2.551E 02	DOWN	1408-1423		
11	27.2	1.464E 16	6.220E 03	DOWN	1308-1320	0.0758	0.0743
	18.7	2.790E 16	1.170E 04	DOWN	1322-1333	0.0730	0.0715
	9.6	5.420E 16	2.245E 04	DOWN	1335-1347		
12	62.6	9.724E 14	3.989E 02	DOWN	1259-1310	0.0824	0.0832
	49.3	2.911E 15	1.207E 03	DOWN	1312-1330	0.0763	0.0768
	35.0	8.276E 15	3.453E 03	DOWN	1333-1350	0.0565	0.0560
	28.0	1.271E 16	5.286E 03	DOWN	1352-1405	0.0694	0.0692
	18.9	2.390E 16	9.922E 03	DOWN	1405-1417	0.0633	0.0623
	9.8	4.251E 16	1.750E 04	DOWN	1418-1430		
13	84.6	1.807E 14	7.391E 01	DOWN	1223-1234	0.0415	0.0412
	68.5	3.525E 14	1.435E 02	DOWN	1237-1248	0.0439	0.0439
	54.1	6.632E 14	2.699E 02	DOWN	1250-1302	0.0729	0.0724
	38.2	2.115E 15	8.534E 02	DOWN	1305-1320	0.0632	0.0650
	28.9	3.807E 15	1.561E 03	DOWN	1325-1344	0.1100	0.1109
	19.6	1.059E 16	4.340E 03	DOWN	1345-1405	0.0953	0.0945
	10.5	2.570E 16	1.055E 04	DOWN	1415-1435		

SCOR
DISCOVERER EXPEDITION MAY,JUNE 1970

TOTAL QUANTA IS IN (PHOTONS/CM**2-SEC)
TOTAL POWER IS IN (MICROWATTS/CM**2)

STATION NUMBER	DEPTH (METERS)	TOTAL QUANTA	TOTAL POWER	FLUX FLOW	TIME START-END	QUANTA K(Q)	POWER K(P)
14	77.6	8.020E 13	3.228E 01	DOWN	1233-1245	0.0717	0.0716
	58.2	3.222E 14	1.295E 02	DOWN	1249-1302	0.0949	0.0950
	36.8	2.454E 15	9.900E 02	DOWN	1305-1326	0.1120	0.1145
	27.9	6.648E 15	2.742E 03	DOWN	1330-1347	0.0997	0.0986
	19.9	1.476E 16	6.035E 03	DOWN	1348-1410	0.0947	0.0946
	10.6	3.558E 16	1.455E 04	DOWN	1412-1433		
15	61.3	6.474E 14	2.616E 02	DOWN	1243-1255	0.0837	0.0849
	48.3	1.922E 15	7.886E 02	DOWN	1258-1310	0.0962	0.0979
	34.6	7.184E 15	3.017E 03	DOWN	1312-1325	0.1144	0.1143
	27.4	1.637E 16	6.871E 03	DOWN	1330-1342	0.0599	0.0596
	19.2	2.675E 16	1.121E 04	DOWN	1343-1357	0.0687	0.0675
	10.2	4.966E 16	2.058E 04	DOWN	1358-1410		
16	90.6	3.639E 13	1.463E 01	DOWN	1237-1250	0.0523	0.0520
	70.5	1.041E 14	4.157E 01	DOWN	1300-1318	0.0666	0.0661
	51.3	3.739E 14	1.480E 02	DOWN	1320-1332	0.0907	0.0907
	31.1	2.335E 15	9.251E 02	DOWN	1335-1350	0.1126	0.1138
	21.2	7.118E 15	2.854E 03	DOWN	1352-1405	0.1262	0.1274
	11.1	2.547E 16	1.033E 04	DOWN	1407-1442		
18	66.1	6.361E 15	2.772E 03	DOWN	1245-1258	0.0366	0.0365
	50.2	1.141E 16	4.951E 03	DOWN	1300-1314	0.0365	0.0362
	37.7	1.801E 16	7.786E 03	DOWN	1315-1329	-.0099	-.0095
	29.8	1.066E 16	7.224E 03	DOWN	1330-1345		
19	5.2	7.073E 16	2.870E 04	DOWN	1022-1038	0.0407	0.0358
	9.9	5.841E 16	2.426E 04	DOWN	1040-1055	0.0477	0.0457
	14.8	4.623E 16	1.939E 04	DOWN	1057-1111	0.0444	0.0435
	29.6	2.396E 16	1.018E 04	DOWN	1113-1129	0.0398	0.0395

SCOR
DISCOVERER EXPEDITION MAY,JUNE 1970

TOTAL QUANTA IS IN (PHOTONS/CM**2-SEC)
TOTAL POWER IS IN (MICROWATTS/CM**2)

STATION NUMBER	DEPTH (METERS)	TOTAL QUANTA	TOTAL POWER	FLUX FLOW	TIME START-END	QUANTA K(Q)	POWER K(P)
	59.5	7.292E 15	3.128E 03	DOWN	1132-1146	0.0407	0.0408
	88.9	2.202E 15	9.436E 02	DOWN	1153-1207		
	88.9	2.166E 15	9.282E 02	DOWN	1202-1215		
	5.2	1.785E 15	7.829E 02	UP	1247-1303	0.0351	0.0351
	10.3	1.493E 15	6.545E 02	UP	1305-1320	0.0419	0.0422
	19.7	1.007E 15	4.404E 02	UP	1322-1335	0.0379	0.0379
	39.4	4.777E 14	2.086E 02	UP	1337-1348	0.0441	0.0443
	59.3	1.984E 14	8.642E 01	UP	1351-1405		
21	10.1	5.901E 16	2.477E 04	DOWN	1042-1057	0.0395	0.0376
	19.5	4.069E 16	1.740E 04	DOWN	1059-1117	0.0189	0.0174
	28.1	3.459E 16	1.498E 04	DOWN	1120-1135	0.0304	0.0301
	78.6	7.450E 15	3.274E 03	DOWN	1142-1156		
	78.6	7.562E 15	3.314E 03	DOWN	1153-1206	0.0336	0.0337
	61.2	1.357E 16	5.955E 03	DOWN	1208-1225	0.0280	0.0278
	41.8	2.338E 16	1.021E 04	DOWN	1228-1247	0.0274	0.0267
	23.9	3.821E 16	1.646E 04	DOWN	1249-1305		
	77.6	2.779E 14	1.237E 02	UP	1328-1343		
	77.6	2.734E 14	1.214E 02	UP	1341-1400	0.0358	0.0361
	61.1	4.931E 14	2.200E 02	UP	1404-1417		
	10.1	6.037E 16	2.542E 04	DOWN	1042-1057	0.0405	0.0383
	19.5	4.126E 16	1.773E 04	DOWN	1059-1117	0.0207	0.0197
	28.1	3.453E 16	1.497E 04	DOWN	1120-1135	0.0303	0.0301
	78.6	7.472E 15	3.277E 03	DOWN	1142-1206	0.0333	0.0334
	61.2	1.335E 16	5.856E 03	DOWN	1208-1225	0.0289	0.0287
	41.8	2.337E 16	1.021E 04	DOWN	1228-1247	0.0271	0.0264
	23.9	3.796E 16	1.637E 04	DOWN	1249-1305		

SCOR
DISCOVERER EXPEDITION MAY,JUNE 1970

TOTAL QUANTA IS IN (PHOTONS/CM**2-SEC)
TOTAL POWER IS IN (MICROWATTS/CM**2)

STATION NUMBER	DEPTH (METERS)	TOTAL QUANTA	TOTAL POWER	FLUX FLOW	TIME START-END	QUANTA K(Q)	POWER K(P)
	77.6	2.826E 14	1.257E 02	UP	1328-1400	0.0314	0.0316
	61.1	4.743E 14	2.116E 02	UP	1404-1417		
22	30.6	3.704E 16	1.607E 04	DOWN	1232-1300	0.0332	0.0316
	10.1	7.310E 16	3.071E 04	DOWN	1303-1320	0.0408	0.0397
	47.0	1.621E 16	7.107E 03	DOWN	1340-1410		
23	10.8	3.526E 16	1.489E 04	DOWN	904- 921	0.0335	0.0319
	28.8	1.931E 16	8.385E 03	DOWN	925- 939	0.0262	0.0258
	48.3	1.158E 16	5.068E 03	DOWN	943- 956	0.0349	0.0355
	55.3	9.068E 15	3.953E 03	DOWN	1000-1015	0.0400	0.0396
	20.3	3.677E 16	1.579E 04	DOWN	1035-1049	0.0313	0.0307
	48.4	1.527E 16	6.666E 03	DOWN	1053-1105	0.0351	0.0353
	70.8	6.954E 15	3.024E 03	DOWN	1125-1143		
	70.8	6.958E 15	3.023E 03	DOWN	1137-1152		

DISCOVERER MAY 4,1970 0.0 METERS DOWNWELLING SURFACE 20,53,12N 84,13,30W STATION 1 TIME 1100

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357	0.4179E 02	455	0.2047E 03	552	0.1769E 03	644	0.1554E 03
362	0.6039E 02	459	0.2051E 03	557	0.1739E 03	649	0.1426E 03
367	0.7150E 02	464	0.2014E 03	561	0.1726E 03	654	0.1414E 03
371	0.8051E 02	469	0.1998E 03	566	0.1720E 03	658	0.1480E 03
376	0.8006E 02	474	0.2043E 03	571	0.1711E 03	663	0.1540E 03
381	0.7965E 02	479	0.2054E 03	576	0.1687E 03	668	0.1444E 03
386	0.7526E 02	484	0.1907E 03	581	0.1719E 03	673	0.1425E 03
391	0.8605E 02	488	0.1933E 03	586	0.1641E 03	678	0.1395E 03
396	0.8973E 02	493	0.1959E 03	591	0.1620E 03	683	0.1245E 03
401	0.1489E 03	498	0.1724E 03	0.1894E 03	596	0.1598E 03	687	0.1216E 03
406	0.1565E 03	503	0.1756E 03	0.1925E 03	596	0.1623E 03	692	0.1237E 03
411	0.1736E 03	508	0.1747E 03	0.1917E 03	601	0.1663E 03	697	0.1243E 03
416	0.1728E 03	513	0.1670E 03	0.1788E 03	605	0.1637E 03	702	0.1301E 03
420	0.1721E 03	518	0.1697E 03	0.1812E 03	610	0.1611E 03	707	0.1274E 03
425	0.1675E 03	523	0.1719E 03		615		712	0.1423E 03
430	0.1559E 03	527	0.1711E 03		620	0.1573E 03	716	0.1020E 03
435	0.1793E 03	532	0.1759E 03		624	0.1587E 03	721	0.1003E 03
440	0.1814E 03	537	0.1707E 03		629	0.1563E 03	726	0.1018E 03
445	0.1952E 03	542	0.1742E 03		634	0.1611E 03	731	0.1093E 03
450	0.2039E 03	547	0.1757E 03		639	0.1579E 03	736	0.1165E 03

DISCOVERER MAY 4,1970 0.0 METERS DOWNWELLING SURFACE 20,53,12N 84,13,30W STATION 1 TIME 1115

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357	0.4132E 02	455		0.2044E 03	552	0.1901E 03	644	0.1654E 03
362	0.6088E 02	459		0.2067E 03	557	0.1865E 03	649	0.1502E 03
367	0.7291E 02	464		0.2031E 03	561	0.1842E 03	654	0.1485E 03
371	0.8009E 02	469		0.2010E 03	566	0.1813E 03	658	0.1559E 03
376	0.8073E 02	474		0.2065E 03	571	0.1816E 03	663	0.1621E 03
381	0.8113E 02	479		0.2067E 03	576	0.1793E 03	668	0.1511E 03
386	0.8131E 02	484		0.1908E 03	581	0.1834E 03	673	0.1501E 03
391	0.8750E 02	488		0.1938E 03	586	0.1739E 03	678	0.1477E 03
396	0.9163E 02	493		0.1968E 03	591	0.1717E 03	683	0.1363E 03
401	0.1520E 03	498		0.1901E 03	596	0.1671E 03	687	0.1281E 03
406	0.1550E 03	503		0.1925E 03	596	0.1697E 03	692	0.1312E 03
411	0.1682E 03	508		0.1914E 03	601	0.1757E 03	697	0.1315E 03
416	0.1767E 03	513		0.1779E 03	605	0.1730E 03	702	0.1330E 03
420	0.1761E 03	518		0.1803E 03	610	0.1704E 03	707	0.1351E 03
425	0.1669E 03	523	0.1887E 03	0.1874E 03	615		712	0.1505E 03
430	0.1491E 03	527	0.1903E 03	0.1895E 03	620	0.1646E 03	716	0.1002E 03
435	0.1741E 03	532	0.1913E 03	0.1896E 03	624	0.1683E 03	721	0.1069E 03
440	0.1842E 03	537	0.1846E 03	0.1852E 03	629	0.1654E 03	726	0.1080E 03
445	0.1968E 03	542	0.1878E 03	0.1865E 03	634	0.1704E 03	731	0.1147E 03
450	0.2064E 03	547	0.1887E 03	0.1878E 03	639	0.1666E 03	736	0.1220E 03

DISCOVERER MAY 4,1970 10.70 METERS DOWNWELLING 20,53,12N 84,13,30W STATION 1 TIME 1311

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1441E 03	0.1517E 03	552			644	0.3037E 01	
362		0.4519E 02	459	0.1501E 03	0.1534E 03	557	0.8200E 02		649		
367			464	0.1527E 03	0.1518E 03	561			654	0.2095E 01	
371		0.6624E 02	469	0.1506E 03	0.1439E 03	566	0.7790E 02		658		
376			474	0.1478E 03	0.1440E 03	571			663	0.1224E 01	
381		0.6535E 02	479	0.1552E 03	0.1524E 03	576	0.5032E 02		668		
386		0.6057E 02	484	0.1320E 03	0.1396E 03	581			673	0.9499E 00	
391		0.8457E 02	488	0.1388E 03	0.1395E 03	586	0.3248E 02		678		
396			493	0.1386E 03	0.1268E 03	591			683	0.5928E 00	
401		0.1133E 03	498	0.1325E 03	0.1234E 03	596	0.1187E 02		687		
406			503			596	0.1172E 02		692	0.2732E 00	
411		0.1257E 03	508	0.1039E 03		601			697		
416			513			605	0.5822E 01		702	0.6864E-01	
420		0.1180E 03	518	0.1022E 03		610			707		
425			523			615	0.5401E 01		712	0.5403E-02	
430		0.1078E 03	527	0.9850E 02		620			716		
435			532			624	0.5148E 01		721		
440		0.1347E 03	537	0.9231E 02		629			726		
445			542			634	0.4468E 01		731		
450	0.1453E 03	0.1464E 03	547	0.8523E 02		639			736		

DISCOVERER MAY 4,1970 30.00 METERS DOWNWELLING 20,53,12N 84,13,30W STATION 1 TIME 1334

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.7425E 02		552			644	0.6862E-02	
362		0.1121E 02	459	0.7418E 02	0.7884E 02	557	0.1661E 02		649		
367			464	0.7804E 02		561			654	0.2273E-02	
371		0.2000E 02	469	0.7685E 02	0.8012E 02	566	0.1249E 02		658		
376			474	0.7763E 02		571			663	0.1066E-02	
381		0.2487E 02	479	0.7808E 02	0.8216E 02	576	0.7338E 01		668		
386			484	0.7265E 02		581			673		
391		0.2926E 02	488	0.7072E 02	0.7220E 02	586	0.1735E 01		678		
396			493	0.6759E 02		591			683		
401		0.5099E 02	498	0.5933E 02	0.6068E 02	596	0.1519E 00		687		
406			503			596	0.1379E 00		692		
411		0.5894E 02	508	0.4089E 02		601			697		
416			513			605	0.2948E-01		702		
420		0.6178E 02	518	0.3049E 02		610			707		
425			523			615	0.2508E-01		712		
430		0.5476E 02	527	0.3035E 02		620			716		
435			532			624	0.1886E-01		721		
440		0.6928E 02	537	0.2507E 02		629			726		
445			542			634	0.1558E-01		731		
450	0.7240E 02	0.7707E 02	547	0.2081E 02		639			736		

DISCOVERER MAY 4,1970 59.60 METERS DOWNWELLING 20,53,12N 84,13,30W STATION 1 TIME 1357

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.2034E 02		552		644
362		0.5205E 00	459	0.2211E 02	0.2084E 02	557	0.1367E 01	649
367			464	0.2261E 02		561		654
371		0.1370E 01	469	0.2295E 02	0.2189E 02	566	0.8616E 00	658
376			474	0.2377E 02		571		663
381		0.2301E 01	479	0.2380E 02	0.2296E 02	576	0.2953E 00	668
386			484	0.2178E 02		581		673
391		0.3657E 01	488	0.2124E 02	0.2048E 02	586	0.4070E-01	678
396			493	0.1970E 02		591		683
401		0.8542E 01	498	0.1594E 02	0.1509E 02	596	0.6119E-02	687
406			503			596	0.1256E-01	692
411		0.1094E 02	508	0.7465E 01		601		697
416			513			605	0.1929E-02	702
420		0.1277E 02	518	0.4734E 01		610		707
425			523			615		712
430		0.1284E 02	527	0.4400E 01		620		716
435			532			624		721
440		0.1691E 02	537	0.3087E 01		629		726
445			542			634		731
450	0.1988F 02	0.1875E 02	547	0.1972E 01		639		736

DISCOVERER MAY 4,1970 89.10 METERS DOWNWELLING 20,53,12N 84,13,30W STATION 1 TIME 1417

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.5112E 01	0.4602E 01	552		644
362		0.3122E-01	459	0.5725E 01	0.5092E 01	557	0.1104E 00	649
367			464	0.6188E 01	0.5512E 01	561		654
371		0.1257E 00	469	0.6424E 01	0.5867E 01	566	0.5829E-01	658
376			474	0.6635E 01	0.6215E 01	571		663
381		0.2827E 00	479	0.6737E 01	0.6204E 01	576	0.1311E-01	668
386			484	0.6226E 01	0.5735E 01	581		673
391		0.5437E 00	488	0.5941E 01	0.5402E 01	586		678
396			493	0.5254E 01	0.4747E 01	591		683
401		0.1403E 01	498	0.3892E 01	0.3516E 01	596		687
406			503			596		692
411		0.1896E 01	508	0.1328E 01	0.1389E 01	601		697
416			513			605		702
420		0.2419E 01	518	0.6380E 00	0.5951E 00	610		707
425			523			615		712
430		0.2690E 01	527	0.5764E 00	0.5476E 00	620		716
435			532			624		721
440		0.3692E 01	537	0.3609E 00	0.3524E 00	629		726
445			542			634		731
450	0.4800E 01	0.4145E 01	547	0.1899E 00		639		736

DISCOVERER MAY 5,1970 9.20 METERS DOWNWELLING 18,16.6N 81,23.5W STATION 2 TIME 1235

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1248E 03		552			644	0.5783E 01	
362		0.6548E 02	459	0.1225E 03	0.1633E 03	557	0.6015E 02		649		
367			464	0.1191E 03		561			654	0.3656E 01	
371		0.8653E 02	469	0.1293E 03	0.1634E 03	566	0.6389E 02		658		
376			474	0.1224E 03		571			663	0.2604E 01	
381		0.8300E 02	479	0.1209E 03	0.1565E 03	576	0.5417E 02		668		
386			484	0.1144E 03		581			673	0.1825E 01	
391		0.8688E 02	488	0.1137E 03	0.1461E 03	586	0.3804E 02		678		
396			493	0.1080E 03		591			683	0.1025E 01	
401		0.1328E 03	498	0.9444E 02	0.1400E 03	596	0.1585E 02		687		
406			503			596	0.1610E 02		692	0.6461E 00	
411		0.1431E 03	508	0.1030E 03		601			697		
416			513			605	0.8519E 01		702	0.1788E 00	
420		0.1406E 03	518	0.9282E 02		610			707		
425			523			615	0.7715E 01		712	0.1283E-01	
430		0.1280E 03	527	0.9486E 02		620			716		
435			532			624	0.6907E 01		721		
440		0.1586E 03	537	0.8017E 02		629			726		
445			542			634	0.7503E 01		731		
450	0.1363E 03	0.1748E 03	547	0.6684E 02		639			736		

DISCOVERER MAY 5,1970 19.00 METERS DOWNWELLING 18,16.6N 81,23.5W STATION 2 TIME 1254

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1284E 03		552			644	0.2587E 00	
362		0.4102E 02	459	0.1312E 03	0.1407E 03	557	0.4538E 02		649		
367			464	0.1302E 03		561			654	0.1355E 00	
371		0.6203E 02	469	0.1255E 03	0.1399E 03	566	0.3874E 02		658		
376			474	0.1387E 03		571			663	0.4478E-01	
381		0.6396E 02	479	0.1310E 03	0.1391E 03	576	0.2659E 02		668		
386			484	0.1304E 03		581			673	0.3529E-01	
391		0.6670E 02	488	0.1174E 03	0.1224E 03	586	0.9949E 01		678		
396			493	0.1146E 03		591			683	0.1569E-01	
401		0.1066E 03	498	0.1097E 03	0.1073E 03	596	0.1908E 01		687		
406			503			596	0.1859E 01		692		
411		0.1104E 03	508	0.8476E 02		601			697		
416			513			605	0.6198E 00		702		
420		0.1149E 03	518	0.6633E 02		610			707		
425			523			615	0.5140E 00		712		
430		0.1031E 03	527	0.6726E 02		620			716		
435			532			624	0.4112E 00		721		
440		0.1310E 03	537	0.5946E 02		629			726		
445			542			634	0.3464E 00		731		
450	0.1318E 03	0.1389E 03	547	0.4910E 02		639			736		

DISCOVERER MAY 5,1970 28.10 METERS DOWNWELLING 18,16.6N 81,23.5W STATION 2 TIME 1312

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1032E 03		552			644	0.1251E-01	
362		0.2585E 02	459	0.1042E 03	0.9738E 02	557	0.2062E 02		649		
367			464	0.1011E 03		561			654		
371		0.4166E 02	469	0.1019E 03	0.9794E 02	566	0.1366E 02		658		
376			474	0.1015E 03		571			663		
381		0.4365E 02	479	0.1013E 03	0.1056E 03	576	0.9204E 01		668		
386			484	0.9255E 02		581			673		
391		0.4884E 02	488	0.8974E 02	0.8517E 02	586	0.2607E 01		678		
396			493	0.8663E 02		591			683		
401		0.7790E 02	498	0.7508E 02	0.7312E 02	596	0.2213E 00		687		
406			503			596	0.2136E 00		692		
411		0.8407E 02	508	0.5210E 02		601			697		
416			513			605	0.5704E-01		702		
420		0.8854E 02	518	0.3970E 02		610			707		
425			523			615	0.4410E-01		712		
430		0.7424E 02	527	0.3447E 02		620			716		
435			532			624	0.3143E-01		721		
440		0.9069E 02	537	0.3054E 02		629			726		
445			542			634	0.2408E-01		731		
450	0.1030E 03	0.9728E 02	547	0.2519E 02		639			736		

DISCOVERER MAY 5,1970 56.30 METERS DOWNWELLING 18,16.6N 81,23.5W STATION 2 TIME 1332

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.2620E 02		552		644
362		0.3664E 01	459	0.2893E 02	0.2549E 02	557	0.2783E 01	649
367			464	0.2948E 02		561		654
371		0.5526E 01	469	0.2998E 02	0.2529E 02	566	0.1829E 01	658
376			474	0.3093E 02		571		663
381		0.8114E 01	479	0.3196E 02	0.2490E 02	576	0.1183F 01	668
386			484	0.2852E 02		581		673
391		0.1075E 02	488	0.2750E 02	0.2116E 02	586	0.4842E 00	678
396			493	0.2515E 02		591	0.5242E-01	683
401		0.1773E 02	498	0.1999E 02	0.1589F 02	596	0.5507E-02	687
406			503	0.1023E 02		596	0.5086E-02	692
411		0.2174E 02	508	0.6360E 01		601		697
416			513			605		702
420		0.2279E 02	518	0.6282E 01		610		707
425			523			615		712
430		0.2055E 02	527	0.5844E 01		620		716
435			532			624		721
440		0.2461E 02	537	0.5020E 01		629		726
445			542			634		731
450	0.2767E 02	0.2485E 02	547	0.4363E 01		639		736

DISCOVERER MAY 5,1970 87.00 METERS DOWNWELLING 18,16.6N 81,23.5W STATION 2 TIME 1351

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.5969E 01		552		644
362		0.1832E 00	459	0.6634E 01	0.7038E 01	557	0.1632E 00	649
367			464	0.7208E 01		561		654
371		0.5011E 00	469	0.7559E 01	0.8072E 01	566	0.8584E-01	658
376			474	0.7809E 01		571		663
381		0.8044E 00	479	0.7921E 01	0.8567E 01	576	0.2719E-01	668
386			484	0.7170E 01		581		673
391		0.1287E 01	488	0.6907E 01		586	0.4522E-02	678
396			493	0.6117E 01		591		683
401		0.2759E 01	498	0.4617E 01		596		687
406			503			596		692
411		0.3378E 01	508	0.1610E 01		601		697
416			513			605		702
420		0.3902E 01	518	0.8601E 00		610		707
425			523			615		712
430		0.3870E 01	527	0.8076E 00		620		716
435			532			624		721
440		0.5145E 01	537	0.5237E 00		629		726
445			542			634		731
450	0.6519E 01	0.5661E 01	547	0.2712E 00		639		736

DISCOVERER MAY 6,1970 85.40 METERS DOWNWELLING 16,17N 78,47W STATION 3 TIME 1258

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.7185E 01		552		644
362		0.2435E 00	459	0.7945E 01	0.7520E 01	557	0.2387E 00	649
367			464	0.8686E 01		561		654
371		0.6913E 00	469	0.9036E 01	0.8632E 01	566	0.1366E 00	658
376			474	0.9388E 01		571		663
381		0.1104E 01	479	0.9486E 01	0.9178E 01	576	0.4128E-01	668
386			484	0.8588E 01		581		673
391		0.1721E 01	488	0.8193E 01	0.8118E 01	586	0.5788E-02	678
396			493	0.7280E 01		591		683
401		0.3574E 01	498	0.5726E 01	0.8703E 01	596		687
406			503			596		692
411		0.4161E 01	508	0.2566E 01		601		697
416			513			605		702
420		0.4597E 01	518	0.1190E 01		610		707
425			523			615		712
430		0.4494E 01	527	0.1093E 01		620		716
435			532			624		721
440		0.5594E 01	537	0.7286E 00		629		726
445			542			634		731
450	0.6616E 01	0.6064E 01	547	0.3936E 00		639		736

DISCOVERER MAY 6,1970 57.40 METERS DOWNWELLING 16,17N . 78,47W STATION 3 TIME 1312

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.2615E 02		552		644
362		0.2602E 01	459	0.2784E 02	0.2399E 02	557	0.2175E 01	649
367			464	0.2898E 02		561		654
371		0.5128E 01	469	0.3040E 02	0.2512E 02	566	0.1403E 01	658
376			474	0.3123E 02		571		663
381		0.7102E 01	479	0.3170E 02	0.2562E 02	576	0.5564E 00	668
386			484	0.2856E 02		581		673
391		0.9728E 01	488	0.2708E 02	0.2238E 02	586	0.7308E-01	678
396			493	0.2544E 02		591		683
401		0.1771E 02	498	0.2032E 02	0.1658E 02	596	0.6732E-02	687
406			503			596	0.1136E-01	692
411		0.1901E 02	508	0.1017E 02		601		697
416			513			605	0.2204E-02	702
420		0.2013E 02	518	0.6983E 01		610		707
425			523			615		712
430		0.1744E 02	527	0.6838E 01		620		716
435			532			624		721
440		0.2109E 02	537	0.4980E 01		629		726
445			542			634		731
450	0.2632E 02	0.2221E 02	547	0.3087E 01		639		736

DISCOVERER MAY 6,1970 28.96 METERS DOWNWELLING 16,17N 78,47W STATION 3 TIME 1326

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.6207E 02		552			644	0.7266E-02	
362		0.1372E 02	459	0.6231E 02	0.5895E 02	557	0.1512E 02		649		
367			464	0.6177E 02		561			654	0.3182E-02	
371		0.2187E 02	469	0.5820E 02	0.5768F 02	566	0.1222E 02		658		
376			474	0.6075E 02		571			663		
381		0.2669E 02	479	0.6098E 02	0.5513E 02	576	0.6420E 01		668		
386			484	0.5289E 02		581			673		
391		0.3008E 02	488	0.5115E 02	0.4779E 02	586	0.1859F 01		678		
396			493	0.4731E 02		591			683		
401		0.4588E 02	498	0.4928E 02	0.4378E 02	596	0.2762E 00		687		
406			503			596	0.2103E 00		692		
411		0.4918E 02	508	0.3502E 02		601			697		
416			513			605	0.2866E-01		702		
420		0.4169E 02	518	0.2838E 02		610			707		
425			523			615	0.1787E-01		712		
430		0.4203E 02	527	0.2656E 02		620			716		
435			532			624	0.9432E-02		721		
440		0.5906E 02	537	0.2029E 02		629			726		
445			542			634	0.8500E-02		731		
450	0.6632E 02	0.6175E 02	547	0.1496E 02		639			736		

DISCOVERER MAY 7, 1970 81.20 METERS DOWNWELLING 13,10.3N 78,58.0W STATION 4 TIME 1209

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.7806E 01		552		644
362		0.2904E 00	459	0.8892E 01	0.9443E 01	557	0.4020E 00	649
367			464	0.9919E 01		561		654
371		0.7815E 00	469	0.1064E 02	0.1085E 02	566	0.2211E 00	658
376			474	0.1110E 02		571		663
381		0.1276E 01	479	0.1145E 02	0.1184E 02	576	0.6637E-01	668
386			484	0.1070E 02		581		673
391		0.1982E 01	488	0.1054E 02	0.1069E 02	586	0.5969E-02	678
396			493	0.9655E 01		591		683
401		0.3896E 01	498	0.7632E 01	0.7468E 01	596		687
406			503			596	0.5086E-02	692
411		0.4754E 01	508	0.3405E 01		601		697
416			513			605		702
420		0.5044E 01	518	0.1776E 01		610		707
425			523			615		712
430		0.4948E 01	527	0.1696E 01		620		716
435			532			624		721
440		0.6370E 01	537	0.1147E 01		629		726
445			542			634		731
450	0.6979E 01	0.7438E 01	547	0.6363E 00		639		736

DISCOVERER MAY 7, 1970 54.90 METERS DOWNWELLING 13,10.3N 78,58.0W STATION 4 TIME 1225

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.3385E 02		552		644
362		0.2554E 01	459	0.3752E 02	0.3124E 02	557	0.2911E 01	649
367			464	0.3756E 02		561		654
371		0.5138E 01	469	0.2654E 02	0.3344E 02	566	0.1875E 01	658
376			474	0.3487E 02		571		663
381		0.7073E 01	479	0.3543E 02	0.3477E 02	576	0.7057E 00	668
386			484	0.3350E 02		581		673
391		0.9464E 01	488	0.3218E 02	0.3083E 02	586	0.8592E-01	678
396			493	0.3015E 02		591		683
401		0.1822E 02	498	0.2517E 02	0.2440E 02	596	0.1448E-01	687
406			503			596	0.1855E-01	692
411		0.2082E 02	508	0.1320E 02		601		697
416			513			605	0.3031E-02	702
420		0.2187E 02	518	0.8959E 01		610		707
425			523			615		712
430		0.2054E 02	527	0.8841E 01		620		716
435			532			624		721
440		0.2600E 02	537	0.6281E 01		629		726
445			542			634		731
450	0.3348E 02	0.2835E 02	547	0.4189E 01		639		736

DISCOVERER MAY 7, 1970 29.20 METERS DOWNWELLING 13,10.3N 78,58.0W STATION 4 TIME 1245

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.8529E 02		552		644
362		0.1724E 02	459	0.8678E 02	0.8323E 02	557	0.1976E 02	649
367			464	0.8791E 02		561		654
371		0.2796E 02	469	0.8874E 02	0.8012E 02	566	0.1630E 02	658
376			474	0.8754E 02		571		663
381		0.3359E 02	479	0.9042E 02	0.8017E 02	576	0.9643E 01	668
386			484	0.8175E 02		581		673
391		0.3929E 02	488	0.8042E 02	0.7138E 02	586	0.2799E 01	678
396			493	0.7836E 02		591		683
401		0.6141E 02	498	0.6821E 02	0.3385E 02	596	0.4208E 00	687
406			503			596	0.3024E 00	692
411		0.4144E 02	508	0.4906E 02		601		697
416			513			605	0.4602E-01	702
420		0.6928E 02	518	0.3669E 02		610		707
425			523			615	0.1845E-01	712
430		0.5011E 02	527	0.3543E 02		620		716
435			532			624	0.1729E-01	721
440		0.7350E 02	537	0.2916E 02		629		726
445			542			634		731
450	0.8471E 02	0.8243E 02	547	0.2435E 02		639		736

DISCOVERER MAY 7, 1970 19.40 METERS DOWNWELLING 13,10.3N 78,58.0W STATION 4 TIME 1304

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1089E 03		552			644	0.1691E 00	
362		0.2773E 02	459	0.1124E 03	0.1045E 03	557	0.4220E 02		649		
367			464	0.1054E 03		561			654	0.8821E-01	
371		0.4122E 02	469	0.1093E 03	0.9767E 02	566	0.3314E 02		658		
376			474	0.1098E 03		571			663	0.3092E-01	
381		0.4545E 02	479	0.1123E 03	0.9871E 02	576	0.2396E 02		668		
386			484	0.1006E 03		581			673		
391		0.4564E 02	488	0.1042E 03	0.8968E 02	586	0.1031E 02		678		
396			493	0.1004E 03		591			683		
401		0.7412E 02	498	0.9560E 02	0.7993E 02	596	0.2511E 01		687		
406			503			596	0.2118E 01		692		
411		0.8518E 02	508	0.7002E 02		601			697		
416			513			605	0.4351E 00		702		
420		0.8399E 02	518	0.5717E 02		610			707		
425			523			615	0.3825E 00		712		
430		0.7603E 02	527	0.5747E 02		620			716		
435			532			624	0.3140E 00		721		
440		0.9212E 02	537	0.5059E 02		629			726		
445			542			634	0.2288E 00		731		
450	0.1138E 03	0.1010E 03	547	0.4489E 02		639			736		

DISCOVERER MAY 7, 1970 9.90 METERS DOWNWELLING 13,10.3N 78,58.0W STATION 4 TIME 1322

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1551E 03		552			644	0.3410E 01	0.3704E 01
362		0.4628E 02	459	0.1529E 03	0.1463E 03	557	0.7509E 02	0.7928E 02	649		
367			464	0.1415E 03		561			654	0.2087E 01	0.2413E 01
371		0.7125E 02	469	0.1486E 03	0.1548E 03	566	0.6837E 02	0.6956E 02	658		
376			474	0.1449E 03		571			663	0.1649E 01	0.1649E 01
381		0.7065E 02	479	0.1500E 03	0.1515E 03	576	0.6042E 02	0.5558E 02	668		
386			484	0.1265E 03		581			673	0.1442E 01	0.1280E 01
391		0.7770E 02	488	0.1342E 03	0.1396E 03	586	0.3189E 02	0.3402E 02	678		
396			493	0.1309E 03		591			683	0.8446E 00	0.7918E 00
401		0.1159E 03	498	0.1376E 03	0.1308E 03	596	0.1327E 02	0.1591E 02	687		
406			503			596	0.1354E 02	0.1300E 02	692	0.3473E 00	0.4477E 00
411		0.1184E 03	508	0.1111E 03	0.1044E 03	601			697		
416			513			605	0.7294E 01	0.6034E 01	702	0.6447E-01	0.1497E 00
420		0.1130E 03	518	0.8762E 02	0.1008E 03	610			707		
425			523			615	0.5990E 01	0.6115E 01	712		
430		0.1036E 03	527	0.9859E 02	0.9969E 02	620			716		
435			532			624	0.4977E 01	0.5370E 01	721		
440		0.1308E 03	537	0.9719E 02	0.9159E 02	629			726		
445			542			634	0.4642E 01	0.4603E 01	731		
450	0.1492E 03	0.1582E 03	547	0.8183E 02	0.9692E 02	639			736		

DISCOVERER MAY 7, 1970 9.90 METERS DOWNWELLING 13,10.3N 78,58.0W STATION 4 TIME 1335

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.3704E	01
362		0.4250E 02	459	0.1463E	03	557	0.7928E	02	649		
367			464			561			654	0.2413E	01
371		0.6242E 02	469	0.1548E	03	566	0.6956E	02	658		
376			474			571			663	0.1649E	01
381		0.6299E 02	479	0.1515E	03	576	0.5558E	02	668		
386			484			581			673	0.1280E	01
391		0.6117E 02	488	0.1396E	03	586	0.3402E	02	678		
396			493			591			683	0.7918E	00
401		0.9364E 02	498	0.1308E	03	596	0.1591E	02	687		
406			503			596	0.1300E	02	692	0.4477E	00
411		0.1000E 03	508	0.1044E	03	601			697		
416			513			605	0.6034E	01	702	0.1497E	00
420		0.1061E 03	518	0.1008E	03	610			707		
425			523			615	0.6115E	01	712		
430		0.8676E 02	527	0.9969E	02	620			716		
435			532			624	0.5370E	01	721		
440		0.1049E 03	537	0.9159E	02	629			726		
445			542			634	0.4603E	01	731		
450	0.1582E 03	0.1259E 03	547	0.9692E	02	639			736		

DISCOVERER MAY 12, 1970 72.30 METERS DOWNWELLING 2,57.9S 84,48.0W STATION 8 TIME 1240

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.6153E 00	557	0.9680E-01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.1500E-02	479	0.1234E 01	576	0.1550E-01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.5800E-02	498	0.1255E 01	596		687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.2980E-01	518	0.3218E 00	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.1842E 00	537	0.2280E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 12, 1970 61.70 METERS DOWNWELLING 2,57.9S 84,48.0W STATION 8 TIME 1252

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.5000E-03	459	0.1023E 01	557	0.3334E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.7000E-02	479	0.2087E 01	576	0.7160E-01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.3520E-01	498	0.2057E 01	596	0.3850E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.9724E-01	518	0.7594E 00	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.4218E 00	537	0.6717E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 12, 1970 45.60 METERS DOWNWELLING 2,57.9S 84,48.0W STATION 8 TIME 1309

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1400E-01	459	0.3206E 01	557	0.1186E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.4730E-01	479	0.4953E 01	576	0.4229F 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.2120E 00	498	0.5060E 01	596	0.2540E-01	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.4868F 00	518	0.2340E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.1486F 01	537	0.1947E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 12, 1970 30.10 METERS DOWNWELLING 2,57.9S 84,48.0W STATION 8 TIME 1327

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1495E 00	459	0.1170E 02	557	0.6299E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.6935E 00	479	0.1624E 02	576	0.2761E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1890E 01	498	0.1721E 02	596	0.6690E-01	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.3148E 01	518	0.1065E 02	610		707	
425		523		615	0.6750E-02	712	
430		527		620		716	
435		532		624		721	
440	0.6547E 01	537	0.9176E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 12, 1970 11.10 METERS DOWNWELLING 2,57.9S 84,48.0W STATION 8 TIME 1345

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1145E 02	459	0.6772E 02	557	0.4483E 02	649	
367		464		561		654	0.6871E 00
371		469		566		658	
376		474		571		663	
381	0.1963E 02	479	0.7367E 02	576	0.3099E 02	668	
386		484		581		673	0.4380E 00
391		488		586		678	
396		493		591		683	
401	0.3949E 02	498	0.7041E 02	596	0.7298E 01	687	
406		503		596		692	0.1250E 00
411		508		601		697	
416		513		605		702	
420	0.4493E 02	518	0.5363E 02	610		707	
425		523		615	0.2818E 01	712	
430		527		620		716	
435		532		624		721	
440	0.5651E 02	537	0.5002E 02	629		726	
445		542		634	0.1766E 01	731	
450		547		639		736	

DISCOVERER MAY 12, 1970 0.00 METERS DOWNWELLING SURFACE 2,57.9S 84,48.0W STATION 8 TIME 1443

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.6851E 02	459	0.1739E 03	557	0.1440E 03	649	
367		464		561		654	0.1081E 03
371		469		566		658	
376		474		571		663	
381	0.8840E 02	479	0.1722E 03	576	0.1376E 03	668	
386		484		581		673	0.1141E 03
391		488		586		678	
396		493		591		683	
401	0.1380E 03	498	0.1547E 03	596	0.1240E 03	687	
406		503		596		692	0.8895E 02
411		508		601		697	
416		513		605		702	
420	0.1447E 03	518	0.1442E 03	610		707	
425		523		615	0.1243E 03	712	0.8268E 02
430		527		620		716	
435		532		624		721	
440	0.1551E 03	537	0.1428E 03	629		726	
445		542		634	0.1196E 03	731	0.7187E 02
450		547		639		736	

DISCOVERER MAY 13, 1970 77.00 METERS DOWNWELLING 03,18.8S 85,04.0W STATION 9 TIME 1232

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.1665E 00	557	0.7035E-01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381		479	0.3499E 00	576	0.9400E-02	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401		498	0.4623E 00	596	0.7000E-03	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1280E-01	518	0.1790E 00	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.5746E-01	537	0.1454E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 13, 1970 62.30 METERS DOWNWELLING 03,18.8S 85,04.0W STATION 9 TIME 1250

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.2584E 00	557	0.1944E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381		479	0.4704E 00	576	0.4045E-01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401		498	0.6852E 00	596	0.1300E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.3474E-01	518	0.3393E 00	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.1088E 00	537	0.3210E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 13, 1970 46.10 METERS DOWNWELLING 03,18.8S 85,04.0W STATION 9 TIME 1305

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.6503E 00	557	0.7306E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.2200E-01	479	0.1074E 01	576	0.2495E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.9535E-01	498	0.1584E 01	596	0.6500E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1453E 00	518	0.1022E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.3284E 00	537	0.1078E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 13, 1970 29.10 METERS DOWNWELLING 03,18.8S 85,04.0W STATION 9 TIME 1322

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.3257E 00	459	0.9437E 01	557	0.6168E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.9965E 00	479	0.1290E 02	576	0.2856E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.2571E 01	498	0.1351E 02	596	0.7500E-01	687	
406		503		596	0.7299E-01	692	
411		508		601		697	
416		513		605		702	
420	0.3368E 01	518	0.9058E 01	610		707	
425		523		615	0.5400E-02	712	
430		527		620		716	
435		532		624		721	
440	0.5884E 01	537	0.8643E 01	629		726	
445		542		634	0.2600E-02	731	
450		547		639		736	

DISCOVERER MAY 13, 1970 20.10 METERS DOWNWELLING 03,18.8S 85,04.0W STATION 9 TIME 1340

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.3606E 01	459	0.3064E 02	557	0.2028E 02	649	
367		464		561		654	0.1349E-01
371		469		566		658	
376		474		571		663	
381	0.6567E 01	479	0.3569E 02	576	0.1104E 02	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1427E 02	498	0.3489E 02	596	0.9292E 00	687	
406		503		596	0.6983E 00	692	
411		508		601		697	
416		513		605		702	
420	0.1715E 02	518	0.2591E 02	610		707	
425		523		615	0.1411E 00	712	
430		527		620		716	
435		532		624		721	
440	0.2279E 02	537	0.2464E 02	629		726	
445		542		634	0.6890E-01	731	
450		547		639		736	

DISCOVERER MAY 13, 1970 10.50 METERS DOWNWELLING 03,18.8S 85,04.0W STATION 9 TIME 1401

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2025E 02	459	0.6442E 02	557	0.5213E 02	649	
367		464		561		654	0.9430E 00
371		469		566		658	
376		474		571		663	
381	0.2474E 02	479	0.7321E 02	576	0.3806E 02	668	
386		484		581		673	0.6829E 00
391		488		586		678	
396		493		591		683	
401	0.4430E 02	498	0.6924E 02	596	0.1097E 02	687	
406		503		596	0.9845E 01	692	0.2461E 00
411		508		601		697	
416		513		605		702	
420	0.4701E 02	518	0.6136E 02	610		707	
425		523		615	0.3282E 01	712	0.2300E-02
430		527		620		716	
435		532		624		721	
440	0.5633E 02	537	0.5614E 02	629		726	
445		542		634	0.2485E 01	731	
450		547		639		736	

650

DISCOVERER MAY 14, 1970 6.10 METERS DOWNWELLING 5,32.6S 87,38.0W STATION 10 TIME 1240

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2582E 02	459	0.7389E 02	557	0.5166E 02	649	
367		464		561		654	0.4386E 01
371		469		566		658	
376		474		571		663	
381	0.3865E 02	479	0.7331E 02	576	0.4052E 02	668	
386		484		581		673	0.2885E 01
391		488		586		678	
396		493		591		683	
401	0.5899E 02	498	0.6836E 02	596	0.1428E 02	687	
406		503		596	0.1310E 02	692	0.1493E 01
411		508		601		697	
416		513		605		702	
420	0.6090E 02	518	0.5766E 02	610		707	
425		523		615	0.8796E 01	712	0.9071E 00
430		527		620		716	
435		532		624		721	
440	0.6518E 02	537	0.5474E 02	629		726	
445		542		634	0.6952E 01	731	
450		547		639		736	

DISCOVERER MAY 14, 1970 15.60 METERS DOWNWELLING 5,32.6S 87,38.0W STATION 10 TIME 1305

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1001E 02	459	0.4012E 02	557	0.2140E 02	649	
367		464		561		654	0.8420E-01
371		469		566		658	
376		474		571		663	
381	0.1690E 02	479	0.4317E 02	576	0.1307E 02	668	
386		484		581		673	0.5965E-01
391		488		586		678	
396		493		591		683	
401	0.3015E 02	498	0.3915E 02	596	0.1591E 01	687	
406		503		596	0.1443E 01	692	0.2040E-01
411		508		601		697	
416		513		605		702	
420	0.3152E 02	518	0.2878E 02	610		707	
425		523		615	0.3465E 00	712	0.3650E-02
430		527		620		716	
435		532		624		721	
440	0.3414E 02	537	0.2637E 02	629		726	
445		542		634	0.2290E 00	731	
450		547		639		736	

DISCOVERER MAY 14, 1970 29.20 METERS DOWNWELLING 5,32.6S 87,38.0W STATION 10 TIME 1328

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2823E 01	459	0.1928E 02	557	0.6712E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.6164E 01	479	0.2177E 02	576	0.2911E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1259E 02	498	0.2022E 02	596	0.7200E-01	687	
406		503		596	0.7180E-01	692	
411		508		601		697	
416		513		605		702	
420	0.1337E 02	518	0.1182E 02	610		707	
425		523		615	0.6500E-02	712	
430		527		620		716	
435		532		624		721	
440	0.1514E 02	537	0.1011E 02	629		726	
445		542		634	0.4150E-02	731	
450		547		639		736	

DISCOVERER MAY 14, 1970 45.1C METERS DOWNWELLING 5,32.6S 87,38.0W STATION 10 TIME 1347

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.6045E 00	459	0.7424E 01	557	0.1559E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.1729E 01	479	0.8970E 01	576	0.4618E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.3932E 01	498	0.8219E 01	596	0.4525E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.4464E 01	518	0.3548E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.5376E 01	537	0.2739E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 14, 1970 61.80 METERS DOWNWELLING 5,32.6S 87,38.0W STATION 10 TIME 1408

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.3221E-01	459	0.2023E 01	557	0.3746E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.2224E 00	479	0.2793E 01	576	0.7439E-01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.7845E 00	498	0.2920E 01	596		687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1071E 01	518	0.1142E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.1244E 01	537	0.8233E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 15, 1970 27.20 METERS DOWNWELLING 7,55S 90,18W STATION 11 TIME 1308

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1320E 02	459	0.4357E 02	557	0.1428E 02	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.1772E 02	479	0.3993E 02	576	0.7709E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.3264E 02	498	0.4182E 02	596	0.4155E 00	687	
406		503		596	0.3460E 00	692	
411		508		601		697	
416		513		605		702	
420	0.3425E 02	518	0.2499E 02	610		707	
425		523		615	0.2530E-01	712	
430		527		620		716	
435		532		624		721	
440	0.3531E 02	537	0.2483E 02	629		726	
445		542		634	0.9300E-02	731	
450		547		639		736	

DISCOVERER MAY 15, 1970 18.70 METERS DOWNWELLING 7,55S 90,18W STATION 11 TIME 1322

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2695E 02	459	0.7088E 02	557	0.3156E 02	649	
367		464		561		654	0.4310E-01
371		469		566		658	
376		474		571		663	
381	0.3134E 02	479	0.6830E 02	576	0.3115E 02	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.5514E 02	498	0.8556E 02	596	0.1940E 01	687	
406		503		596	0.1954E 01	692	
411		508		601		697	
416		513		605		702	
420	0.5634E 02	518	0.5669E 02	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.6375E 02	537	0.4153F 02	629		726	
445		542		634	0.2237F 00	731	
450		547		639		736	

DISCOVERER MAY 15, 1970 9.60 METERS DOWNWELLING 7,55S 90,18W STATION 11 TIME 1335

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.5364E 02	459	0.1300E 03	557	0.8532E 02	649	
367		464		561		654	0.2970E 01
371		469		566		658	
376		474		571		663	
381	0.5957E 02	479	0.1366E 03	576	0.6294E 02	668	
386		484		581		673	0.1579E 01
391		488		586		678	
396		493		591		683	
401	0.9505E 02	498	0.1231E 03	596	0.1851E 02	687	
406		503		596	0.1637E 02	692	0.6369E 00
411		508		601		697	
416		513		605		702	
420	0.9877E 02	518	0.1014E 03	610		707	
425		523		615	0.7546E 01	712	0.6700E-02
430		527		620		716	
435		532		624		721	
440	0.1151E 03	537	0.9870E 02	629		726	
445		542		634	0.4824E 01	731	
450		547		639		736	

DISCOVERER MAY 16, 1970 62.60 METERS DOWNWELLING 05,32.4S 87,52.5W STATION 12 TIME 1255

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.3034E-01	459	0.3330E 01	557	0.8097E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.1408E 00	479	0.4718E 01	576	0.2027E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.6395E 00	498	0.5033E 01	596	0.1949E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1043E 01	518	0.1979E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.1819E 01	537	0.1413E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 16, 1970 49.3(METERS DOWNWELLING 05,32.4S 87,52.5W STATION 12 TIME 1312

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1144E 00	459	0.1044E 02	557	0.2434E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.9033E 00	479	0.1301E 02	576	0.7371E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.3149E 01	498	0.1225E 02	596	0.7300E-01	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.4438E 01	518	0.5642E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.6637E 01	537	0.4306E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 16, 1970 35.60 METERS DOWNWELLING 05,32.4S 87,52.5W STATION 12 TIME 1333

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1000E 01	459	0.2713E 02	557	0.8083E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.3902E 01	479	0.3263E 02	576	0.3041E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1350E 02	498	0.2916E 02	596	0.4595E-01	687	
406		503		596	0.4650E-01	692	
411		508		601		697	
416		513		605		702	
420	0.1611E 02	518	0.1514E 02	610		707	
425		523		615	0.3600E-02	712	
430		527		620		716	
435		532		624		721	
440	0.2011E 02	537	0.1256E 02	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER . MAY 16, 1970 28.00 METERS DOWNWELLING 05,32.4S 87,52.5W STATION 12 TIME 1352

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2519E 01	459	0.3819E 02	557	0.1522E 02	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.7022E 01	479	0.4700E 02	576	0.7140E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1880E 02	498	0.3554E 02	596	0.1874E 00	687	
406		503		596	0.1686E 00	692	
411		508		601		697	
416		513		605		702	
420	0.2858E 02	518	0.2737E 02	610		707	
425		523		615	0.2210E-01	712	
430		527		620		716	
435		532		624		721	
440	0.2957E 02	537	0.2225E 02	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 16, 1970 18.90 METERS DOWNWELLING 05,32.4S 87,52.5W STATION 12 TIME 1405

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.9159E 01	459	0.7093E 02	557	0.3398E 02	649	
367		464		561		654	0.3520E-01
371		469		566		658	
376		474		571		663	
381	0.1883E 02	479	0.7586E 02	576	0.1944E 02	668	
386		484		581		673	0.3890E-01
391		488		586		678	
396		493		591		683	
401	0.3612E 02	498	0.6882E 02	596	0.1491E 01	687	
406		503		596	0.1246E 01	692	0.1310E-01
411		508		601		697	
416		513		605		702	
420	0.4425E 02	518	0.4728E 02	610		707	
425		523		615	0.1660E 00	712	
430		527		620		716	
435		532		624		721	
440	0.5796E 02	537	0.4099E 02	629		726	
445		542		634	0.1347E 00	731	
450		547		639		736	

DISCOVERER MAY 16, 1970 9.80 METERS DOWNWELLING 05,32.4S 87,52.5W STATION 12 TIME 1418

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2393E 02	459	0.1099E 03	557	0.6478E 02	649	
367		464		561		654	0.1290E 01
371		469		566		658	
376		474		571		663	
381	0.3959E 02	479	0.1150E 03	576	0.5818E 02	668	
386		484		581		673	0.7614E 00
391		488		586		678	
396		493		591		683	
401	0.6559E 02	498	0.1048E 03	596	0.1183E 02	687	
406		503		596	0.1009E 02	692	0.2903E 00
411		508		601		697	
416		513		605		702	
420	0.7808E 02	518	0.7994E 02	610		707	
425		523		615	0.4420E 01	712	
430		527		620		716	
435		532		624		721	
440	0.9389E 02	537	0.7370E 02	629		726	
445		542		634	0.3687E 01	731	
450		547		639		736	

DISCOVERER MAY 17,1970 84.60 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1223

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.7594E 00	557	0.6550E-01	649	
367		464		561		654	
371		469	0.1028E 01	566	0.3620E-01	658	
376		474		571		663	
381		479	0.1271E 01	576	0.4800E-02	668	
386		484		581		673	
391	0.6200E-02	488	0.1275E 01	586		678	
396		493		591		683	
401	0.1650E-01	498	0.1037E 01	596		687	
406		503		596		692	
411	0.2350E-01	508	0.5426E 00	601		697	
416		513		605		702	
420	0.5300E-01	518	0.2836E 00	610		707	
425		523		615		712	
430	0.1096E 00	527	0.2687E 00	620		716	
435		532		624		721	
440	0.2714E 00	537	0.1747E 00	629		726	
445		542		634		731	
450	0.4987E 00	547	0.1021E 00	639		736	

DISCOVERER MAY 17,1970 68.50 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1237

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.1368E 01	557	0.2575E 00	649	
367		464		561		654	
371		469	0.1649E 01	566	0.1738E 00	658	
376		474		571		663	
381	0.9000E-02	479	0.2032E 01	576	0.6070E-01	668	
386		484		581		673	
391	0.2070E-01	488	0.2287E 01	586	0.4400E-02	678	
396		493		591		683	
401	0.6160E-01	498	0.1963E 01	596		687	
406		503		596		692	
411	0.9200E-01	508	0.1212E 01	601		697	
416		513		605		702	
420	0.1725E 00	518	0.6769E 00	610		707	
425		523		615		712	
430	0.2606E 00	527	0.5872E 00	620		716	
435		532		624		721	
440	0.6058E 00	537	0.4333E 00	629		726	
445		542		634		731	
450	0.9756E 00	547	0.2925E 00	639		736	

DISCOVERER MAY 17,1970 54.10 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1250

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.2454E 01	557	0.6751E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.4640E-01	479	0.3693E 01	576	0.1656E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.2145E 00	498	0.2815E 01	596	0.3350E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.3973E 00	518	0.1426E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.1195E 01	537	0.1231E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 17,1970 38.20 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1305

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1460E 00	459	0.5850E 01	557	0.2722E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.5107E 00	479	0.8286E 01	576	0.1571E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1405E 01	498	0.8180E 01	596	0.3762E-01	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1836E 01	518	0.5140E 01	610		707	
425		523		615	0.1550E-02	712	
430		527		620		716	
435		532		624		721	
440	0.4196E 01	537	0.4459E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 17,1970 28.90 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1325

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.7220E 00	459	0.1131E 02	557	0.5377E 01	649	
367		464		561		654	0.1550E-02
371		469		566		658	
376		474		571		663	
381	0.1824E 01	479	0.1410E 02	576	0.2780E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.4584E 01	498	0.1311E 02	596	0.7999E-01	687	
406		503		596	0.8220E-01	692	
411		508		601		697	
416		513		605		702	
420	0.5442E 01	518	0.8508E 01	610		707	
425		523		615	0.9000E-02	712	
430		527		620		716	
435		532		624		721	
440	0.7561E 01	537	0.7119E 01	629		726	
445		542		634	0.4450E-02	731	
450		547		639		736	

DISCOVERER MAY 17,1970 19.60 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1345

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.3355E 01	459	0.2898E 02	557	0.1600E 02	649	
367		464		561		654	0.1615E-01
371		469		566		658	
376		474		571		663	
381	0.7629E 01	479	0.3341E 02	576	0.8704E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1794E 02	498	0.2985E 02	596	0.6855E 00	687	
406		503		596	0.6718E 00	692	
411		508		601		697	
416		513		605		702	
420	0.1940E 02	518	0.2382E 02	610		707	
425		523		615	0.1271E 00	712	
430		527		620		716	
435		532		624		721	
440	0.2223E 02	537	0.1952E 02	629		726	
445		542		634	0.6645E-01	731	
450		547		639		736	

DISCOVERER MAY 17,1970 10.30 METERS DOWNWELLING 03,04.0S 85,25.1W STATION 13 TIME 1415

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1204E 02	459	0.7179E 02	557	0.5048E 02	649	
367		464		561		654	0.7684E 00
371		469		566		658	
376		474		571		663	
381	0.2235E 02	479	0.6284E 02	576	0.2811E 02	668	
386		484		581		673	0.4270E 00
391		488		586		678	
396		493		591		683	
401	0.4482E 02	498	0.6329E 02	596	0.5394E 01	687	
406		503		596	0.5596E 01	692	0.1691E 00
411		508		601		697	
416		513		605		702	
420	0.4281E 02	518	0.5246E 02	610		707	
425		523		615	0.2637E 01	712	0.9299E-02
430		527		620		716	
435		532		624		721	
440	0.4940E 02	537	0.4718E 02	629		726	
445		542		634	0.1727E 01	731	
450		547		639		736	

DISCOVERER MAY 18,1970 77.60 METERS DOWNWELLING 02,56.5S 84,55.0W STATION 14 TIME 1233

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.2331E 00	557	0.6725E-01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381		479	0.4688E 00	576	0.6500E-02	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.5800E-02	498	0.5028E 00	596		687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1450E-01	518	0.1829E 00	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.7786E-01	537	0.1433E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 18,1970 58.20 METERS DOWNWELLING 02,56.5S 84,55.0W STATION 14 TIME 1249

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.9764E 00	557	0.4260E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.1135E-01	479	0.1615E 01	576	0.9740E-01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.7365E-01	498	0.1669E 01	596	0.3999E-03	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.1322E 00	518	0.7931E 00	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.4113E 00	537	0.6772E 00	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 18,1970 36.80 METERS DOWNWELLING 02,56.5S 84,55.0W STATION 14 TIME 1305

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1595E 00	459	0.5849E 01	557	0.3310E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.8062E 00	479	0.8616E 01	576	0.1873E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.2189E 01	498	0.9613E 01	596	0.2365E-01	687	
406		503		596	0.2905E-01	692	
411		508		601		697	
416		513		605		702	
420	0.2693E 01	518	0.6294E 01	610		707	
425		523		615	0.3400E-02	712	
430		527		620		716	
435		532		624		721	
440	0.3815E 01	537	0.7030E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 16,1970 27.90 METERS DOWNWELLING 02,56.5S 84,55.0W STATION 14 TIME 1330

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1916E 01	459	0.1717E 02	557	0.8172E 01	649	
367		464		561		654	0.2100E-02
371		469		566		658	
376		474		571		663	
381	0.4292E 01	479	0.2393E 02	576	0.3968E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.7970E 01	498	0.2071E 02	596	0.1386E 00	687	
406		503		596	0.1077E 00	692	
411		508		601		697	
416		513		605		702	
420	0.1087E 02	518	0.1577E 02	610		707	
425		523		615	0.1045E-01	712	
430		527		620		716	
435		532		624		721	
440	0.1613E 02	537	0.1403E 02	629		726	
445		542		634	0.5300E-02	73-	
450		547		639		736	

DISCOVERER MAY 18,1970 19.90 METERS DOWNWELLING 02,56.5S 84,55.0W STATION 14 TIME 1348

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.4060E 01	459	0.3532E 02	557	0.2525E 02	649	
367		464		561		654	0.4745E-01
371		469		566		658	
376		474		571		663	
381	0.1131E 02	479	0.4355E 02	576	0.1482E 02	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1683E 02	498	0.4142E 02	596	0.1147E 01	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.2822E 02	518	0.3289E 02	610		707	
425		523		615	0.2354E 00	712	
430		527		620		716	
435		532		624		721	
440	0.3265E 02	537	0.2516E 02	629		726	
445		542		634	0.9700E-01	731	
450		547		639		736	

DISCOVERER MAY 18,1970 10.60 METERS DOWNWELLING 02,56.5S 84,55.0W STATION 14 TIME 1412

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1928E 02	459	0.8436E 02	557	0.6172E 02	649	
367		464		561		654	0.7868E 00
371		469		566		658	
376		474		571		663	
381	0.3440E 02	479	0.9320E 02	576	0.4043E 02	668	
386		484		581		673	0.4666E 00
391		488		586		678	
396		493		591		683	
401	0.5552E 02	498	0.9495E 02	596	0.1026E 02	687	
406		503		596		692	0.1547E 00
411		508		601		697	
416		513		605		702	
420	0.5740E 02	518	0.7111E 02	610		707	
425		523		615	0.2449E 01	712	0.4600E-02
430		527		620		716	
435		532		624		721	
440	0.6328E 02	537	0.6913E 02	629		726	
445		542		634	0.2034E 01	731	
450		547		639		736	

DISCOVERER MAY 20, 1970 61.30 METERS DOWNWELLING 04,33.2N 82,56.0W STATION 15 TIME 1243

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1218E-01	459	0.1779E 01	557	0.7224E 00	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.6590E-01	479	0.3040E 01	576	0.1728E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.2716E 00	498	0.3615E 01	596	0.1400E-02	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.4867E 00	518	0.1610E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.8385E 00	537	0.1281E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 20, 1970 48.30 METERS DOWNWELLING 04,33.2N 82,56.0W STATION 15 TIME 1258

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1490E 00	459	0.5777E 01	557	0.1802E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.7218E 00	479	0.8744E 01	576	0.5884E 00	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1885E 01	498	0.6979E 01	596		687	
406		503		596	0.6600E-02	692	
411		508		601		697	
416		513		605		702	
420	0.2698E 01	518	0.4924E 01	610		707	
425		523		615		712	
430		527		620		716	
435		532		624		721	
440	0.3417E 01	537	0.3957E 01	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 20, 1970 34.6(METERS DOWNWELLING 04,33.2N 82,56.0W STATION 15 TIME 1312

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2338E 01	459	0.2654E 02	557	0.7885E 01	649	
367		464		561		654	
371		469		566		658	
376		474		571		663	
381	0.5267F 01	479	0.2487E 02	576	0.1422F 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.1171F 02	498	0.2393E 02	596	0.3130F-01	687	
406		503		596	0.3810E-01	692	
411		508		601		697	
416		513		605		702	
420	0.1223F 02	518	0.1245E 02	610		707	
425		523		615	0.8500E-02	712	
430		527		620		716	
435		532		624		721	
440	0.2034E 02	537	0.1060E 02	629		726	
445		542		634		731	
450		547		639		736	

DISCOVERER MAY 20, 1970 27.40 METERS DOWNWELLING 04,33.2N 82,56.0W STATION 15 TIME 1330

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357
362 0.6839E 01
367
371
376
381 0.1526E 02
386
391
396
401 0.2959E 02
406
411
416
420 0.3383E 02
425
430
435
440 0.3708E 02
445
450
455
459 0.5154E 02
464
469
474
479 0.5914E 02
484
488
493
498 0.4818E 02
503
508
513
518 0.2911E 02
523
527
532
537 0.2531E 02
542
547
552
557 0.1844E 02
561
566
571
576 0.9167E 01
581
586
591
596 0.2135E 00
596 0.2152E 00
601
605
610
615 0.3390E-01
620
624
629
634 0.1620E-01
639
644
649
654 0.7200E-02
658
663
668
673
678
683
687
692
697
702
707
712
716
721
726
731
736

DISCOVERER MAY 20, 1970 19.20 METERS DOWNWELLING 04,33.2N 82,56.0W STATION 15 TIME 1343

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1567E 02	459	0.7809E 02	557	0.3684E 02	649	
367		464		561		654	0.6250E-01
371		469		566		658	
376		474		571		663	
381	0.2945E 02	479	0.8848E 02	576	0.1766E 02	668	
386		484		581		673	0.2940E-01
391		488		586		678	
396		493		591		683	
401	0.5231E 02	498	0.6622E 02	596	0.1316E 01	687	
406		503		596	0.1232E 01	692	
411		508		601		697	
416		513		605		702	
420	0.4926E 02	518	0.5017E 02	610		707	
425		523		615	0.2956E 00	712	
430		527		620		716	
435		532		624		721	
440	0.5956E 02	537	0.4855E 02	629		726	
445		542		634	0.1906E 00	731	
450		547		639		736	

DISCOVERER MAY 20, 1970 10.20 METERS DOWNWELLING 04,33.2N 82,56.0W STATION 15 TIME 1358

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.2976E 02	459	0.1284E 03	557	0.7758E 02	649	
367		464		561		654	0.1838E 01
371		469		566		658	
376		474		571		663	
381	0.5513E 02	479	0.1407E 03	576	0.6182E 02	668	
386		484		581		673	0.1026E 01
391		488		586		678	
396		493		591		683	
401	0.8635E 02	498	0.1317E 03	596	0.1251E 02	687	
406		503		596	0.1203E 02	692	0.3759E 00
411		508		601		697	
416		513		605		702	
420	0.9648E 02	518	0.7050E 02	610		707	
425		523		615	0.5984E 01	712	0.5000E-02
430		527		620		716	
435		532		624		721	
440	0.1116E 03	537	0.7535E 02	629		726	
445		542		634	0.4788E 01	731	
450		547		639		736	

DISCOVERER MAY 21, 1970 90.60 METERS DOWNWELLING 6,26,42N 79,55,00W STATION 16 TIME 1237

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362		459	0.1029E 00	557	0.2240E-01	649	
367		464		561		654	
371		469	0.1555E 00	566	0.1230E-01	658	
376		474		571		663	
381		479	0.2260E 00	576	0.2100E-02	668	
386		484		581		673	
391		488	0.2630E 00	586		678	
396		493		591		683	
401		498	0.2558E 00	596		687	
406		503		596		692	
411	0.2000E-02	508	0.1471E 00	601		697	
416		513		605		702	
420	0.3500E-02	518	0.8500E-01	610		707	
425		523		615		712	
430	0.7300E-02	527	0.8365E-01	620		716	
435		532		624		721	
440	0.2325E-01	537	0.5745E-01	629		726	
445		542		634		731	
450	0.6050E-01	547	0.3520E-01	639		736	

DISCOVERER MAY 21, 1970 70.5(METERS DOWNWELLING 6,26,42N 79,55,00W STATION 16 TIME 1300

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357	455	552	644
362	459 0.2852E 00	557 0.1135E 00	649
367	464	561	654
371	469 0.3818E 00	566 0.7770E-01	658
376	474	571	663
381	479 0.5287E 00	576 0.2520E-01	668
386	484	581	673
391	488 0.6119E 00	586	678
396	493	591	683
401 0.7900E-02	498 0.6039E 00	596	687
406	503	596	692
411 0.9100E-02	508 0.4490E 00	601	697
416	513	605	702
420 0.2030E-01	518 0.2904E 00	610	707
425	523	615	712
430 0.3760E-01	527 0.3077E 00	620	716
435	532	624	721
440 0.8350E-01	537 0.2291E 00	629	726
445	542	634	731
450 0.1820E 00	547 0.1519E 00	639	736

DISCOVERER MAY 21, 1970 51.30 METERS DOWNWELLING 6,26,42N 79,55,00W STATION 16 TIME 1320

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357	455	552	644
362 0.6100E-02	459 0.8993E 00	557 0.5961E 00	649
367	464	561	654
371 0.1070E-01	469 0.1146E 01	566 0.4999E 00	658
376	474	571	663
381 0.1630E-01	479 0.1519E 01	576 0.2382E 00	668
386	484	581	673
391 0.3220E-01	488 0.1697E 01	586 0.3330E-01	678
396	493	591	683
401 0.7580E-01	498 0.1874E 01	596	687
406	503	596	692
411 0.8810E-01	508 0.1550E 01	601	697
416	513	605	702
420 0.1256E 00	518 0.1171E 01	610	707
425	523	615	712
430 0.1628E 00	527 0.1273E 01	620	716
435	532	624	721
440 0.3462E 00	537 0.1019E 01	629	726
445	542	634	731
450 0.6394E 00	547 0.6596E 00	639	736

DISCOVERER MAY 21, 1970 31.10 METERS DOWNWELLING 6,26,42N 79,55,00W STATION 16 TIME 1335

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1530E 00	459	0.5049E 01	557	0.4851E 01	649	
367		464		561		654	
371	0.3494E 00	469	0.6143E 01	566	0.4059E 01	658	
376		474		571		663	
381	0.5234E 00	479	0.7725E 01	576	0.2520E 01	668	
386		484		581		673	
391	0.7552E 00	488	0.8181E 01	586	0.7001E 00	678	
396		493		591		683	
401	0.1255E 01	498	0.8676E 01	596	0.6240E-01	687	
406		503		596		692	
411	0.1379E 01	508	0.8378E 01	601		697	
416		513		605	0.5200E-02	702	
420	0.1693E 01	518	0.6981E 01	610		707	
425		523		615	0.4100E-02	712	
430	0.1761E 01	527	0.7828E 01	620		716	
435		532		624	0.2600E-02	721	
440	0.2682E 01	537	0.6234E 01	629		726	
445		542		634	0.6000E-03	731	
450	0.4199E 01	547	0.5422E 01	639		736	

DISCOVERER MAY 21, 1970 21.2(METERS DOWNWELLING 6,26,42N 79,55,00W STATION 16 TIME 1352

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1215E 01	459	0.1807E 02	557	0.1397E 02	649	
367		464		561		654	0.1390E-01
371		469		566		658	
376		474		571		663	
381	0.3041E 01	479	0.2250E 02	576	0.7144E 01	668	
386		484		581		673	
391		488		586		678	
396		493		591		683	
401	0.5979E 01	498	0.2031E 02	596	0.4485E 00	687	
406		503		596		692	
411		508		601		697	
416		513		605		702	
420	0.7460E 01	518	0.1859E 02	610		707	
425		523		615	0.1003E 00	712	
430		527		620		716	
435		532		624		721	
440	0.1199E 02	537	0.1690E 02	629		726	
445		542		634	0.5550E-01	731	
450		547		639		736	

DISCOVERER MAY 21, 1970 11.10 METERS DOWNWELLING 6,26,42N 79,55,00W STATION 16 TIME 1407

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.9496E 01	459	0.6059E 02	557	0.4447E 02	649	
367		464		561		654	0.7902E 00
371		469		566		658	
376		474		571		663	
381	0.1925E 02	479	0.6678E 02	576	0.3327E 02	668	
386		484		581		673	0.4463E 00
391		488		586		678	
396		493		591		683	
401	0.3702E 02	498	0.6176E 02	596	0.5963E 01	687	
406		503		596		692	0.1791E 00
411		508		601		697	
416		513		605		702	
420	0.4107E 02	518	0.5211E 02	610		707	
425		523		615	0.2509E 01	712	
430		527		620		716	
435		532		624		721	
440	0.4796E 02	537	0.4987E 02	629		726	
445		542		634	0.2094F 01	731	
450		547		639		736	

DISCOVERER MAY 29, 1970 66.10 METERS DOWNWELLING 19,24N 73,51W STATION 18 TIME 1245

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644		
362		0.3741E 01	459	0.2692E 02	0.2640E 02	557	0.1160E 01		649		
367			464			561			654		
371		0.5209E 01	469	0.2780E 02	0.2721E 02	566	0.7826E 00		658		
376			474			571			663		
381		0.6751E 01	479	0.2831E 02	0.2763E 02	576	0.2721E 00		668		
386			484			581			673		
391		0.9886E 01	488	0.2440E 02	0.2406E 02	586	0.2405E-01		678		
396			493			591			683		
401		0.1473E 02	498	0.1811E 02	0.1726E 02	596	0.2964E-02		687		
406			503			596			692		
411		0.1772E 02	508	0.9327E 01	0.8476E 01	601			697		
416			513			605			702		
420		0.1928E 02	518	0.4946E 01	0.4494E 01	610			707		
425			523			615			712		
430		0.1842E 02	527	0.4547E 01	0.4151E 01	620			716		
435			532			624			721		
440		0.2338E 02	537	0.3163E 01	0.2977E 01	629			726		
445			542			634			731		
450	0.2446E 02	0.2432E 02	547	0.1942E 01		639			736		

690

DISCOVERER MAY 29, 1970 50.20 METERS DOWNWELLING 19,24N 73,51W STATION 18 TIME 1300

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644		
362		0.5512E 01	459	0.4744E 02	0.4523E 02	557	0.3573E 01		649		
367			464			561			654		
371		0.8859E 01	469	0.4864E 02	0.4566E 02	566	0.2433E 01		658		
376		.	474			571			663		
381		0.1191E 02	479	0.4710E 02	0.4599E 02	576	0.1024E 01		668		
386			484			581			673		
391		0.1559E 02	488	0.4014E 02	0.4004E 02	586	0.1477E 00		678		
396			493			591			683		
401		0.2835E 02	498	0.3123E 02	0.3080E 02	596	0.1233E-01		687		
406			503			596			692		
411		0.3218E 02	508	0.1786E 02	0.1774E 02	601			697		
416			513			605	0.4409E-02		702		
420		0.3453E 02	518	0.1068E 02	0.1070E 02	610			707		
425			523			615	0.3459E-02		712		
430		0.3170E 02	527	0.1029E 02	0.1026E 02	620			716		
435			532			624			721		
440		0.3994E 02	537	0.7855E 01	0.7701E 01	629			726		
445			542			634			731		
450	0.4657E 02	0.4207E 02	547	0.5130E 01	0.5208E 01	639			736		

DISCOVERER MAY 29, 1970 37.70 METERS DOWNWELLING 19,24N 73,51W STATION 18 TIME 1315

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.2825E-02	
362	0.9491E 01		459	0.7037E 02	0.6560E 02	557	0.9823E 01		649		
367			464			561			654		
371	0.1743E 02		469	0.7019E 02	0.6559E 02	566	0.7054E 01		658		
376			474			571			663		
381	0.2192E 02		479	0.6852E 02	0.6585E 02	576	0.3499E 01		668		
386			484			581			673		
391	0.2630E 02		488	0.5971E 02	0.5907E 02	586	0.7529E 00		678		
396			493			591			683		
401	0.4533E 02		498	0.4819E 02	0.4686E 02	596	0.4610E-01		687		
406			503			596	0.4966E-01		692		
411	0.4961E 02		508	0.3180E 02	0.2994E 02	601			697		
416			513			605	0.1185E-01		702		
420	0.5282E 02		518	0.2128E 02	0.1953E 02	610			707		
425			523			615	0.8649E-02		712		
430	0.4691E 02		527	0.2075E 02	0.1830E 02	620			716		
435			532			624	0.5344E-02		721		
440	0.6010E 02	0.5915E 02	537	0.1644E 02	0.1432E 02	629			726		
445			542			634	0.4250E-02		731		
450	0.6472E 02	0.6324E 02	547	0.1244E 02	0.1005E 02	639			736		

DISCOVERER MAY 29, 1970 29.80 METERS DOWNWELLING 19,24N 73,51W STATION 18 TIME 1330

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.6055E-02	
362		0.1121E 02	459	0.6569E 02	0.5233E 02	557	0.9758E 01		649		
367			464			561			654	0.3637E-02	
371		0.1891E 02	469	0.6587E 02	0.5264E 02	566	0.7590E 01		658		
376			474			571			663		
381		0.2292E 02	479	0.6284E 02	0.5405E 02	576	0.4205E 01		668		
386			484			581			673		
391		0.2702E 02	488	0.5376E 02	0.4622E 02	586	0.5361E 00		678		
396			493			591			683		
401		0.4378E 02	498	0.4293E 02	0.3663E 02	596	0.8710E-01		687		
406			503			596	0.8467E-01		692		
411		0.4929E 02	508	0.3032E 02	0.2530E 02	601			697		
416			513			605	0.1984E-01		702		
420		0.4758E 02	518	0.2131E 02	0.1877E 02	610			707		
425			523			615	0.1441E-01		712		
430		0.4240E 02	527	0.2080E 02	0.1696E 02	620			716		
435			532			624	0.8803E-02		721		
440	0.6421E 02	0.5060E 02	537	0.1642E 02	0.1363E 02	629			726		
445			542			634	0.6375E-02		731		
450	0.6570E 02	0.5315E 02	547	0.1248E 02	0.1095E 02	639			736		

DISCOVERER MAY 30, 1970 5.20 METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1022

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.2263E	02
362		0.5537E 02	459	0.1467E	03 0.1535E 03	557	0.1130E	03	649		
367			464			561			654	0.1663E	02
371		0.7854E 02	469	0.1484E	03 0.1484E 03	566	0.1013E	03	658		
376			474			571			663	0.1416E	02
381		0.7889E 02	479	0.1486E	03 0.1405E 03	576	0.8332E	02	668		
386			484			581			673	0.1253E	02
391		0.7743E 02	488	0.1447E	03 0.1365E 03	586	0.6836E	02	678		
396			493			591			683	0.1032E	02
401		0.1157E 03	498	0.1380E	03 0.1449E 03	596	0.3984E	02	687		
406			503			596	0.3835E	02	692	0.5683E	01
411		0.1222E 03	508	0.1267E	03 0.1374E 03	601			697		
416			513			605	0.2897E	02	702	0.2404E	01
420		0.1342E 03	518	0.1194E	03 0.1305E 03	610			707		
425			523			615	0.2857E	02	712	0.5376E	00
430		0.1234E 03	527	0.1408E	03 0.1209E 03	620			716		
435			532			624	0.2490E	02	721	0.7785E	-01
440		0.1455E 03	537	0.1171E	03 0.1121E 03	629			726		
445			542			634	0.2640E	02	731		
450	0.1547E 03	0.1456E 03	547	0.1200E	03	639			736		

DISCOVERER MAY 30, 1970 9.90 METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1040

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644	0.4153E 01
362	0.3693E 02		459	0.1511E 03	0.1558E 03	557	0.7959E 02	649	
367			464			561		654	0.2451E 01
371	0.6222E 02		469	0.1484E 03	0.1558E 03	566	0.7703E 02	658	
376			474			571		663	0.1900E 01
381	0.6314E 02		479	0.1496E 03	0.1526E 03	576	0.6448E 02	668	
386			484			581		673	0.1755E 01
391	0.6810E 02		488	0.1324E 03	0.1447E 03	586	0.3960E 02	678	
396			493			591		683	0.1068E 01
401	0.1108E 03		498	0.1281E 03	0.1391E 03	596	0.1574E 02	687	
406			503			596	0.1412E 02	692	0.6052E 00
411	0.1228E 03		508	0.1180E 03	0.1282E 03	601		697	
416			513			605	0.7667E 01	702	0.1934E 00
420	0.1186E 03		518	0.9713E 02	0.1059E 03	610		707	
425			523			615	0.7003E 01	712	0.6754E-02
430	0.1127E 03		527	0.1109E 03	0.1058E 03	620		716	
435			532			624	0.5701E 01	721	
440	0.1415E 03		537	0.1020E 03	0.1005E 03	629		726	
445			542			634	0.5334E 01	731	
450	0.1480E 03	0.1554E 03	547	0.9962E 02	0.8770E 02	639		736	

DISCOVERER MAY 30, 1970 14.8(METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1057

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.8114E 00	
362		0.2677E 02	459	0.1399E 03	0.1296E 03	557	0.5892F 02		649		
367			464			561			654	0.4674E 00	
371		0.4664E 02	469	0.1343E 03	0.1335E 03	566	0.4888F 02		658		
376			474			571			663	0.2799E 00	
381		0.4998E 02	479	0.1403E 03	0.1434F 03	576	0.3900E 02		668		
386			484			581			673	0.2177E 00	
391		0.5396E 02	488	0.1332E 03	0.1235E 03	586	0.2036E 02		678		
396			493			591			683	0.1055E 00	
401		0.8695E 02	498	0.1151E 03	0.1193E 03	596	0.4764E 01		687		
406			503			596	0.4464F 01		692	0.5022E-01	
411		0.1024E 03	508	0.9499E 02	0.9447E 02	601			697		
416			513			605	0.1695E 01		702	0.8320E-02	
420		0.1044E 03	518	0.7734E 02	0.8226E 02	610			707		
425			523			615	0.1615F 01		712		
430		0.9298E 02	527	0.8226E 02	0.8391F 02	620			716		
435			532			624	0.1351E 01		721		
440		0.1193E 03	537	0.7380E 02	0.6969F 02	629			726		
445			542			634	0.1124F 01		731		
450	0.1309E 03	0.1287E 03	547	0.6578E 02	0.7114F 02	639			736		

DISCOVERER MAY 30, 1970 29.6(METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1113

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455		0.8334E 02	552			644	0.1130E-01	
362		0.8821E 01	459	0.8618E 02	0.8388E 02	557	0.1992E 02		649		
367			464		0.8487E 02	561			654	0.3182E-02	
371		0.1595E 02	469	0.8805E 02	0.8560E 02	566	0.1568E 02		658		
376			474		0.8816E 02	571			663	0.1599E-02	
381		0.2103E 02	479	0.8780E 02	0.8665E 02	576	0.9502E 01		668		
386			484		0.7952E 02	581			673		
391		0.2760E 02	488	0.7885E 02	0.7953E 02	586	0.2850E 01		678		
396			493		0.7425E 02	591			683		
401		0.4840E 02	498	0.6797E 02	0.6592E 02	596	0.2762E 00		687		
406			503			596	0.3294E 00		692		
411		0.5685E 02	508	0.5026E 02	0.4710E 02	601			697		
416			513			605	0.4795E-01		702		
420		0.6108E 02	518	0.3480E 02	0.3338E 02	610			707		
425			523			615	0.3257E-01		712		
430		0.5748E 02	527	0.3522E 02	0.3399E 02	620			716		
435			532			624	0.2200E-01		721		
440		0.7397E 02	537	0.2973E 02	0.2890E 02	629			726		
445			542			634	0.1558E-01		731		
450	0.8071E 02	0.8124E 02	547	0.2391E 02	0.2357E 02	639			736		

DISCOVERER MAY 30, 1970 59.50 METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1132

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455		0.3030E 02	552		644
362		0.8015E 00	459	0.3202E 02	0.3248E 02	557	0.2088E 01	649
367			464		0.3303E 02	561		654
371		0.2362E 01	469	0.3323E 02	0.3321E 02	566	0.1366E 01	658
376			474		0.3380E 02	571		663
381		0.3836E 01	479	0.3376E 02	0.3379E 02	576	0.5112E 00	668
386			484		0.3033E 02	581		673
391		0.5899E 01	488	0.2979E 02	0.2952E 02	586	0.7181E-01	678
396			493		0.2736E 02	591		683
401		0.1339E 02	498	0.2223E 02	0.2227E 02	596	0.1122E-01	687
406			503			596	0.1615E-01	692
411		0.1843E 02	508	0.1212E 02	0.1210E 02	601		697
416			513			605	0.2480E-02	702
420		0.2058E 02	518	0.6867E 01	0.6743E 01	610		707
425			523			615		712
430		0.2042E 02	527	0.6478E 01	0.6406E 01	620		716
435			532			624		721
440		0.2724E 02	537	0.4630E 01	0.4710E 01	629		726
445			542			634		731
450	0.2945E 02	0.2968E 02	547	0.3029E 01	0.3136E 01	639		736

DISCOVERER MAY 30, 1970 88.9C METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1153

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455		0.1013E 02	552			644
362		0.8952E-01	459	0.1126E 02	0.1104E 02	557	0.2384E 00	0.2356E 00	649
367			464		0.1141E 02	561			654
371		0.2921E 00	469	0.1197E 02	0.1177E 02	566	0.1331E 00	0.1328E 00	658
376			474		0.1199E 02	571			663
381		0.6260E 00	479	0.1232E 02	0.1212E 02	576	0.4063E-01	0.3885E-01	668
386			484		0.1104E 02	581			673
391		0.1187E 01	488	0.1065E 02	0.1053E 02	586	0.5788E-02	0.4341E-02	678
396			493		0.9368E 01	591			683
401		0.3039E 01	498	0.7260E 01	0.7155E 01	596			687
406			503			596			692
411		0.4572E 01	508	0.2998E 01	0.2957E 01	601			697
416			513			605			702
420		0.5649E 01	518	0.1230E 01	0.1215E 01	610			707
425			523			615			712
430		0.6182E 01	527	0.1134E 01	0.1104E 01	620			716
435			532			624			721
440		0.8826E 01	537	0.7104E 00	0.7067E 00	629			726
445			542			634			731
450	0.9740E 01	0.9817E 01	547	0.4065E 00	0.3920E 00	639			736

DISCOVERER MAY 30, 1970 88.9(METERS DOWNWELLING 20,20.3N 70,56.0W STATION 19 TIME 1202

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1013E 02	0.9907E 01	552			644
362		0.4164E-01	459	0.1104E 02	0.1062E 02	557	0.2356E 00		649
367			464	0.1141E 02	0.1121E 02	561			654
371		0.2882E 00	469	0.1177E 02	0.1152E 02	566	0.1328E 00		658
376			474	0.1199E 02	0.1176E 02	571			663
381		0.6152E 00	479	0.1212E 02	0.1180E 02	576	0.3885E-01		668
386			484	0.1104E 02	0.1074E 02	581			673
391		0.1185E 01	488	0.1053E 02	0.1028E 02	586	0.4341E-02		678
396			493	0.9368E 01	0.9145E 01	591			683
401		0.2977E 01	498	0.7155E 01	0.6814E 01	596			687
406			503			596			692
411		0.4411E 01	508	0.2957E 01	0.2878E 01	601			697
416			513			605			702
420		0.5698E 01	518	0.1215E 01	0.1201E 01	610			707
425			523			615			712
430		0.6078E 01	527	0.1104E 01	0.1058E 01	620			716
435			532			624			721
440	0.8826E 01	0.8618E 01	537	0.7067E 00	0.6907E 00	629			726
445			542			634			731
450	0.9817E 01	0.9514E 01	547	0.3920E 00	0.3763E 00	639			736

6100

DISCOVERER MAY 30, 1970 5.2(METERS UPWELLING 20,20.3N 70,56.0W STATION 19 TIME 1247

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455		0.6372E 01	552		644	0.2785E-01
362		0.1734E 01	459	0.6469E 01	0.6438E 01	557	0.8392E 00	649	
367			464		0.6290E 01	561		654	0.1045E-01
371		0.2592E 01	469	0.6143E 01	0.6078E 01	566	0.6736E 00	658	
376			474		0.5955E 01	571		663	0.1066E-01
381		0.2891E 01	479	0.5791E 01	0.5767E 01	576	0.4432E 00	668	
386			484		0.5093E 01	581		673	0.1076E-01
391		0.3246E 01	488	0.4765E 01	0.4777E 01	586	0.2474E 00	678	
396			493		0.4310E 01	591		683	0.7134E-02
401		0.4932E 01	498	0.3564E 01	0.3537E 01	596	0.9506E-01	687	
406			503			596	0.9514E-01	692	
411		0.5811E 01	508	0.2306E 01	0.2278E 01	601		697	
416			513			605	0.5456E-01	702	
420		0.6079E 01	518	0.1632E 01	0.1627E 01	610		707	
425			523			615	0.4180E-01	712	
430		0.5473E 01	527	0.1526E 01	0.1533E 01	620		716	
435			532			624	0.3772E-01	721	
440		0.6458E 01	537	0.1223E 01	0.1250E 01	629		726	
445			542			634	0.3364E-01	731	
450	0.6432E 01	0.6416E 01	547	0.1005E 01	0.1005E 01	639		736	

.6101

DISCOVERER MAY 30, 1970 10.30 METERS UPWELLING 20,20.3N 70,56.0W STATION 19 TIME 1305

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455		0.5501E 01	552			644	0.7266E-02		
362		0.1217E 01	459	0.5677E 01	0.5582E 01	557	0.6358F 00		649			
367			464		0.5479E 01	561			654	0.3182E-02		
371		0.1904F 01	469	0.5398E 01	0.5300F 01	566	0.5007E 00		658			
376			474		0.5179E 01	571			663			
381		0.2197E 01	479	0.5103E 01	0.4990E 01	576	0.3296E 00		668			
386			484		0.4422E 01	581			673			
391		0.2597E 01	488	0.4201E 01	0.4133F 01	586	0.1488E 00		678			
396			493		0.3707E 01	591			683			
401		0.4111E 01	498	0.3096E 01	0.3034E 01	596	0.4630E-01		687			
406			503			596	0.4876E-01		692			
411		0.4895E 01	508	0.1912E 01	0.1883E 01	601			697			
416			513			605	0.2370E-01		702			
420		0.5160E 01	518	0.1333E 01	0.1317E 01	610			707			
425			523			615	0.1556F-01		712			
430		0.4724E 01	527	0.1229E 01	0.1216F 01	620			716			
435			532			624	0.1194F-01		721			
440		0.5540E 01	537	0.9779E 00	0.9707E 00	629			726			
445			542			634	0.8500E-02		731			
450	0.5651E 01	0.5500E 01	547	0.7863E 00	0.7771E 00	639			736			

DISCOVERER MAY 30, 1970 19.70 METERS UPWELLING 20,20.3N 70,56.0W STATION 19 TIME 1322

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.4029E 01		552		644
362		0.5246E 00	459	0.4107E 01	0.4012E 01	557	0.3459E 00	649
367			464	0.4047E 01		561		654
371		0.9498E 00	469	0.3937E 01	0.3853E 01	566	0.2576E 00	658
376			474	0.3863E 01		571		663
381		0.1214E 01	479	0.3733E 01	0.3645E 01	576	0.1539E 00	668
386			484	0.3309E 01		581		673
391		0.1553E 01	488	0.3082E 01	0.3018E 01	586	0.6241E-01	678
396			493	0.2747E 01		591		683
401		0.2615E 01	498	0.2203E 01	0.2140E 01	596	0.2019E-01	687
406			503			596	0.2692E-01	692
411		0.3246E 01	508	0.1252E 01	0.1234E 01	601		697
416			513			605	0.7992E-02	702
420		0.3522E 01	518	0.8262E 00	0.8007E 00	610		707
425			523			615	0.4901E-02	712
430		0.3279E 01	527	0.7600E 00	0.7363E 00	620		716
435			532			624	0.2829E-02	721
440		0.3946E 01	537	0.5844E 00	0.5684E 00	629		726
445			542			634		731
450	0.4035E 01	0.3912E 01	547	0.4465E 00	0.4234E 00	639		736

DISCOVERER MAY 30, 1970 39.40 METERS UPWELLING 20,20.3N 70,56.0W STATION 19 TIME 1337

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.2042E 01		552		644
362		0.1041E 00	459	0.2109E 01	0.2082E 01	557	0.1059E 00	649
367			464	0.2104E 01		561		654
371		0.2872E 00	469	0.2065E 01	0.2050E 01	566	0.7138E-01	658
376			474	0.2032E 01		571		663
381		0.4311E 00	479	0.1973E 01	0.1949E 01	576	0.4209E-01	668
386			484	0.1758E 01		581		673
391		0.6324E 00	488	0.1624E 01	0.1592E 01	586	0.1555E-01	678
396			493	0.1403E 01		591		683
401		0.1188E 01	498	0.1080E 01	0.1063E 01	596	0.9898E-02	687
406			503			596		692
411		0.1523E 01	508	0.5286E 00		601		697
416			513			605	0.3031E-02	702
420		0.1714E 01	518	0.3026E 00		610		707
425			523			615		712
430		0.1643E 01	527	0.2727E 00		620		716
435			532			624		721
440		0.2002E 01	537	0.1998E 00		629		726
445			542			634		731
450	0.2019E 01	0.1978E 01	547	0.1400E 00		639		736

DISCOVERER MAY 30, 1970 59.30 METERS UPWELLING 20,20.3N 70,56.0W STATION 19 TIME 1351

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.8967E 00	0.8774E 00	552		644
362		0.2498E-01	459	0.9434E 00	0.9205E 00	557	0.3573E-01	649
367			464	0.9499E 00	0.9343E 00	561		654
371		0.6834E-01	469	0.9472E 00	0.9300E 00	566	0.2283E-01	658
376			474	0.9351E 00	0.9139E 00	571		663
381		0.1337E 00	479	0.9127E 00	0.8851E 00	576	0.1440E-01	668
386			484	0.8099E 00	0.7855E 00	581		673
391		0.2156E 00	488	0.7416E 00	0.7186E 00	586	0.5607E-02	678
396			493	0.6228E 00	0.6104E 00	591		683
401		0.4359E 00	498	0.4627E 00	0.4528E 00	596		687
406			503			596		692
411		0.5952E 00	508	0.1960E 00	0.1860E 00	601		697
416			513			605		702
420		0.6969E 00	518	0.1025E 00	0.9887E-01	610		707
425			523			615		712
430		0.6935E 00	527	0.9005E-01	0.8725E-01	620		716
435			532			624		721
440	0.8852E 00	0.8616E 00	537	0.6607E-01	0.6273E-01	629		726
445	0.8922E 00		542			634		731
450	0.8735E 00	0.8531E 00	547	0.4638E-01	0.4359E-01	639		736

DISCOVERER JUNE 1, 1970 10.10 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1042

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.1208E	01
362		0.5501E 02	459	0.1681E 03	0.1609E 03	557	0.8758E 02		649		
367			464			561			654	0.7257E	00
371		0.7918E 02	469	0.1624E 03	0.7330E 02	566	0.7683E 02		658		
376			474			571			663	0.4532E	00
381		0.8540E 02	479	0.1700E 03	0.8484E 02	576	0.5476E 02		668		
386			484			581			673	0.6939E	00
391		0.8450E 02	488	0.1502E 03	0.1698E 03	586	0.3723E 02		678		
396			493			591			683	0.8546E	00
401		0.1411E 03	498	0.1439E 03	0.1603E 03	596	0.1878E 02		687		
406			503			596	0.1662E 02		692	0.6240E	00
411		0.1521E 03	508	0.1272E 03		601			697		
416			513			605	0.4762E 01		702	0.1757E	00
420		0.1362E 03	518	0.1052E 03		610			707		
425			523			615	0.3506E 01		712		
430		0.8203E 02	527	0.1018E 03		620			716		
435			532			624	0.7310E 01		721		
440		0.9982E 02	537	0.8764E 02		629			726		
445			542			634	0.5468E 01		731		
450	0.1705E 03	0.1676E 03	547	0.8591E 02		639			736		

DISCOVERER JUNE 1, 1970 19.50 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1059

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.2282E 01	
362		0.4227E 02	459	0.9384E 02	0.1403E 03	557	0.4726E 02		649		
367			464			561			654	0.1311E 01	
371		0.5898E 02	469	0.1145E 03	0.1310E 03	566	0.3799E 02		658		
376			474			571			663	0.6914E 00	
381		0.6103E 02	479	0.1133E 03	0.1411E 03	576	0.2566E 02		668		
386			484			581			673	0.4880E 00	
391		0.6701E 02	488	0.1202E 03	0.1265E 03	586	0.1141E 02		678		
396			493			591			683	0.2494E 00	
401		0.1054E 03	498	0.3459E 02	0.1074E 03	596	0.2199E 02		687		
406			503			596	0.3565E 02		692	0.4961E-01	
411		0.1114E 03	508	0.2769E 02		601			697		
416			513			605	0.8789E 01		702		
420		0.1169E 03	518	0.4481E 02		610			707		
425			523			615	0.7426E 01		712		
430		0.1045E 03	527	0.2794E 02		620			716		
435			532			624	0.5977E 01		721		
440		0.1298E 03	537	0.3992E 02		629			726		
445			542			634	0.4520E 01		731		
450	0.5070E 02	0.1418E 03	547	0.4972E 02		639			736		

DISCOVERER JUNE 1, 1970 28.10 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1120

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644	0.1614E-01
362		0.3358E 02	459	0.7777E 02	0.1155E 03	557	0.2404E 02	649	
367			464			561		654	0.8184E-02
371		0.4587E 02	469	0.1106E 03	0.1101E 03	566	0.1866E 02	658	
376			474			571		663	0.3732E-02
381		0.4913E 02	479	0.1175E 03	0.1138E 03	576	0.1136E 02	668	
386			484			581		673	
391		0.5504E 02	488	0.1029E 03	0.1062E 03	586	0.3409E 01	678	
396			493			591		683	
401		0.9056E 02	498	0.8680E 02	0.8041E 02	596	0.4375E 00	687	
406			503			596	0.4066E 00	692	
411		0.9676E 02	508	0.6072E 02		601		697	
416			513			605	0.6945E-01	702	
420		0.1037E 03	518	0.4254E 02		610		707	
425			523			615	0.5362E-01	712	
430		0.9003E 02	527	0.4296E 02		620		716	
435			532			624	0.3426E-01	721	
440	0.1143E 03	0.1097E 03	537	0.3518E 02		629		726	
445			542			634	0.2337E-01	731	
450	0.1266E 03	0.1211E 03	547	0.2864E 02		639		736	

6108

DISCOVERER JUNE 1, 1970 78.60 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1142

CALIBRATED IRRADIANCES FOR ABUVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.3227E 02	0.3387E 02	552		644
362		0.2465E 01	459	0.3294E 02	0.3525E 02	557	0.7454E 00	649
367			464	0.2261E 02	0.3448E 02	561		654
371		0.4230E 01	469	0.1855E 02	0.3436E 02	566	0.4387E 00	658
376			474	0.2867E 02	0.3387E 02	571		663
381		0.6725E 01	479	0.3170E 02	0.3355E 02	576	0.1350E 00	668
386			484	0.2830E 02	0.2937E 02	581		673
391		0.9953E 01	488	0.2646E 02	0.2689E 02	586	0.2007E-01	678
396			493	0.2100E 02	0.2338E 02	591		683
401		0.2062E 02	498	0.1714E 02	0.1751E 02	596	0.5507E-02	687
406			503			596	0.5684E-02	692
411		0.2494E 02	508	0.7983E 01	0.7965E 01	601		697
416			513			605	0.4409E-02	702
420		0.2858E 02	518	0.3375E 01	0.3465E 01	610		707
425			523			615	0.2306E-02	712
430		0.2705E 02	527	0.2975E 01		620		716
435			532			624		721
440	0.3264E 02	0.3365E 02	537	0.1928E 01		629		726
445	0.3291E 02		542			634		731
450	0.3248E 02	0.3368E 02	547	0.1164E 01		639		736

DISCOVERER JUNE 1, 1970 78.60 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1153

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.3387E 02		552			644		
362		0.2719E 01	459	0.3525E 02	0.3422E 02	557	0.6356E 00		649		
367			464	0.3448E 02	0.3422E 02	561			654		
371		0.4019E 01	469	0.3436E 02	0.3303E 02	566	0.3561E 00		658		
376			474	0.3387E 02	0.3282E 02	571			663		
381		0.6270E 01	479	0.3355E 02	0.3262E 02	576	0.1149E 00		668		
386			484	0.2937E 02	0.2951E 02	581			673		
391		0.9288E 01	488	0.2689E 02	0.2778E 02	586	0.1827E-01		678		
396			493	0.2338E 02	0.2227E 02	591			683		
401		0.1980E 02	498	0.1751E 02	0.1839E 02	596	0.5304E-02		687		
406			503			596	0.5086E-02		692		
411		0.2362E 02	508	0.7965E 01	0.8378E 01	601			697		
416			513			605	0.4409E-02		702		
420		0.2742E 02	518	0.3465E 01	0.3851E 01	610			707		
425			523			615	0.3171E-02		712		
430		0.2607E 02	527	0.2970E 01	0.3205E 01	620			716		
435			532			624			721		
440		0.3236E 02	537	0.1907E 01		629			726		
445			542			634			731		
450	0.3368E 02	0.3255E 02	547	0.1066E 01		639			736		

DISCOVERER JUNE 1, 1970 61.20 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1208

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.5704E 02	0.5577E 02	552			644
362		0.8009E 01	459	0.5626E 02	0.5603E 02	557	0.2115E 01		649
367			464	0.5647E 02	0.5595E 02	561			654
371		0.1071E 02	469	0.5498E 02	0.5396E 02	566	0.1303E 01		658
376			474	0.5574E 02	0.5456E 02	571			663
381		0.1471E 02	479	0.5451E 02	0.5368E 02	576	0.4999E 00		668
386			484	0.4712E 02	0.4773E 02	581			673
391		0.1990E 02	488	0.4540E 02	0.4627E 02	586	0.6946E-01		678
396			493		0.4094E 02	591			683
401		0.3680E 02	498	0.3634E 02	0.3327E 02	596	0.1326E-01		687
406			503			596	0.1735E-01		692
411		0.4355E 02	508	0.1615E 02	0.1752E 02	601			697
416			513			605	0.6338E-02		702
420		0.4708E 02	518	0.8297E 01	0.8881E 01	610			707
425			523			615	0.4901E-02		712
430		0.4455E 02	527	0.7527E 01	0.8091E 01	620			716
435			532			624	0.2515E-02		721
440	0.5597E 02	0.5396E 02	537	0.5548E 01	0.5542E 01	629			726
445			542			634			731
450	0.5624E 02	0.5625E 02	547	0.3221E 01	0.3429E 01	639			736

DISCOVERER JUNE 1, 1970 41.80 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1228

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.8024E 02	0.8568E 02	552			644	0.2422E-02	
362		0.1873E 02	459		0.8731E 02	557	0.9329E 01		649		
367			464		0.8429E 02	561			654		
371		0.2740E 02	469		0.7974E 02	566	0.6427E 01		658		
376			474	0.8792E 02	0.8184E 02	571			663		
381		0.3017E 02	479	0.9112E 02	0.8065E 02	576	0.3076E 01		668		
386			484	0.7780E 02	0.7367E 02	581			673		
391		0.3510E 02	488	0.7327E 02	0.7075E 02	586	0.6139E 00		678		
396			493	0.6801E 02	0.6630E 02	591			683		
401		0.5770E 02	498	0.6091E 02	0.5512E 02	596	0.5793E-01		687		
406			503			596	0.5744E-01		692		
411		0.7669E 02	508	0.3860E 02	0.3330E 02	601			697		
416			513			605	0.1488E-01		702		
420		0.7868E 02	518	0.2307E 02	0.2156E 02	610			707		
425			523			615	0.1009E-01		712		
430		0.6906E 02	527	0.2231E 02	0.1960E 02	620			716		
435			532			624	0.5659E-02		721		
440	0.8970E 02	0.8461E 02	537	0.1716E 02	0.1569E 02	629			726		
445			542			634	0.4604E-02		731		
450	0.9107E 02	0.8591E 02	547	0.1222E 02	0.1091E 02	639			736		

DISCOVERER JUNE 1, 1970 23.90 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1249

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455		0.1228E 03	552			644	0.4844E-01	
362		0.4507E 02	459	0.1278E 03	0.1270E 03	557	0.3201E 02		649		
367			464		0.1215E 03	561			654	0.1136E-01	
371		0.4962E 02	469	0.1212E 03	0.1199E 03	566	0.2442E 02		658		
376			474		0.1210E 03	571			663	0.7997E-02	
381		0.5559E 02	479	0.1216E 03	0.1185E 03	576	0.1607E 02		668		
386			484		0.1098E 03	581			673	0.7178E-02	
391		0.5710E 02	488	0.1075E 03	0.1093E 03	586	0.6701E 01		678		
396			493		0.1034E 03	591			683	0.2853E-02	
401		0.8971E 02	498	0.8688E 02	0.9187E 02	596	0.1088E 01		687		
406			503			596	0.9367E 00		692	0.1702E-02	
411		0.9597E 02	508	0.7314E 02	0.7051E 02	601			697		
416			513			605	0.1672E 00		702		
420		0.1062E 03	518	0.5430E 02	0.5306E 02	610			707		
425			523			615	0.1355E 00		712		
430		0.9197E 02	527	0.5342E 02	0.4870E 02	620			716		
435			532			624	0.8897E-01		721		
440	0.1220E 03	0.1127E 03	537	0.4625E 02	0.3872E 02	629			726		
445			542			634	0.7969E-01		731		
450	0.1253E 03	0.1237E 03	547	0.4004E 02	0.3630E 02	639			736		

DISCOVERER JUNE 1, 1970 77.60 METERS UPWELLING 25,42.7N 65,40.5W STATION 21 TIME 1328

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		0.1919E-01	455	0.1016E 01	0.1229E 01	552	0.3927E-01		644
362		0.5413E-01	459	0.1051E 01	0.1086F 01	557	0.3752E-01		649
367		0.1219E 00	464	0.1089E 01	0.8227E 00	561	0.3138E-01		654
371		0.1911E 00	469	0.1060E 01	0.7154E 00	566	0.2572E-01		658
376		0.2527E 00	474	0.1029E 01	0.9607E 00	571	0.2022F-01		663
381		0.3076E 00	479	0.9760E 00	0.9743E 00	576	0.1554F-01		668
386		0.3483E 00	484	0.8501E 00	0.8927E 00	581	0.1010E-01		673
391		0.4776E 00	488	0.7527E 00	0.7927E 00	586	0.5969E-02		678
396		0.5906E 00	493	0.6125E 00	0.6349E 00	591	0.3258E-02		683
401		0.9307E 00	498	0.4385E 00	0.4351E 00	596			687
406		0.1092E 01	503	0.2969E 00		596			692
411		0.1228E 01	508	0.1750E 00	0.1633F 00	601			697
416		0.1357F 01	513	0.1061E 00		605			702
420		0.1372E 01	518	0.9452E-01		610			707
425		0.1350E 01	523	0.9174E-01		615			712
430		0.1266E 01	527	0.8376E-01		620			716
435		0.1430E 01	532	0.7360E-01		624			721
440	0.1068E 01	0.1460E 01	537	0.6212E-01		629			726
445		0.1393E 01	542	0.5608E-01		634			731
450	0.9896F 00	0.1290E 01	547	0.4757E-01		639			736

DISCOVERER JUNE 1, 1970 77.60 METERS UPWELLING 25,42.7N 65,40.5W STATION 21 TIME 1341

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455	0.1229E 01	0.1226E 01	552			644
362		0.3122E-01	459	0.1086E 01	0.1259E 01	557	0.2825E-01		649
367			464	0.8227E 00	0.1236E 01	561			654
371		0.1495E 00	469	0.7154E 00	0.1184E 01	566	0.1872E-01		658
376			474	0.9607E 00	0.1117E 01	571			663
381		0.2840E 00	479	0.9743E 00	0.1051E 01	576	0.1003E-01		668
386			484	0.8927E 00	0.9147E 00	581			673
391		0.4401E 00	488	0.7927E 00	0.8025E 00	586	0.3618E-02		678
396			493	0.6349E 00	0.6581E 00	591			683
401		0.8520E 00	498	0.4351E 00	0.4576E 00	596			687
406		0.9580E 00	503			596			692
411		0.1080E 01	508	0.1633E 00	0.1736E 00	601			697
416		0.1206E 01	513			605			702
420		0.1245E 01	518	0.8291E-01	0.9218E-01	610			707
425		0.1258E 01	523			615			712
430		0.1210E 01	527	0.6757E-01	0.7689E-01	620			716
435		0.1349E 01	532			624			721
440		0.1344E 01	537	0.4544E-01	0.4532E-01	629			726
445		0.1296E 01	542			634			731
450	0.1290E 01	0.1213E 01	547	0.3468E-01	0.2631E-01	639			736

DISCOVERER JUNE 1, 1970 61.1(METERS UPWELLING 25,42.7N 65,40.5W STATION 21 TIME 1404

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644
362		0.1811E 00	459	0.2122E 01	0.1965E 01	557	0.5277E-01		649
367			464			561			654
371		0.4397E 00	469	0.2089E 01	0.1778E 01	566	0.3698E-01		658
376			474			571			663
381		0.6808E 00	479	0.1752E 01	0.1711E 01	576	0.2185E-01		668
386			484			581			673
391		0.8924E 00	488	0.1332E 01	0.1251E 01	586	0.9225E-02		678
396			493			591			683
401	0.1849E 01	0.1656E 01	498	0.7656E 00	0.7153E 00	596	0.2856E-02		687
406			503			596			692
411	0.2211E 01	0.1938E 01	508	0.3180E 00	0.3064E 00	601			697
416			513			605			702
420	0.2367E 01	0.2079E 01	518	0.1692E 00	0.1672E 00	610			707
425			523			615			712
430	0.2114E 01	0.1889E 01	527	0.1398E 00		620			716
435			532			624			721
440	0.2390E 01	0.2167E 01	537	0.9966E-01		629			726
445			542			634			731
450	0.2202E 01	0.1904E 01	547	0.7003E-01		639			736

DISCOVERER JUNE 1, 1970 10.10 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1042

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	0.6943E 01
362	0.6269E 02	459	0.1781E 03	557	0.8249E 02	649	
367		464		561		654	0.1687E 01
371	0.8314E 02	469	0.1365E 03	566	0.7216E 02	658	
376		474		571		663	0.1009E 01
381	0.8383E 02	479	0.1460E 03	576	0.5131E 02	668	
386		484		581		673	0.6277E 00
391	0.7787E 02	488	0.1447E 03	586	0.3479E 02	678	
396		493		591		683	0.9573E 00
401	0.1227E 03	498	0.1373E 03	596	0.1750E 02	687	
406		503		596	0.1549E 02	692	0.1174E 01
411	0.1348E 03	508	0.1204E 03	601		697	
416		513		605	0.4363E 01	702	0.8542E 00
420	0.1436E 03	518	0.9959E 02	610		707	
425		523		615	0.5149E 01	712	0.2397E 00
430	0.1198E 03	527	0.9630E 02	620		716	
435		532		624	0.3769E 01	721	
440	0.1449E 03	537	0.8281E 02	629		726	
445		542		634	0.8511E 01	731	
450	0.1930E 03	547	0.8113E 02	639		736	

DISCOVFRER JUNE 1, 1970 19.5(METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1059

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357	455	552	644 0.1533E 00
362 0.4098E 02	459 0.1244E 03	557 0.4201E 02	649
367	464	561	654 0.8650E-01
371 0.5728E 02	469 0.1317E 03	566 0.3403E 02	658
376	474	571	663 0.4570E-01
381 0.5969E 02	479 0.1185E 03	576 0.2322E 02	668
386	484	581	673 0.3240E-01
391 0.6564E 02	488 0.1295E 03	586 0.1040E 02	678
396	493	591	683 0.1650E-01
401 0.1037E 03	498 0.8714E 02	596 0.2570E 01	687
406	503	596 0.2247E 01	692 0.3200E-02
411 0.1100E 03	508 0.5884E 02	601	697
416	513	605 0.5633E 00	702
420 0.1159E 03	518 0.6524E 02	610	707
425	523	615 0.4798E 00	712
430 0.1039E 03	527 0.5457E 02	620	716
435	532	624 0.3870E 00	721
440 0.1294E 03	537 0.4795E 02	629	726
445	542	634 0.2969E 00	731
450 0.1034E 03	547 0.4673E 02	639	736

DISCOVERER JUNE 1, 1970 28.1(METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1120

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	0.1610E-01
362	0.3366E 02	459	0.9982E 02	557	0.2384E 02	649	
367		464		561		654	0.8400E-02
371	0.4649E 02	469	0.1177E 03	566	0.1852E 02	658	
376		474		571		663	
381	0.4931E 02	479	0.1123E 03	576	0.1126E 02	668	
386		484		581		673	
391	0.5528E 02	488	0.1025E 03	586	0.3384E 01	678	
396		493		591		683	
401	0.9086E 02	498	0.8235E 02	596	0.4352E 00	687	
406		503		596	0.4044E 00	692	
411	0.9710E 02	508	0.5929E 02	601		697	
416		513		605	0.6920E-01	702	
420	0.1041E 03	518	0.4193E 02	610		707	
425		523		615	0.5340E-01	712	
430	0.9040E 02	527	0.4241E 02	620		716	
435		532		624	0.3420E-01	721	
440	0.1103E 03	537	0.3477E 02	629		726	
445		542		634	0.2330E-01	731	
450	0.1209E 03	547	0.2837E 02	639		736	

DISCOVERER JUNE 1, 1970 78.60 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1142

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455	0.3334E 02	552		644	
362	0.2599E 01	459	0.3431E 02	557	0.6857E 00	649	
367		464	0.3059E 02	561		654	
371	0.4138F 01	469	0.2878E 02	566	0.3943E 00	658	
376		474	0.3208E 02	571		663	
381	0.5015E 01	479	0.3302E 02	576	0.1239F 00	668	
386		484	0.2946E 02	581		673	
391	0.9639F 01	488	0.2746E 02	586	0.1900E-01	678	
396		493	0.2258E 02	591		683	
401	0.2013F 02	498	0.1801E 02	596	0.5300E-02	687	
406		503		596	0.5300E-02	692	
411	0.2432E 02	508	0.8213E 01	601		697	
416		513		605	0.4350E-02	702	
420	0.2804E 02	518	0.3515E 01	610		707	
425		523		615	0.2700E-02	712	
430	0.2660F 02	527	0.3036E 01	620		716	
435		532		624		721	
440	0.3283E 02	537	0.1924E 01	629		726	
445	0.3290E 02	542		634		731	
450	0.3300E 02	547	0.1108E 01	639		736	

DISCOVERER JUNE 1, 1970 61.20 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1208

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455	0.5583E 02	552		644	
362	0.7793E 01	459	0.5656E 02	557	0.2095E 01	649	
367		464	0.5563E 02	561		654	
371	0.1045E 02	469	0.5390E 02	566	0.1288E 01	658	
376		474	0.5456E 02	571		663	
381	0.1437E 02	479	0.5350E 02	576	0.4930E 00	668	
386		484	0.4689E 02	581		673	
391	0.1946E 02	488	0.4531E 02	586	0.6830E-01	678	
396		493	0.4001E 02	591		683	
401	0.3609E 02	498	0.3220E 02	596	0.1300E-01	687	
406		503		596	0.1690E-01	692	
411	0.4282E 02	508	0.1662E 02	601		697	
416		513		605	0.6100E-02	702	
420	0.4641E 02	518	0.8468E 01	610		707	
425		523		615	0.4800E-02	712	
430	0.4403E 02	527	0.7690E 01	620		716	
435		532		624	0.2400E-02	721	
440	0.5436E 02	537	0.5378E 01	629		726	
445		542		634		731	
450	0.5570E 02	547	0.3267E 01	639		736	

DISCOVERER JUNE 1, 1970 41.80 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1228

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455	0.8163E 02	552		644	0.2400E-02
362	0.1891E 02	459	0.8801E 02	557	0.9157E 01	649	
367		464	0.8507E 02	561		654	
371	0.2833E 02	469	0.8060E 02	566	0.6344E 01	658	
376		474	0.8697E 02	571		663	
381	0.3029E 02	479	0.8555E 02	576	0.3051E 01	668	
386		484	0.7529E 02	581		673	
391	0.3512E 02	488	0.7172E 02	586	0.6125E 00	678	
396		493	0.6861E 02	591		683	
401	0.5757E 02	498	0.5774E 02	596	0.5805E-01	687	
406		503		596	0.5756E-01	692	
411	0.7663E 02	508	0.3582E 02	601		697	
416		513		605	0.1500E-01	702	
420	0.7874E 02	518	0.2224E 02	610		707	
425		523		615	0.1016E-01	712	
430	0.6920E 02	527	0.2089E 02	620		716	
435		532		624	0.5740E-02	721	
440	0.8574E 02	537	0.1638E 02	629		726	
445		542		634	0.4600E-02	731	
450	0.8688E 02	547	0.1155E 02	639		736	

DISCOVERER JUNE 1, 1970 23.90 METERS DOWNWELLING 25,42.7N 65,40.5W STATION 21 TIME 1249

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455	0.1216E 03	552		644	0.4900E-01
362	0.4523E 02	459	0.1278E 03	557	0.3261E 02	649	
367		464	0.1198E 03	561		654	0.1150E-01
371	0.5033E 02	469	0.1207E 03	566	0.2486E 02	658	
376		474	0.1188E 03	571		663	0.8100E-02
381	0.5663E 02	479	0.1199E 03	576	0.1638E 02	668	
386		484	0.1074E 03	581		673	0.7200E-02
391	0.5858E 02	488	0.1080E 03	586	0.6837E 01	678	
396		493	0.1007E 03	591		683	0.2800E-02
401	0.9273E 02	498	0.8878E 02	596	0.1111E 01	687	
406		503		596	0.9562E 00	692	0.1700E-02
411	0.9370E 02	508	0.7155E 02	601		697	
416		513		605	0.1705E 00	702	
420	0.1041E 03	518	0.5356E 02	610		707	
425		523	0.5106E 02	615	0.1378E 00	712	
430	0.9098E 02	527		620		716	
435		532	0.4259E 02	624	0.9040E-01	721	
440	0.1181E 03	537		629		726	
445		542	0.3831E 02	634	0.8080E-01	731	
450	0.1252E 03	547		639		736	

DISCOVERER JUNE 1, 1970 77.60 METERS UPWELLING 25,42.7N 65,40.5W STATION 21 TIME 1328

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357 0.1960E-01	455 0.1170E 01	552 0.3930E-01	644
362 0.4365E-01	459 0.1140E 01	557 0.3340E-01	649
367 0.1254E 00	464 0.1051E 01	561 0.3150E-01	654
371 0.1748E 00	469 0.9853E 00	566 0.2262E-01	658
376 0.2620E 00	474 0.1035E 01	571 0.2030E-01	663
381 0.3042E 00	479 0.9986E 00	576 0.1300E-01	668
386 0.3637E 00	484 0.8825E 00	581 0.1020E-01	673
391 0.5007E 00	488 0.7781E 00	586 0.4936E-02	678
396 0.6222E 00	493 0.6300E 00	591 0.3300E-02	683
401 0.9213E 00	498 0.4392E 00	596	687
406 0.1059E 01	503 0.2996E 00	596	692
411 0.1192E 01	508 0.1749E 00	601	697
416 0.1323E 01	513 0.1069E 00	605	702
420 0.1350E 01	518 0.9587E-01	610	707
425 0.1344E 01	523 0.9210E-01	615	712
430 0.1274E 01	527 0.8510E-01	620	716
435 0.1430E 01	532 0.7380E-01	624	721
440 0.1333E 01	537 0.5939E-01	629	726
445 0.1382E 01	542 0.5610E-01	634	731
450 0.1182E 01	547 0.4365E-01	639	736

DISCOVERER JUNE 1, 1970 61.10 METERS UPWELLING 25,42.7N 65,40.5W STATION 21 TIME 1404

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	
362	0.1761E 00	459	0.1960E 01	557	0.5120E-01	649	
367		464		561		654	
371	0.4284E 00	469	0.1858E 01	566	0.3590E-01	658	
376		474		571		663	
381	0.6650E 00	479	0.1671E 01	576	0.2130E-01	668	
386		484		581		673	
391	0.8715E 00	488	0.1247E 01	586	0.9000E-02	678	
396		493		591		683	
401	0.1675E 01	498	0.7254E 00	596	0.2800E-02	687	
406		503		596		692	
411	0.1986E 01	508	0.3019E 00	601		697	
416		513		605		702	
420	0.2135E 01	518	0.1623E 00	610		707	
425		523		615		712	
430	0.1916E 01	527	0.1352E 00	620		716	
435		532		624		721	
440	0.2182E 01	537	0.9650E-01	629		726	
445		542		634		731	
450	0.1970E 01	547	0.6780E-01	639		736	

DISCOVERER JUNE 2, 1970 30.60 METERS DOWNWELLING 25,36N 69,45W STATION 22 TIME 1232

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357	455	552	644 0.1115E-01
362 0.3128E 02	459 0.1292E 03	557 0.2383E 02	649
367	464	561	654 0.5350E-02
371 0.4555E 02	469 0.1158E 03	566 0.1909E 02	658
376	474	571	663 0.4300E-02
381 0.5027E 02	479 0.1162E 03	576 0.9981E 01	668
386	484	581	673
391 0.5781E 02	488 0.1026E 03	586 0.2961E 01	678
396	493	591	683
401 0.9392E 02	498 0.9124E 02	596 0.3498E 00	687
406	503	596 0.3107E 00	692
411 0.1094E 03	508 0.6401E 02	601	697
416	513	605 0.5470E-01	702
420 0.1174E 03	518 0.4403E 02	610	707
425	523	615 0.4105E-01	712
430 0.1077E 03	527 0.4281E 02	620	716
435	532	624 0.3110E-01	721
440 0.1218E 03	537 0.3506E 02	629	726
445	542	634 0.1775E-01	731
450 0.1344E 03	547 0.2839E 02	639	736

DISCOVERER JUNE 2, 1970 10.10 METERS DOWNWELLING 25,36N 69,45W STATION 22 TIME 1303

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357		455		552		644	0.4690E 01
362	0.8683E 02	459	0.1986E 03	557	0.9355E 02	649	
367		464		561		654	0.2340E 01
371	0.8788E 02	469	0.1850E 03	566	0.8426E 02	658	
376		474		571		663	0.1788E 01
381	0.9281E 02	479	0.1992E 03	576	0.6810E 02	668	
386		484		581		673	0.1663E 01
391	0.9424E 02	488	0.1709E 03	586	0.4331E 02	678	
396		493		591		683	0.1130E 01
401	0.1488E 03	498	0.1733E 03	596	0.2152E 02	687	
406		503		596	0.1731E 02	692	0.6014E 00
411	0.1622E 03	508	0.1508E 03	601		697	
416		513		605	0.7775E 01	702	0.8480E-01
420	0.1592E 03	518	0.1272E 03	610		707	
425		523		615	0.7333E 01	712	0.2380E-01
430	0.1342E 03	527	0.1252E 03	620		716	
435		532		624	0.6258E 01	721	
440	0.1792E 03	537	0.1105E 03	629		726	
445		542		634	0.5240E 01	731	
450	0.2051E 03	547	0.9915E 02	639		736	

DISCOVERER JUNE 2, 1970 47.00 METERS DOWNWELLING 25,36N 69,45W STATION 22 TIME 1340

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357
362 0.1170E 02
367
371 0.1784E 02
376
381 0.2176E 02
386
391 0.2764E 02
396
401 0.5188E 02
406
411 0.5223E 02
416
420 0.5600E 02
425
430 0.4872E 02
435
440 0.5897E 02
445
450 0.5912E 02
455
459 0.6288E 02
464
469 0.5625E 02
474
479 0.5723E 02
484
488 0.4416E 02
493
498 0.4216E 02
503
508 0.2150E 02
513
518 0.1682E 02
523
527 0.1282E 02
532
537 0.1118E 02
542
547 0.6492E 01
552
557 0.6203E 01
561
566 0.4124E 01
571
576 0.1672E 01
581
586 0.3020E 00
591
596 0.1860E-01
596 0.2150E-01
601
605 0.9400E-02
610
615 0.4850E-02
620
624 0.3400E-02
629
634 0.5000E-03
639
644
649
654
658
663
668
673
678
683
687
692
697
702
707
712
716
721
726
731
736

DISCOVERER JUNE 3, 1970 10.80 METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 904

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.1222E 01	
362		0.2355E 02	459	0.9569E 02	0.1011E 03	557	0.4464E 02		649		
367			464			561			654	0.4797E 00	
371		0.4004E 02	469	0.8731E 02	0.9922E 02	566	0.3945E 02		658		
376			474			571			663	0.3823E 00	
381		0.5211E 02	479	0.9384E 02	0.1014E 03	576	0.3102E 02		668		
386			484			581			673	0.4414E 00	
391		0.5470E 02	488	0.8250E 02	0.9174E 02	586	0.1822E 02		678		
396			493			591			683	0.3053E 00	
401		0.8106E 02	498	0.7372E 02	0.8294E 02	596	0.6845E 01		687		
406			503			596	0.5712E 01		692	0.1251E 00	
411		0.7975E 02	508	0.6292E 02	0.6992E 02	601			697		
416			513			605	0.2529E 01		702	0.3119E-02	
420		0.8737E 02	518	0.5435E 02	0.5858E 02	610			707		
425			523			615	0.2253E 01		712		
430		0.7769E 02	527	0.5782E 02	0.6348E 02	620			716		
435			532			624	0.2017E 01		721		
440	0.8624E 02	0.9865E 02	537	0.3891E 02	0.5461E 02	629			726		
445			542			634	0.1573E 01		731		
450	0.9114E 02	0.9976E 02	547	0.4761E 02	0.5309E 02	639			736		

DISCOVERER JUNE 3, 1970 28.8(METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 925

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644	0.6459E-02	
362		0.2015E 02	459	0.6796E 02	0.6915E 02	557	0.1163E 02		649		
367			464			561			654	0.1364E-02	
371		0.2286E 02	469	0.6297E 02	0.6630E 02	566	0.8766E 01		658		
376			474			571			663		
381		0.2733E 02	479	0.6402E 02	0.6528E 02	576	0.5026E 01		668		
386			484			581			673		
391		0.3082E 02	488	0.5621E 02	0.5707E 02	586	0.1461E 01		678		
396			493			591			683		
401		0.5094E 02	498	0.4793E 02	0.4639E 02	596	0.1360E 00		687		
406			503			596	0.1178E 00		692		
411		0.5547E 02	508	0.3281E 02	0.3095E 02	601			697		
416			513			605	0.1405E-01		702		
420		0.5736E 02	518	0.2205E 02	0.2295E 02	610			707		
425			523			615	0.1700E-01		712		
430		0.5113E 02	527	0.2186E 02	0.2280E 02	620			716		
435			532			624	0.1068E-01		721		
440	0.6239E 02	0.6417E 02	537	0.1717E 02	0.1851E 02	629			726		
445			542			634	0.7084E-02		731		
450	0.6616E 02	0.6650E 02	547	0.1481E 02	0.1530E 02	639			736		

DISCOVERER JUNE 3, 1970 48.30 METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 943

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644
362		0.7709E 01	459	0.4475E 02	0.4651E 02	557	0.3195E 01	649
367			464			561		654
371		0.1045E 02	469	0.4399E 02	0.4520E 02	566	0.2119F 01	658
376			474			571		663
381		0.1338E 02	479	0.4392E 02	0.4348E 02	576	0.9168E 00	668
386			484			581		673
391		0.1763E 02	488	0.3699E 02	0.3726E 02	586	0.1441E 00	678
396			493			591		683
401		0.3240E 02	498	0.2737E 02	0.2836E 02	596	0.1570E-01	687
406			503			596	0.1645E-01	692
411		0.3679E 02	508	0.1564E 02	0.1661E 02	601		697
416			513			605	0.5520E-02	702
420		0.3910E 02	518	0.9375E 01	0.9825E 01	610		707
425			523			615	0.2883E-02	712
430		0.3634E 02	527	0.8884E 01	0.9332E 01	620		716
435			532			624	0.1886E-02	721
440	0.4535E 02	0.4447E 02	537	0.6560E 01	0.6756E 01	629		726
445			542			634		731
450	0.4520E 02	0.4485E 02	547	0.4394E 01	0.4462E 01	639		736

DISCOVERER JUNE 3, 1970 55.30 METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 1000

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644			
362		0.3041E 01	459	0.3782E 02	0.3738E 02	557	0.1951E 01	649			
367			464			561		654			
371		0.6194E 01	469	0.3682E 02	0.3853E 02	566	0.1267E 01	658			
376			474			571		663			
381		0.8905E 01	479	0.3610E 02	0.3772E 02	576	0.5078E 00	668			
386			484			581		673			
391		0.1115E 02	488	0.3122E 02	0.3182E 02	586	0.5662E-01	678			
396			493			591		683			
401		0.2416E 02	498	0.2261E 02	0.2365E 02	596	0.1162E-01	687			
406			503			596	0.1675E-01	692			
411		0.2737E 02	508	0.1230E 02	0.1294E 02	601		697			
416			513			605		702			
420		0.3056E 02	518	0.6818E 01	0.6998E 01	610		707			
425			523			615		712			
430		0.2909E 02	527	0.6233E 01	0.6436E 01	620		716			
435			532			624		721			
440	0.3521E 02	0.3683E 02	537	0.4451E 01	0.4977E 01	629		726			
445			542			634		731			
450	0.3604E 02	0.3790E 02	547	0.2780E 01	0.3291E 01	639		736			

DISCOVERER JUNE 3, 1970 20.30 METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 1035

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644	0.1033E 00
362		0.4019E 02	459	0.1120E 03	0.1150E 03	557	0.3253E 02	649	
367			464			561		654	0.4637E-01
371		0.4766E 02	469	0.1084E 03	0.1109E 03	566	0.2796E 02	658	
376			474			571		663	0.2346E-01
381		0.4930E 02	479	0.1094E 03	0.1146E 03	576	0.1952E 02	668	
386			484			581		673	0.1674E-01
391		0.5496E 02	488	0.1008E 03	0.1050F 03	586	0.8263E 01	678	
396			493			591		683	0.1141E-01
401		0.8811E 02	498	0.8621E 02	0.9181E 02	596	0.1946E 01	687	
406			503			596	0.1564E 01	692	
411		0.9833E 02	508	0.6814E 02	0.7208E 02	601		697	
416			513			605	0.3467E 00	702	
420		0.9993E 02	518	0.5176E 02	0.5427F 02	610		707	
425			523			615	0.2779E 00	712	
430		0.8736E 02	527	0.5113E 02	0.5289E 02	620		716	
435			532			624	0.1999E 00	721	
440	0.1046E 03	0.1086E 03	537	0.4508E 02	0.4378E 02	629		726	
445			542			634	0.1526E 00	731	
450	0.1110E 03	0.1176F 03	547	0.3879E 02	0.3962E 02	639		736	

DISCOVERER JUNE 3, 1970 48.4(METERS DOWNWELL ING 25,47.3N 74,14.0W STATION 23 TIME 1053

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THF TRUE WAVELENGTH
SECOND AND THIRD NUMBFRS ARF THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644
362		0.9863F 01	459	0.5840E 02	0.6186E 02	557	0.4746F 01	649
367			464			561		654
371		0.1352E 02	469	0.5784F 02	0.5921E 02	566	0.3246F 01	658
376			474			571		663
381		0.1767E 02	479	0.5788E 02	0.5787E 02	576	0.1428F 01	668
386			484			581		673
391		0.2295E 02	488	0.5049E 02	0.5100E 02	586	0.2447F 00	678
396			493			591		683
401		0.4085F 02	498	0.3012E 02	0.3887F 02	596	0.2040E-01	687
406			503			596	0.2333E-01	692
411		0.4666E 02	508	0.2261E 02	0.2298E 02	601		697
416			513			605	0.7992E-02	702
420		0.5101F 02	518	0.1383E 02	0.1427E 02	610		707
425			523			615	0.5766F-02	712
430		0.4710E 02	527	0.1320E 02	0.1321F 02	620		716
435			532			624	0.3772E-02	721
440	0.5649E 02	0.5781F 02	537	0.9578E 01	0.9907E 01	629		726
445			542			634	0.2125F-02	731
450	0.5765F 02	0.6016E 02	547	0.6624E 01	0.7088F 01	639		736

DISCOVERER JUNE 3, 1970 70.80 METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 1125

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552			644
362		0.2046E 01	459	0.3120E 02	0.2774E 02	557	0.1074E 01	0.1046F 01	649
367			464			561			654
371		0.3114E 01	469	0.2691E 02	0.3078E 02	566	0.6448E 00	0.6211E 00	658
376			474			571			663
381		0.5006E 01	479	0.3133E 02	0.2892F 02	576	0.2166E 00	0.2180F 00	668
386			484			581			673
391		0.7503E 01	488	0.2727E 02	0.2715F 02	586	0.2641E-01	0.3129E-01	678
396			493			591			683
401		0.1601E 02	498	0.1900E 02	0.1911E 02	596	0.6119F-02		687
406			503			596			692
411		0.2044E 02	508	0.9437E 01	0.9724F 01	601			697
416			513			605			702
420		0.2355E 02	518	0.4587E 01	0.4787F 01	610			707
425			523			615			712
430		0.2335E 02	527	0.4164E 01	0.4158E 01	620			716
435			532			624			721
440	0.2855F 02	0.2976E 02	537	0.2881E 01	0.2755F 01	629			726
445			542			634			731
450	0.2963E 02	0.3057E 02	547	0.1672E 01	0.1668E 01	639			736

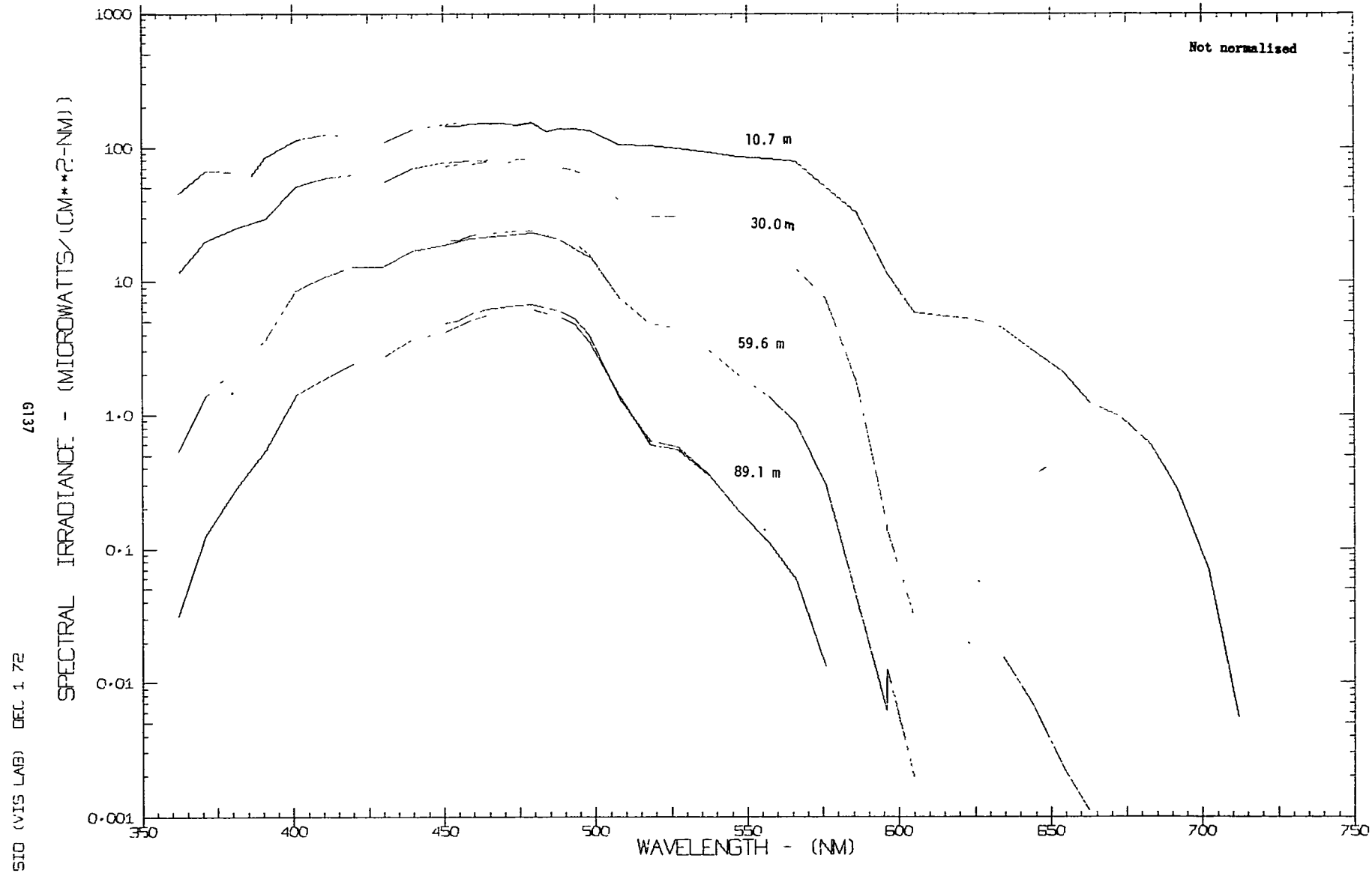
DISCOVERER JUNE 3, 1970 70.80 METERS DOWNWELLING 25,47.3N 74,14.0W STATION 23 TIME 1137

CALIBRATED IRRADIANCES FOR ABOVE STATION
FIRST NUMBER IS THE TRUE WAVELENGTH
SECOND AND THIRD NUMBERS ARE THE IRRADIANCES IN (MICROWATTS/CM**2-NM)

357			455			552		644
362		0.2138E 01	459	0.2774E 02	0.3163E 02	557	0.1046E 01	649
367			464			561		654
371		0.3221E 01	469	0.3078E 02	0.3182E 02	566	0.6211E 00	658
376			474			571		663
381		0.5021E 01	479	0.2892E 02	0.3166E 02	576	0.2180E 00	668
386			484			581		673
391		0.7532E 01	488	0.2715E 02	0.2738E 02	586	0.3129E-01	678
396			493			591		683
401		0.1558E 02	498	0.1911E 02	0.1931E 02	596	0.9180E-02	687
406			503			596	0.6582E-02	692
411		0.1933E 02	508	0.9724E 01	0.9360E 01	601		697
416			513			605	0.1378E-02	702
420		0.2232E 02	518	0.4787E 01	0.4589E 01	610		707
425			523			615		712
430		0.2242E 02	527	0.4158E 01	0.4069E 01	620		716
435			532			624		721
440	0.2976E 02	0.2889E 02	537	0.2755E 01	0.2836E 01	629		726
445			542			634		731
450	0.3057E 02	0.2992E 02	547	0.1668E 01	0.1658E 01	639		736

DISCOVERER MAY 4, 1970

DOWNWELLING

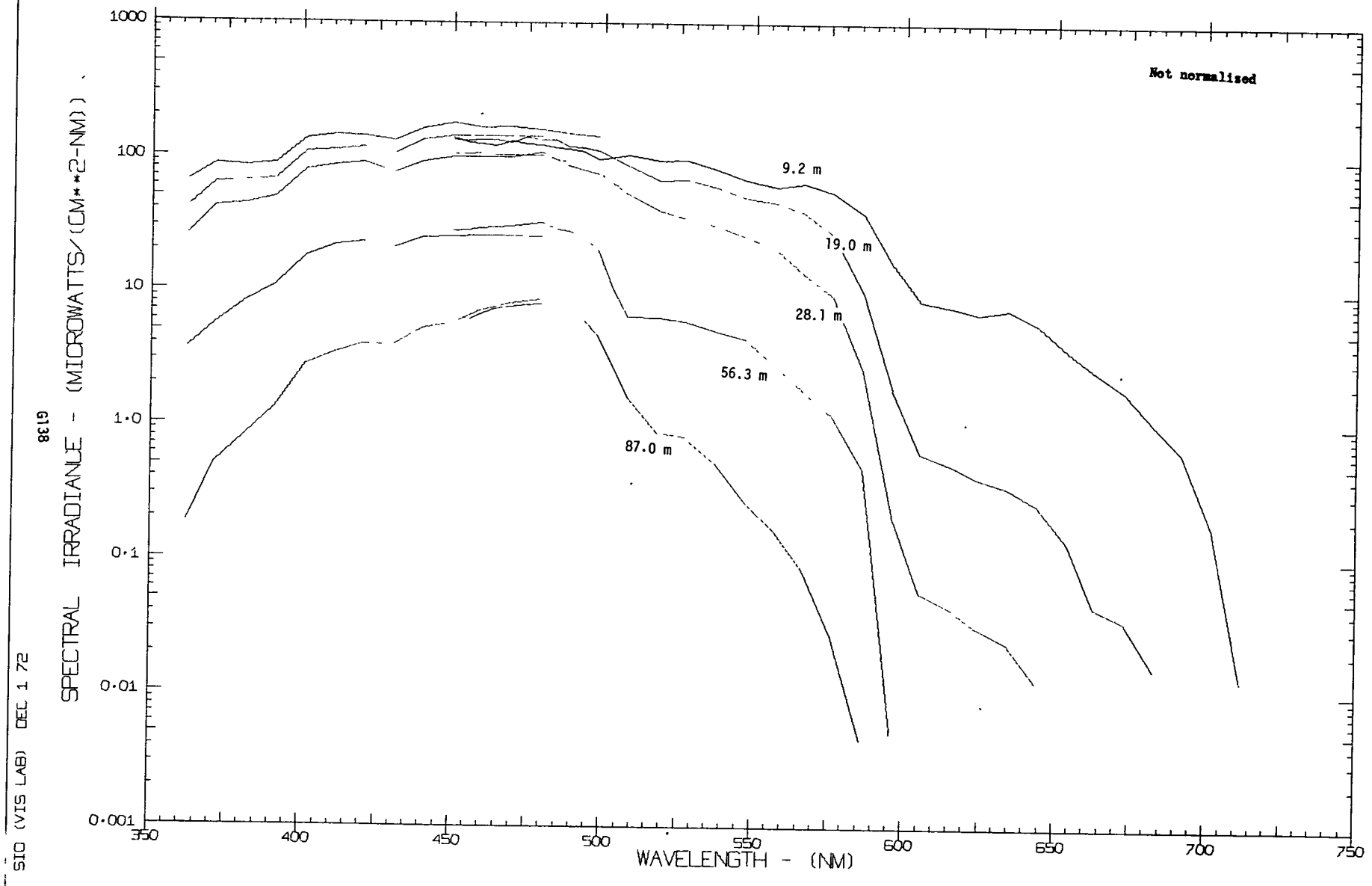


SIO (VIS LAB) DEC 1 72

6137

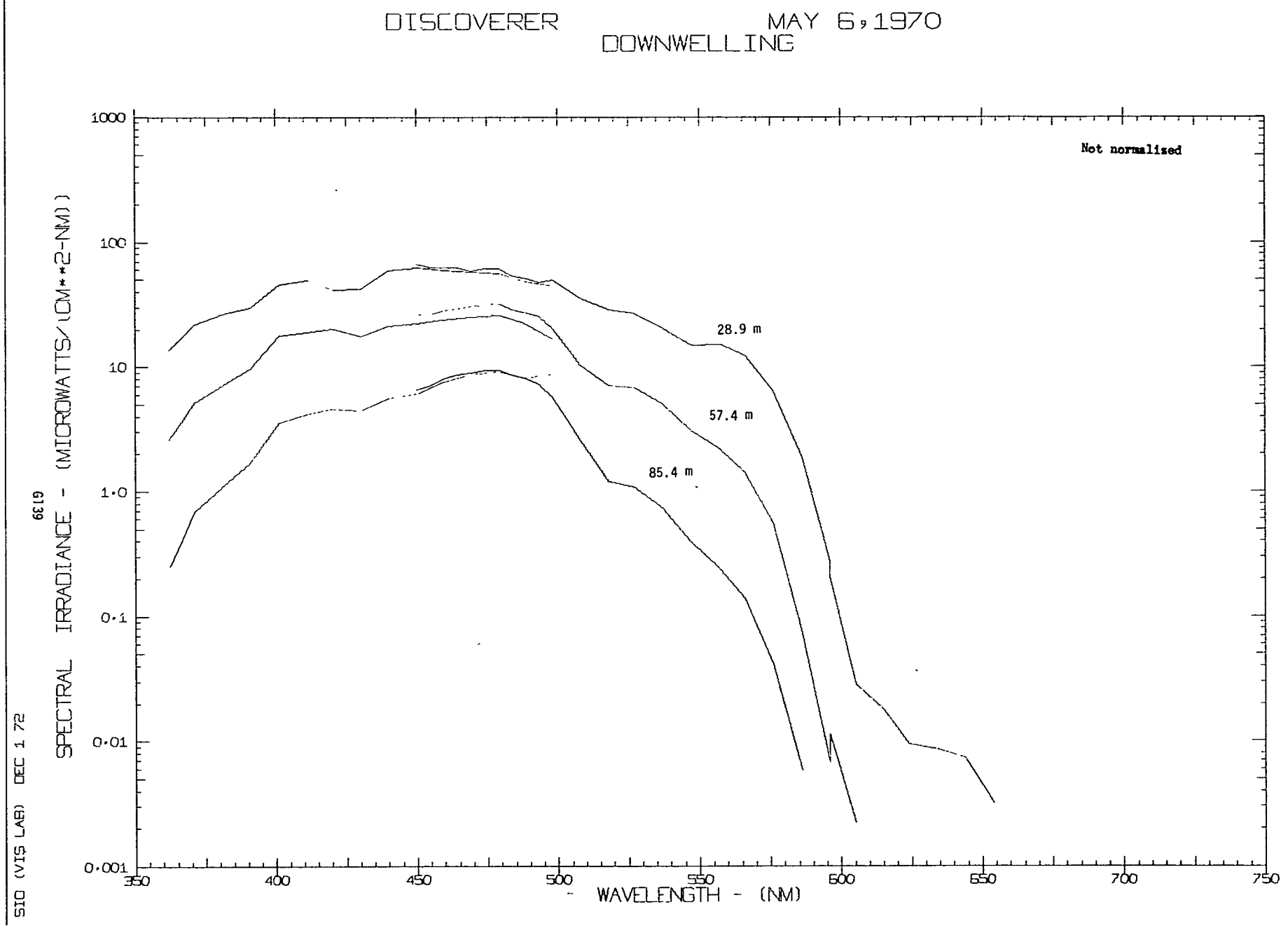
DISCOVERER MAY 5, 1970

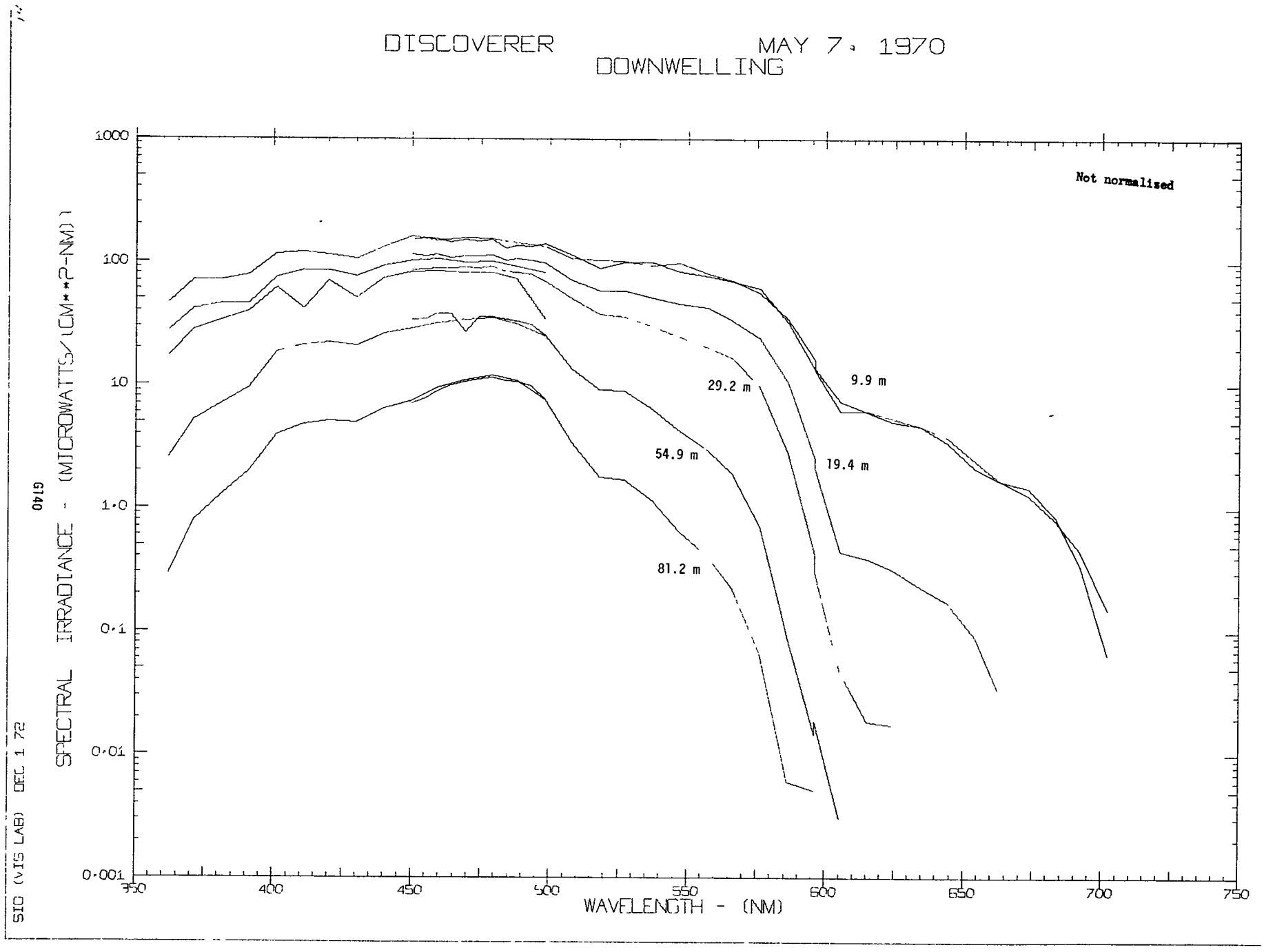
DOWNWELLING



SIO (VIS LAB) DEC 1 72

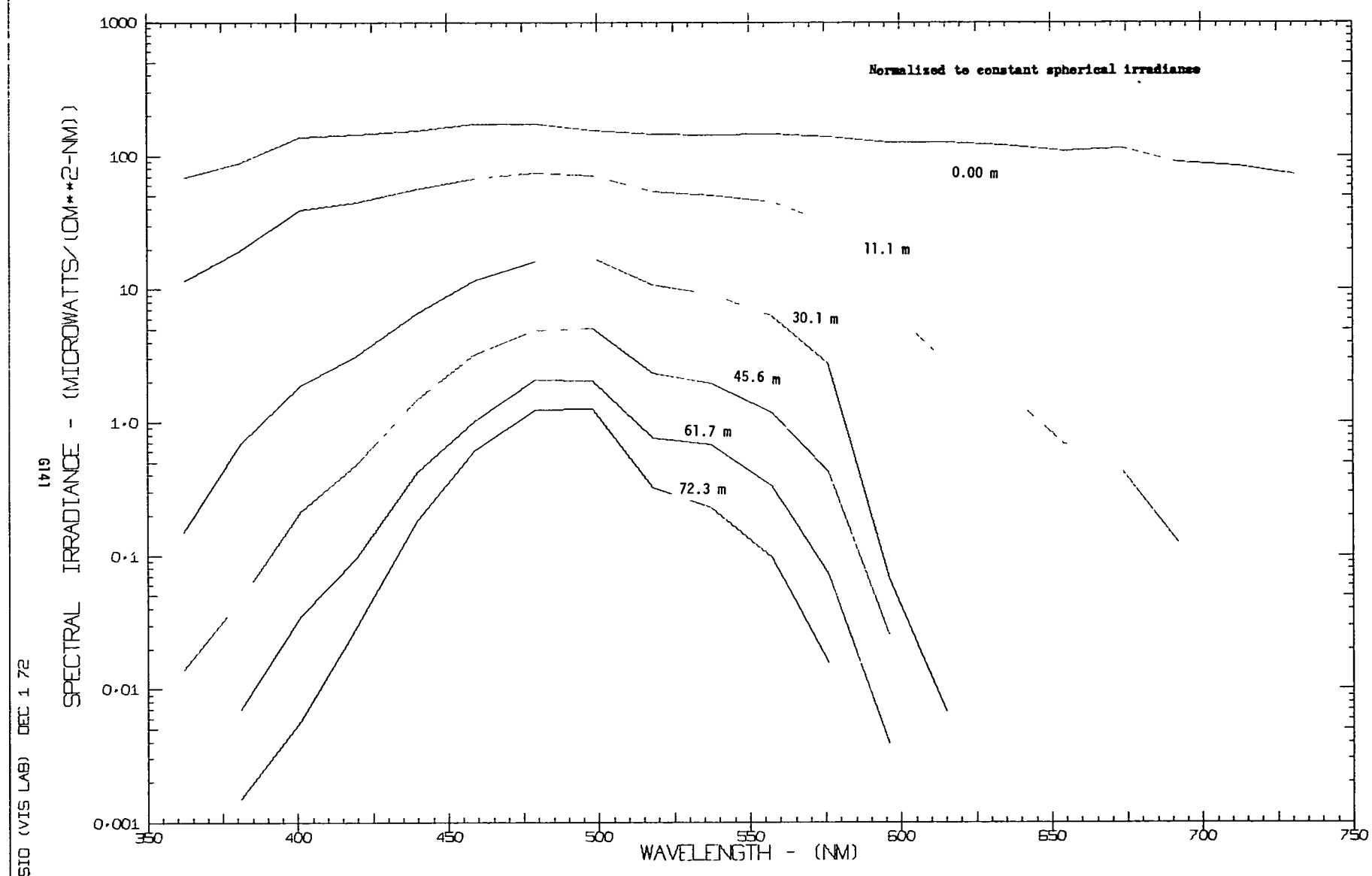
6138


DISCOVERER
MAY 6, 1970
DOWNWELLING
Not normalised
28.9 m
57.4 m
85.4 m
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2-NM))
WAVELENGTH - (NM)
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
600
650
700
750
6139
SIO (VIS LAB) DEC 1 72


DISCOVERER
MAY 7, 1970
DOWNWELLING
Not normalised
9.9 m
29.2 m
19.4 m
54.9 m
81.2 m
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2-NM))
WAVELENGTH - (NM)
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
600
650
700
750
6140
SIO (VIS LAB) DEC 1 72

DISCOVERER MAY 12, 1970

DOWNWELLING

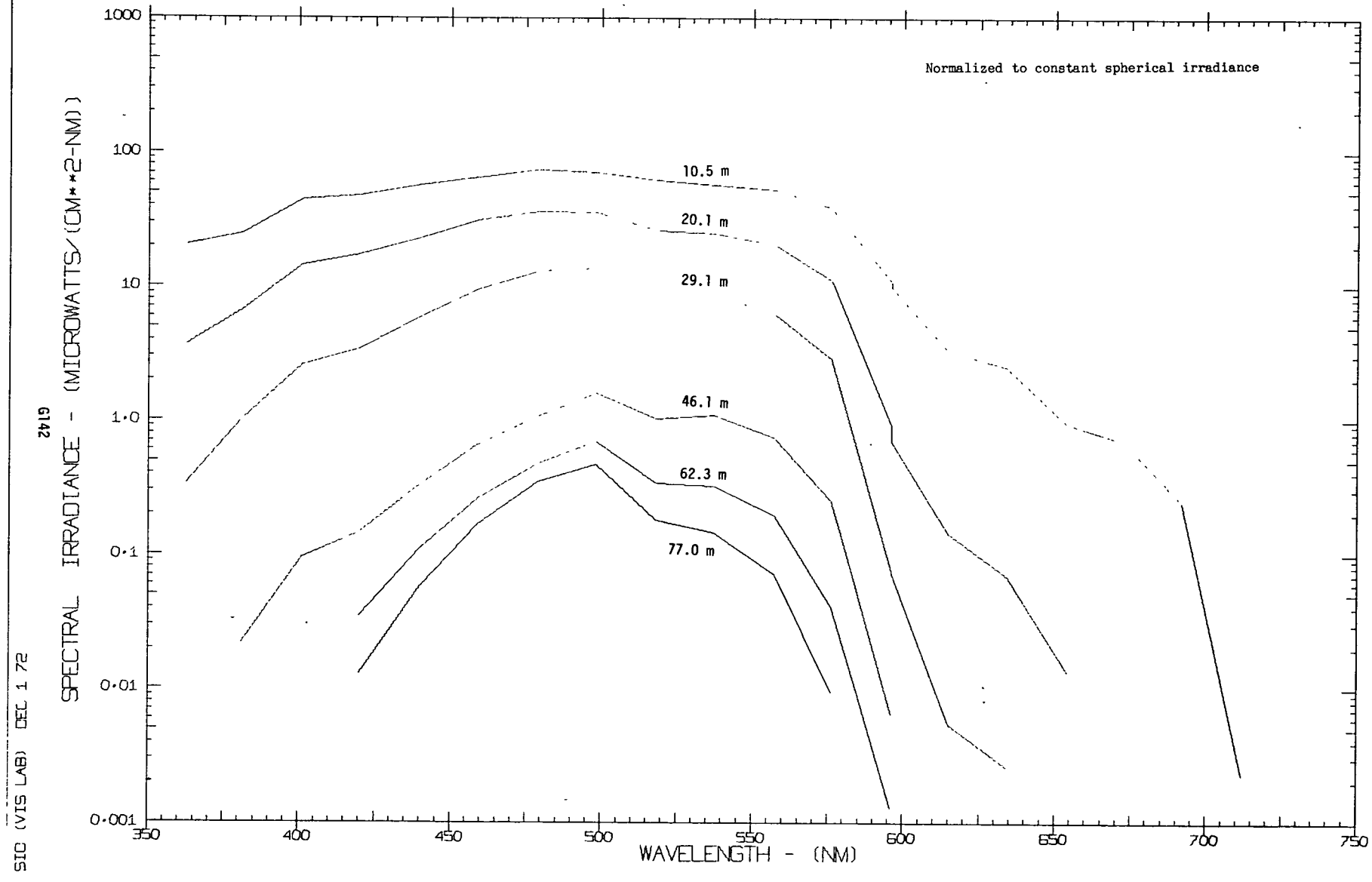


SIO (VIS LAB) DEC 1 72

6141

DISCOVERER MAY 13, 1970

DOWNWELLING

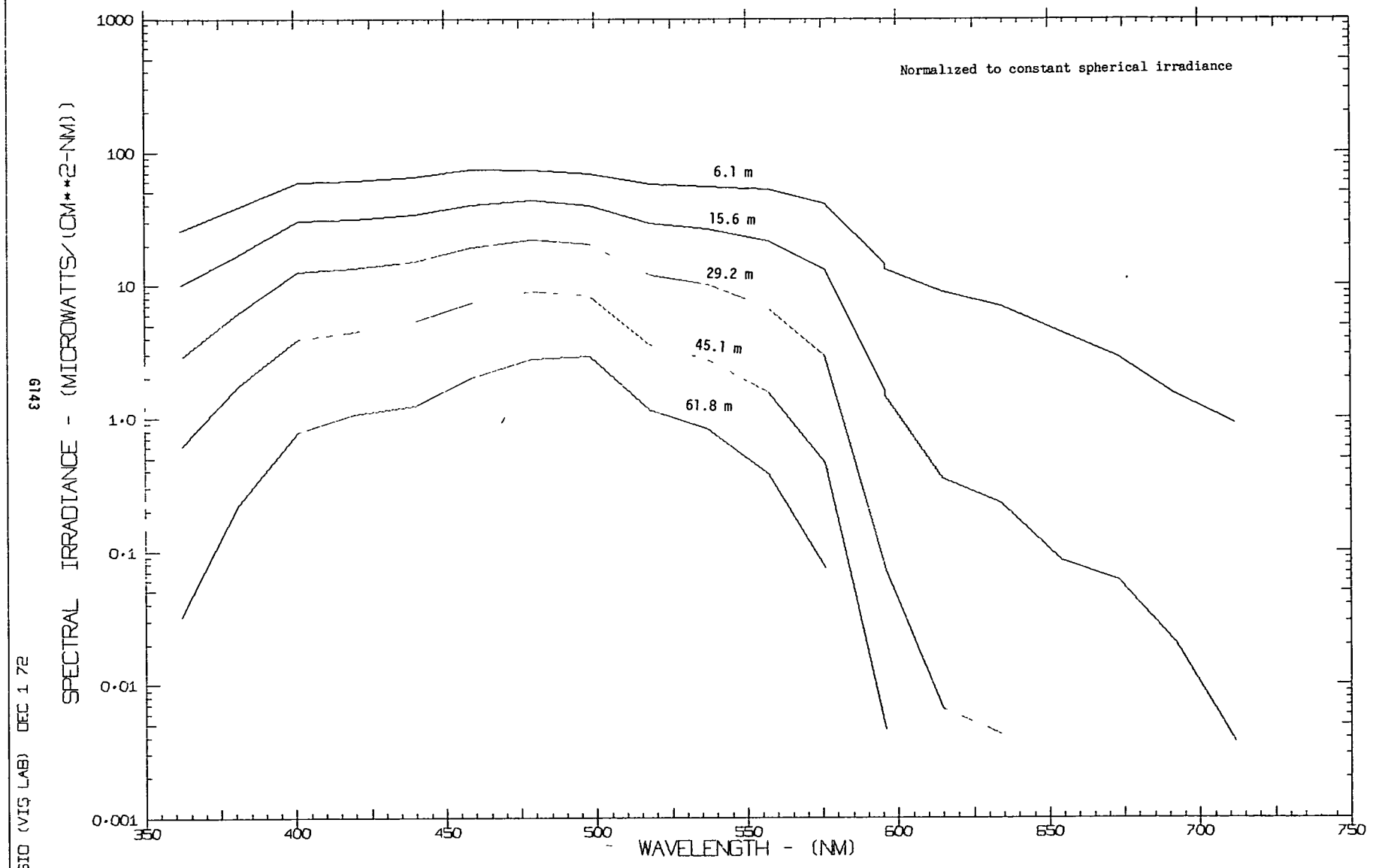


6142

SIO (VIS LAB) DEC 1 72

DISCOVERER MAY 14, 1970

DOWNWELLING

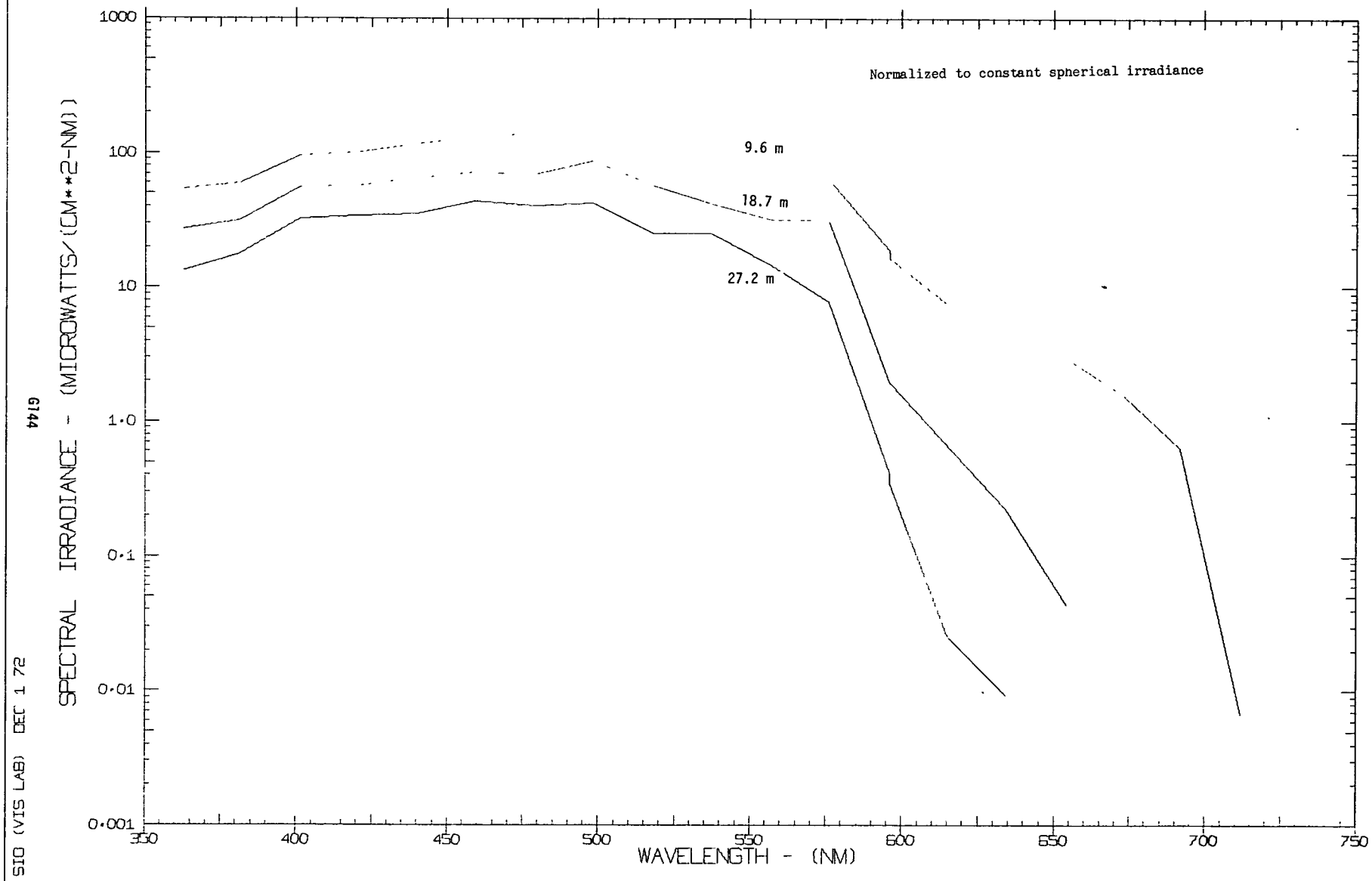


SIO (VIS LAB) DEC 1 72

6143

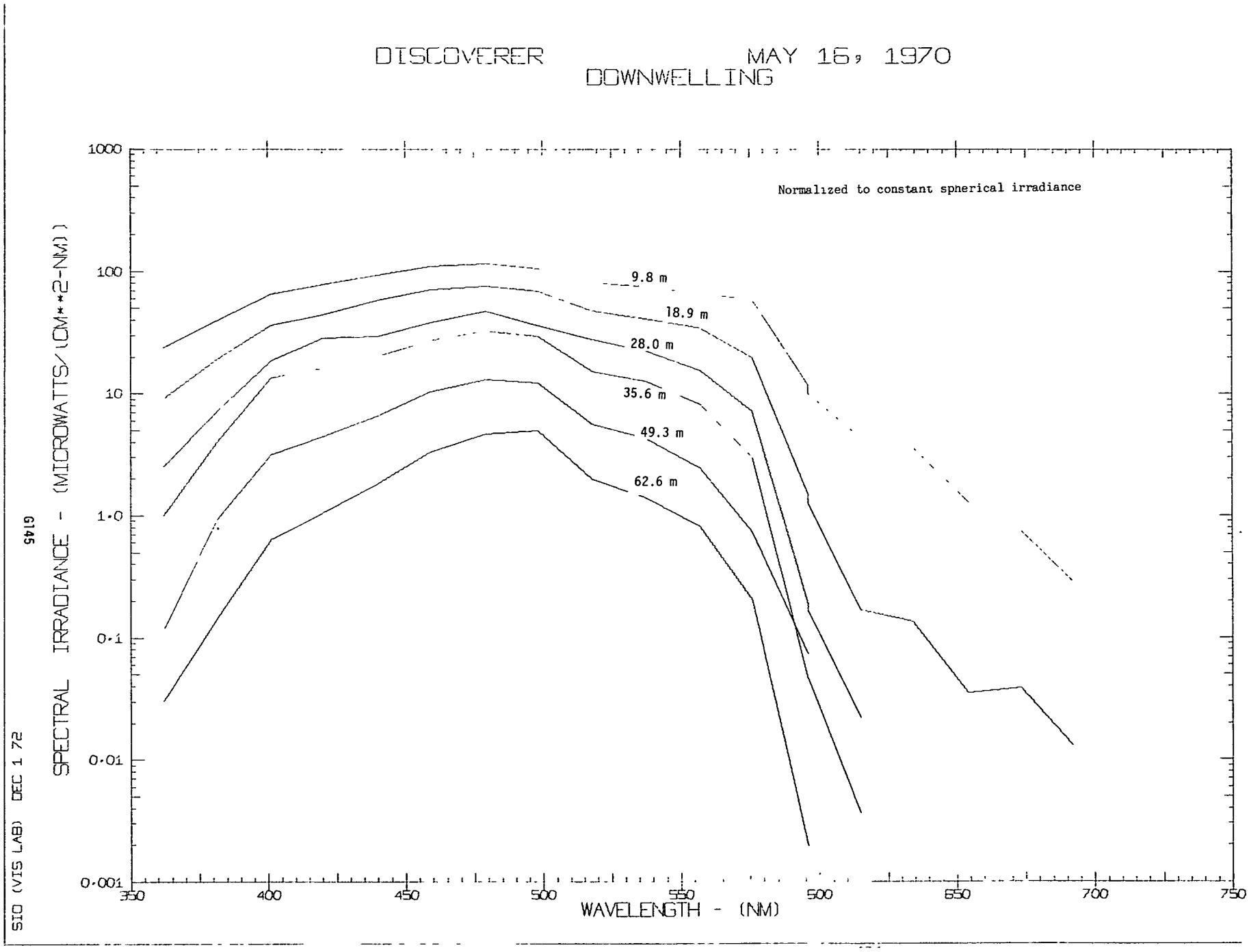
DISCOVERER MAY 15, 1970

DOWNWELLING



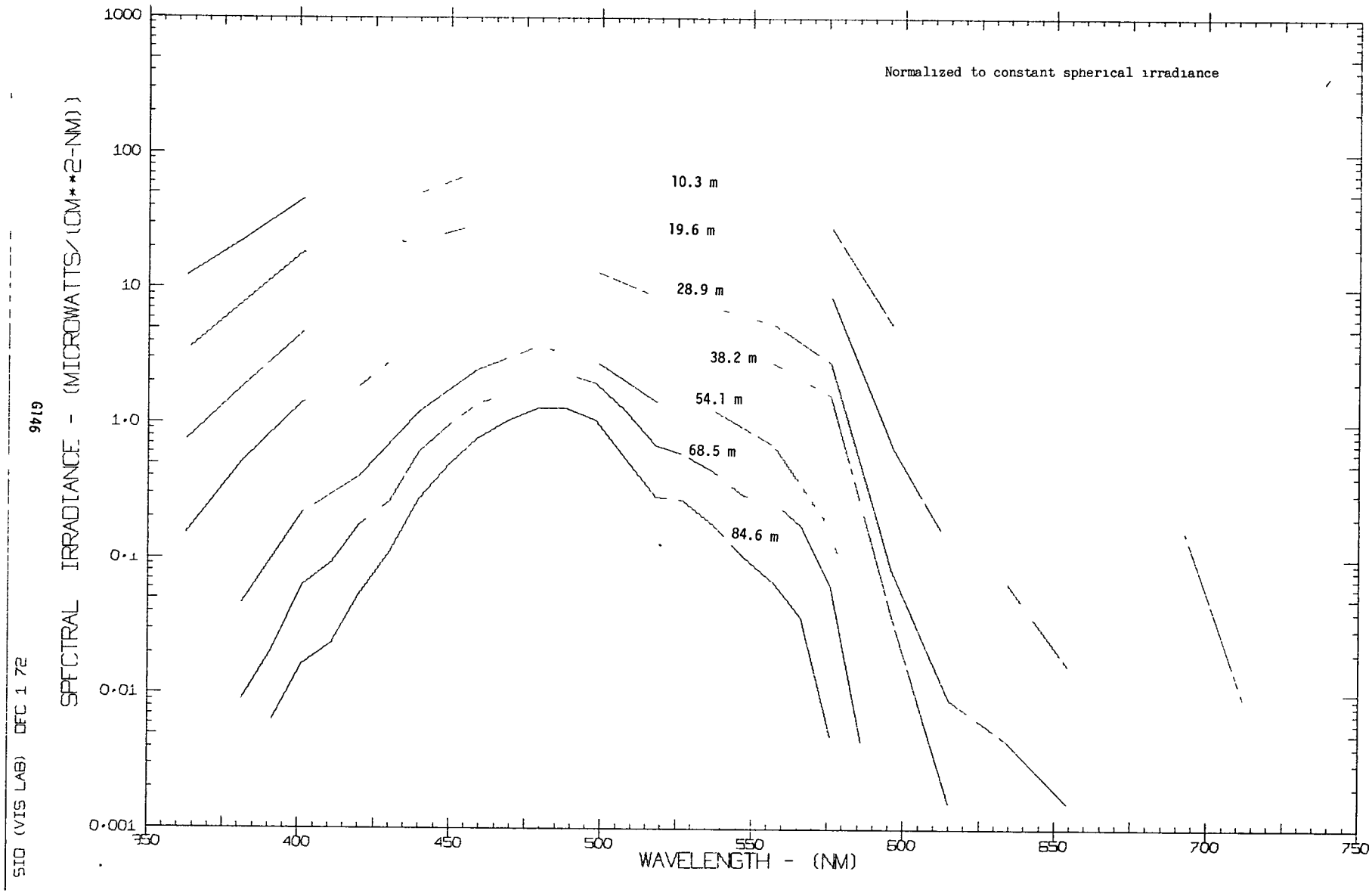
6144

SIO (VIS LAB) DEC 1 72


DISCOVERER
MAY 16, 1970
DOWNWELLING
Normalized to constant spherical irradiance
9.8 m
18.9 m
28.0 m
35.6 m
49.3 m
62.6 m
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2-NM))
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
600
650
700
750
WAVELENGTH - (NM)
SIO (VIS LAB) DEC 1 72
6145

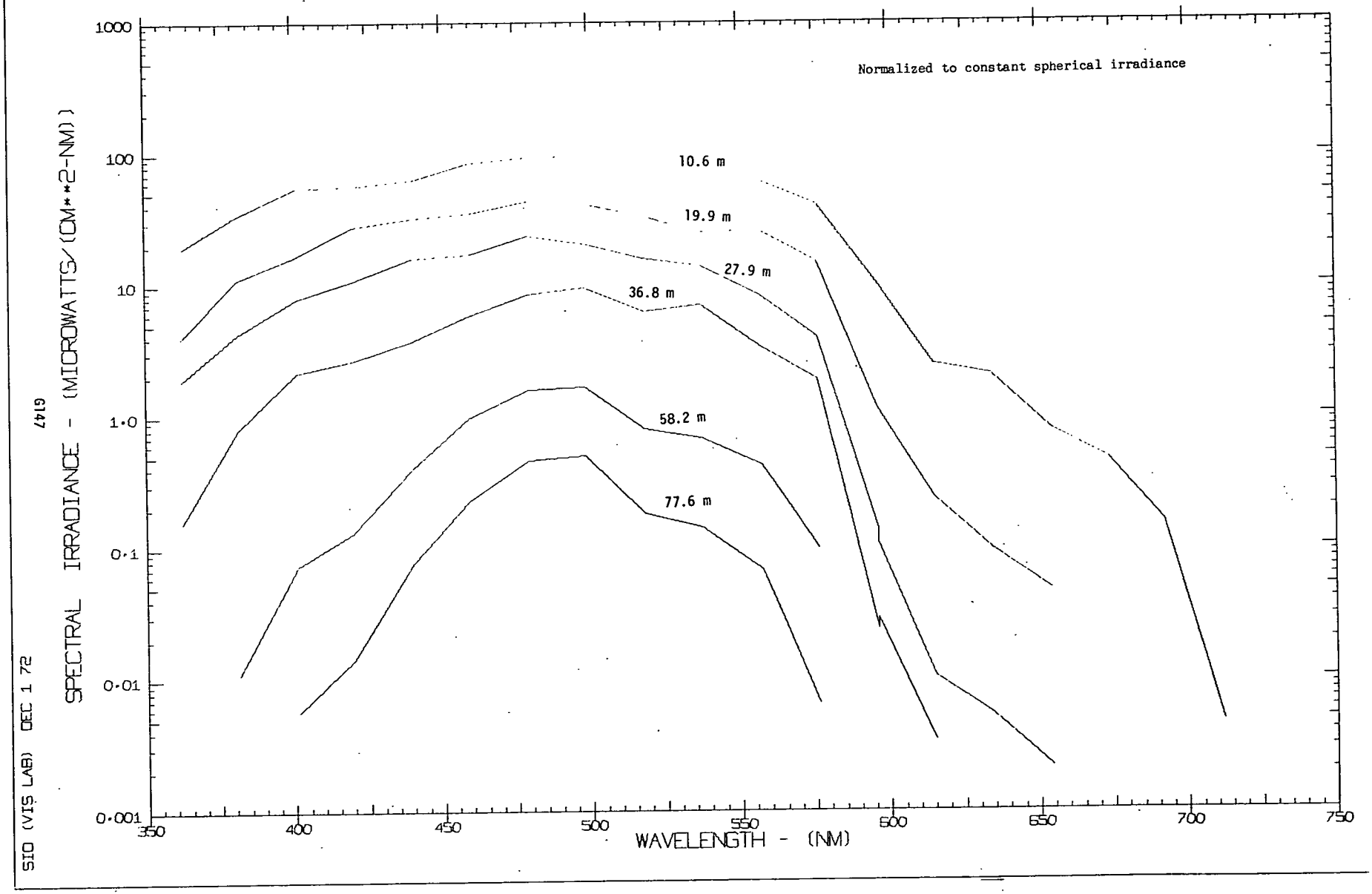
DISCOVERER MAY 17, 1970

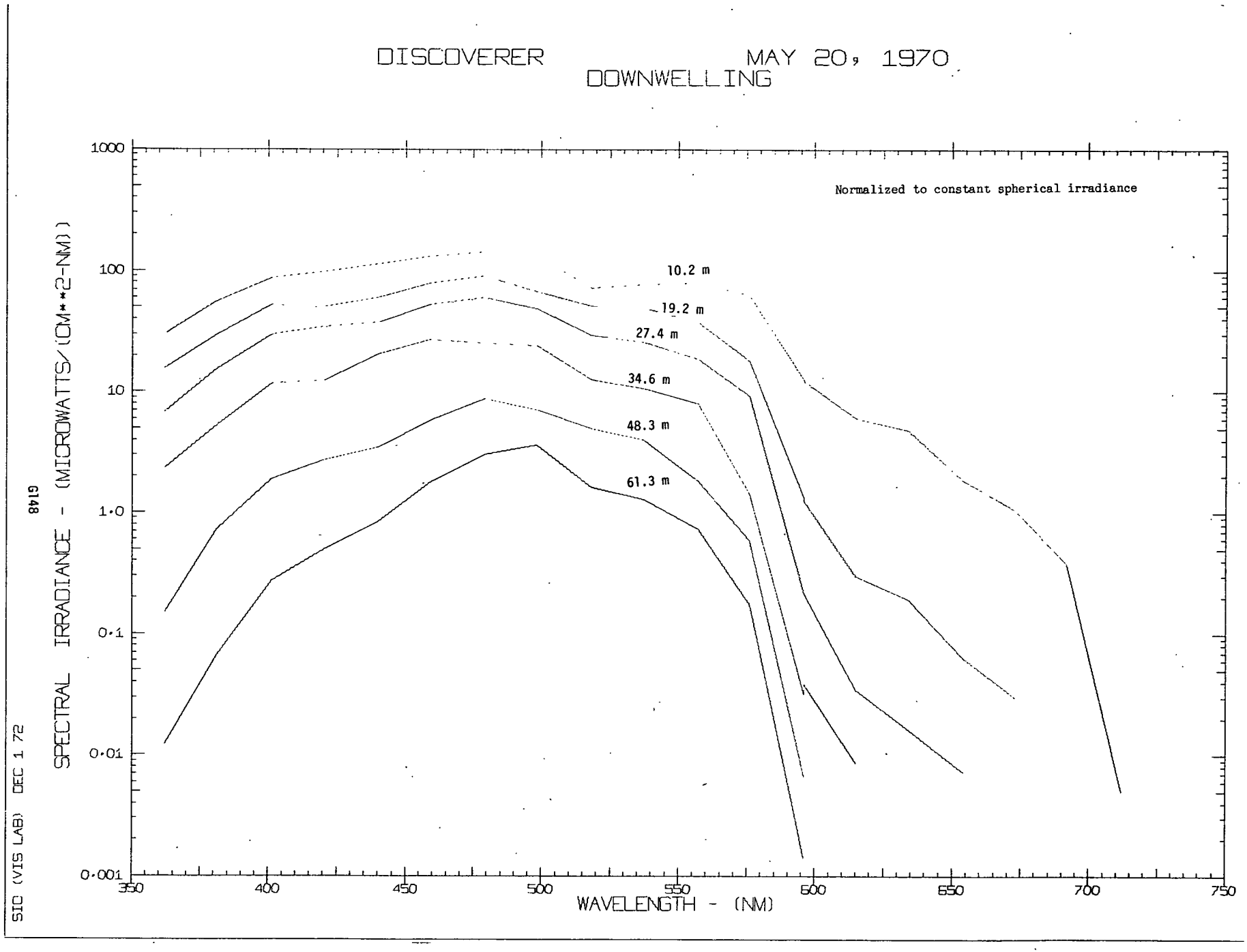
DOWNWELLING



DISCOVERER MAY 18, 1970

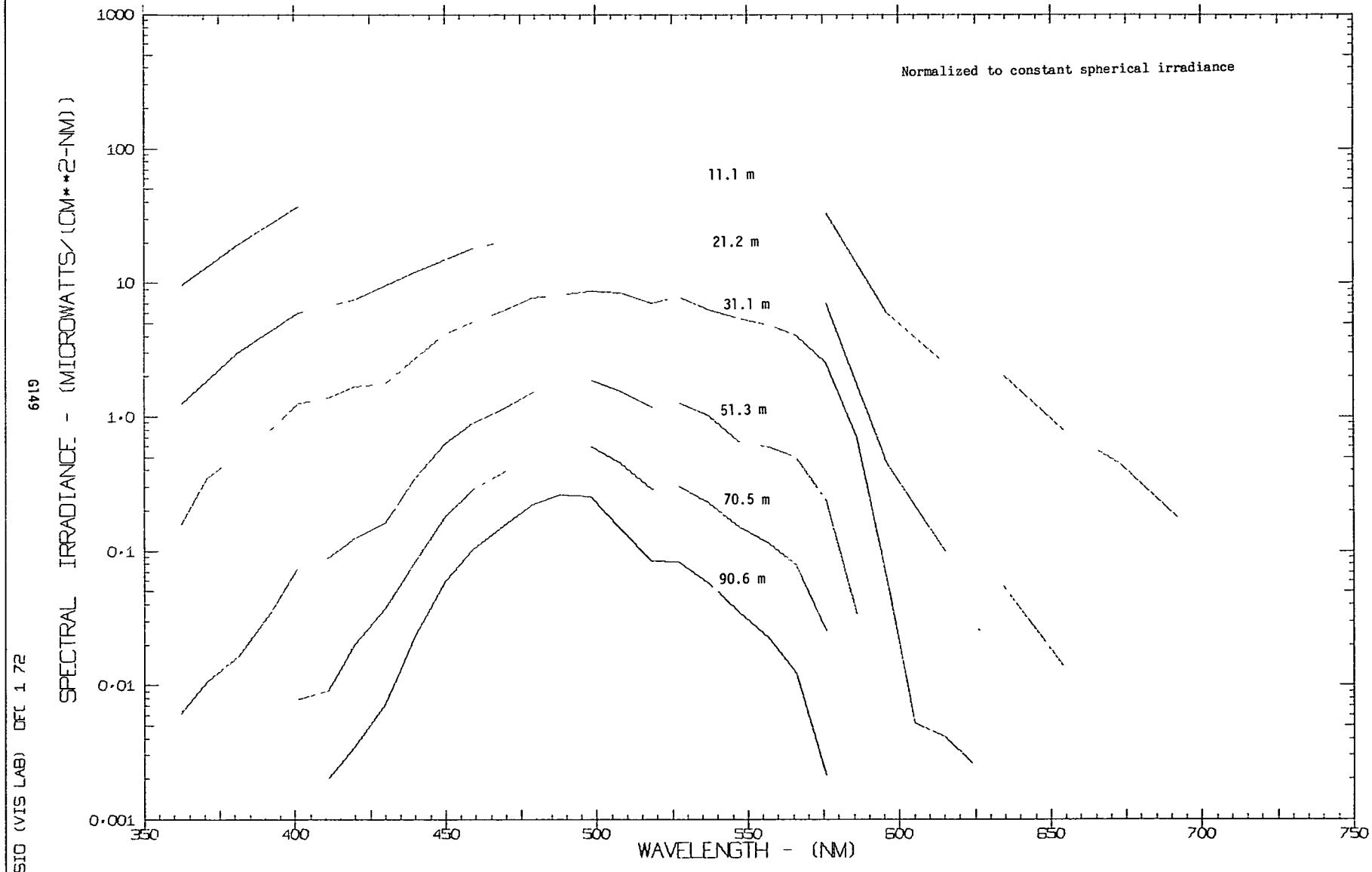
DOWNWELLING




DISCOVERER
MAY 20, 1970
DOWNWELLING
Normalized to constant spherical irradiance
10.2 m
19.2 m
27.4 m
34.6 m
48.3 m
61.3 m
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2-NM))
WAVELENGTH - (NM)
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
600
650
700
750
6148
SIO (VIS LAB) DEC 1 72

DISCOVERER MAY 21, 1970

DOWNWELLING

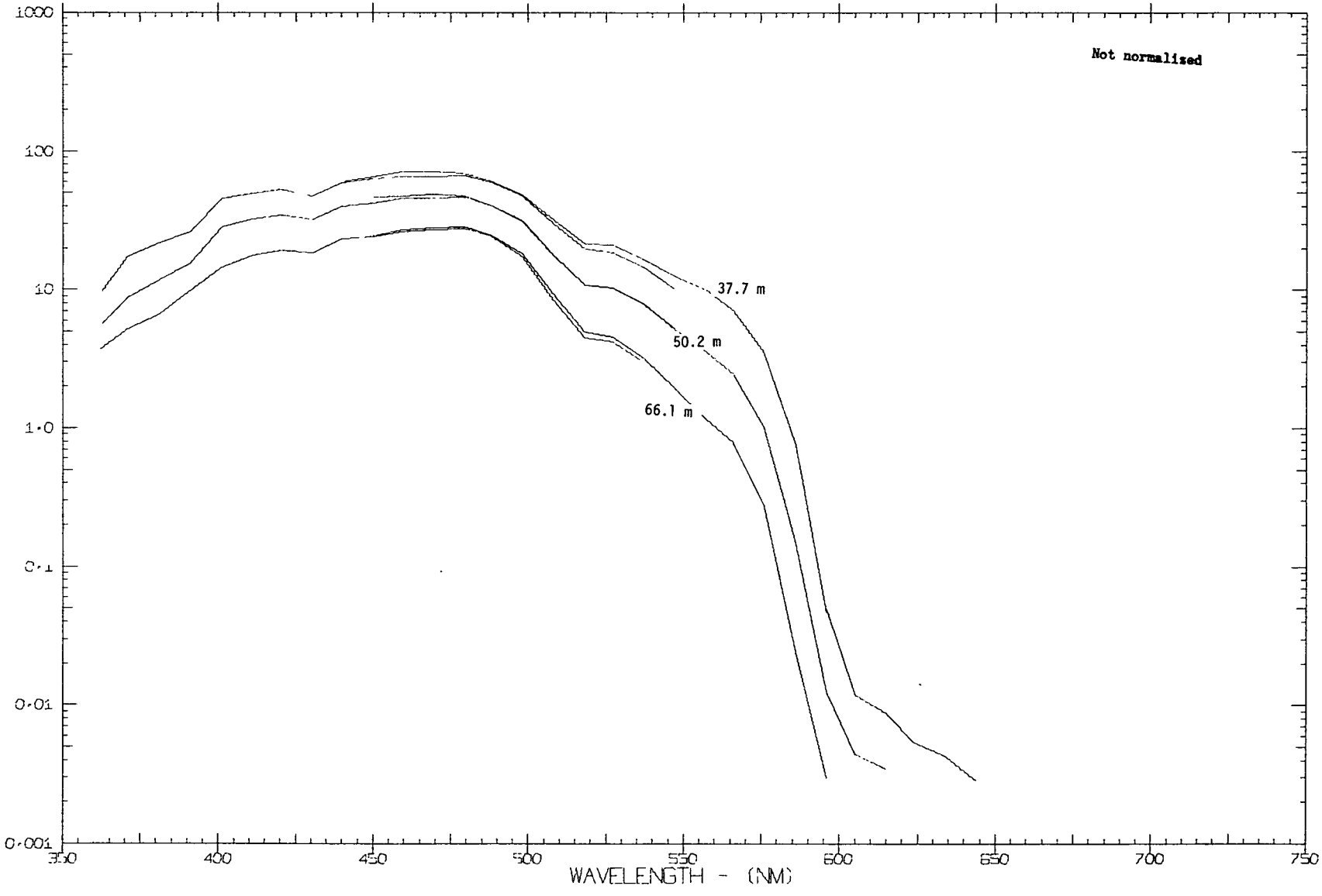


6149

SIO (VIS LAB) DEC 1 72

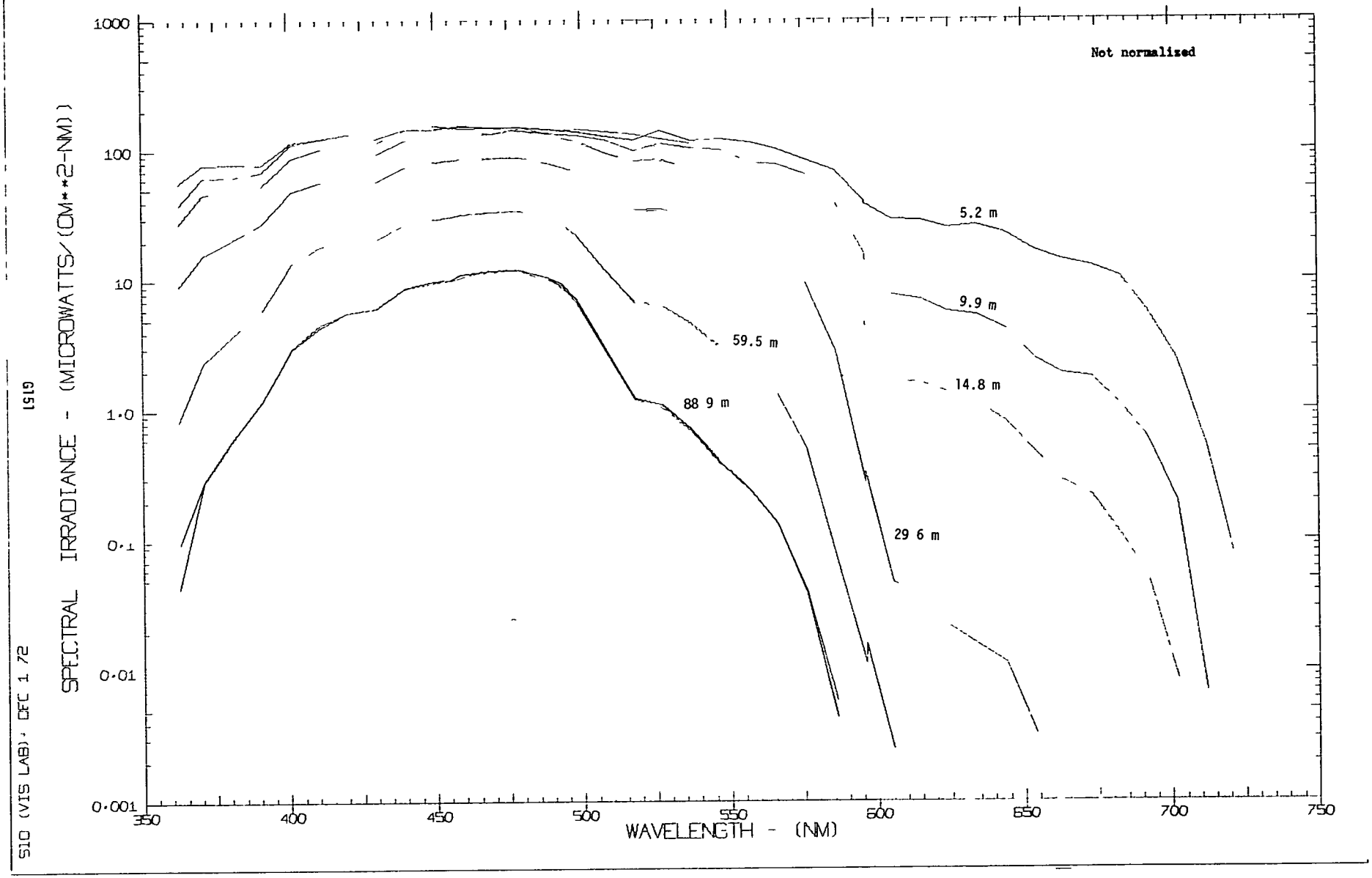
DISCOVERER MAY 29, 1970

DOWNWELLING



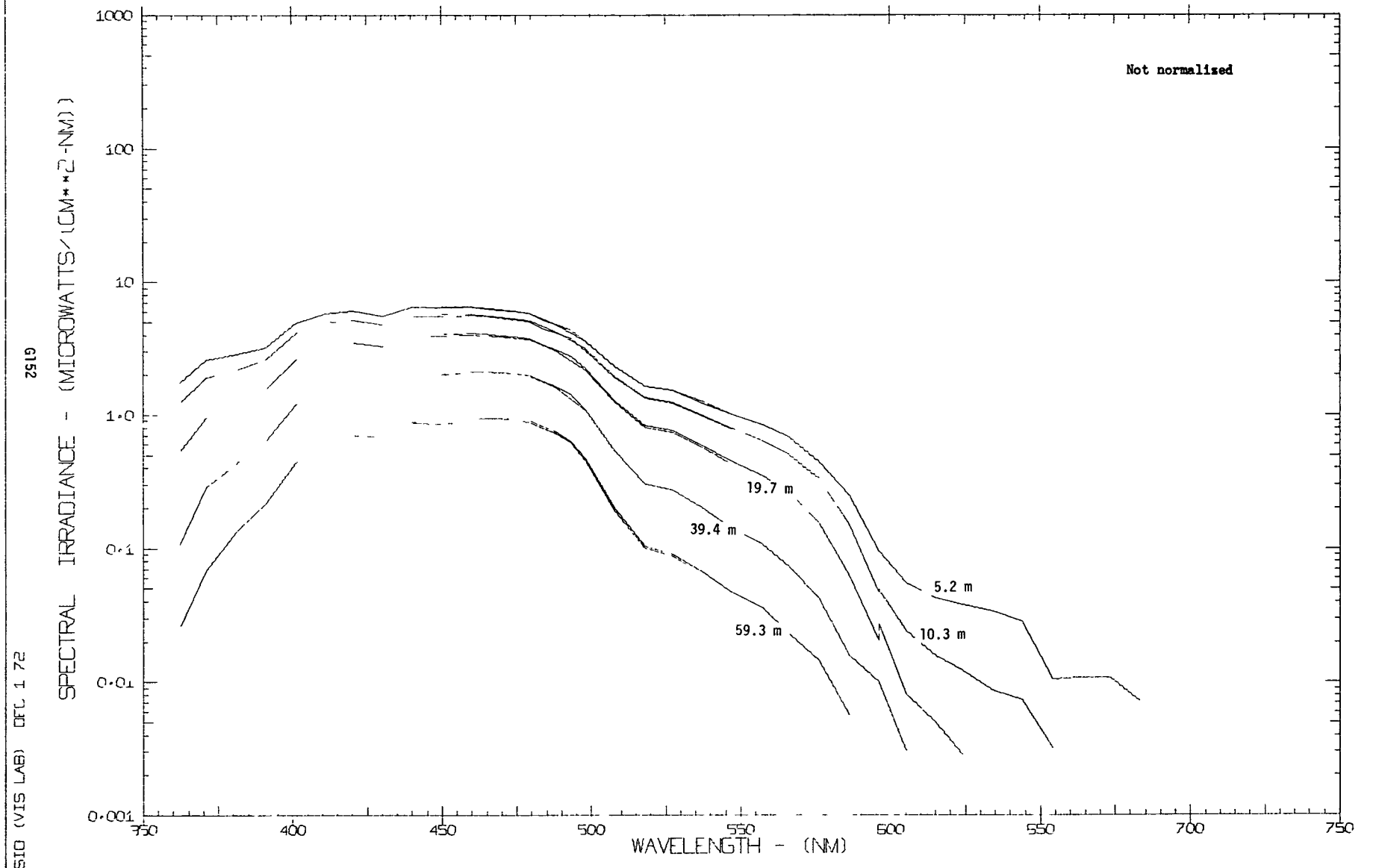
6150

SIO (VIS LAB) DEC 1 72


DISCOVERER
MAY 30, 1970
DOWNWELLING
Not normalized
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2-NM))
WAVELENGTH - (NM)
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
600
650
700
750
5.2 m
9.9 m
14.8 m
29 6 m
59.5 m
88 9 m
S10 (VIS LAB), DEC 1 72
6151

DISCOVERER MAY 30, 1970

UPWELLING

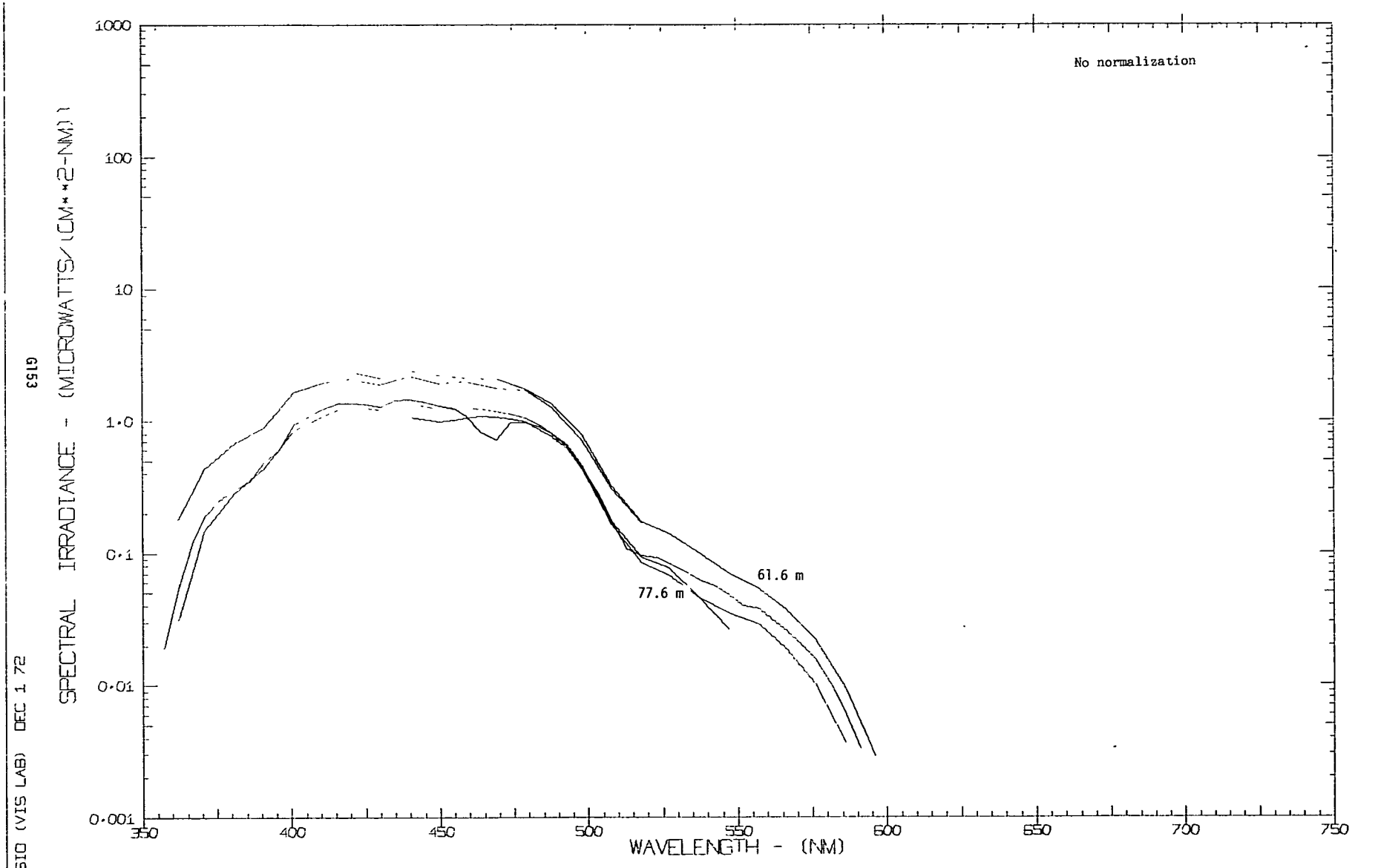


SIO (VIS LAB) DEC 1 72

6152

DISCOVERER JUNE 1, 1970

UPWELLING

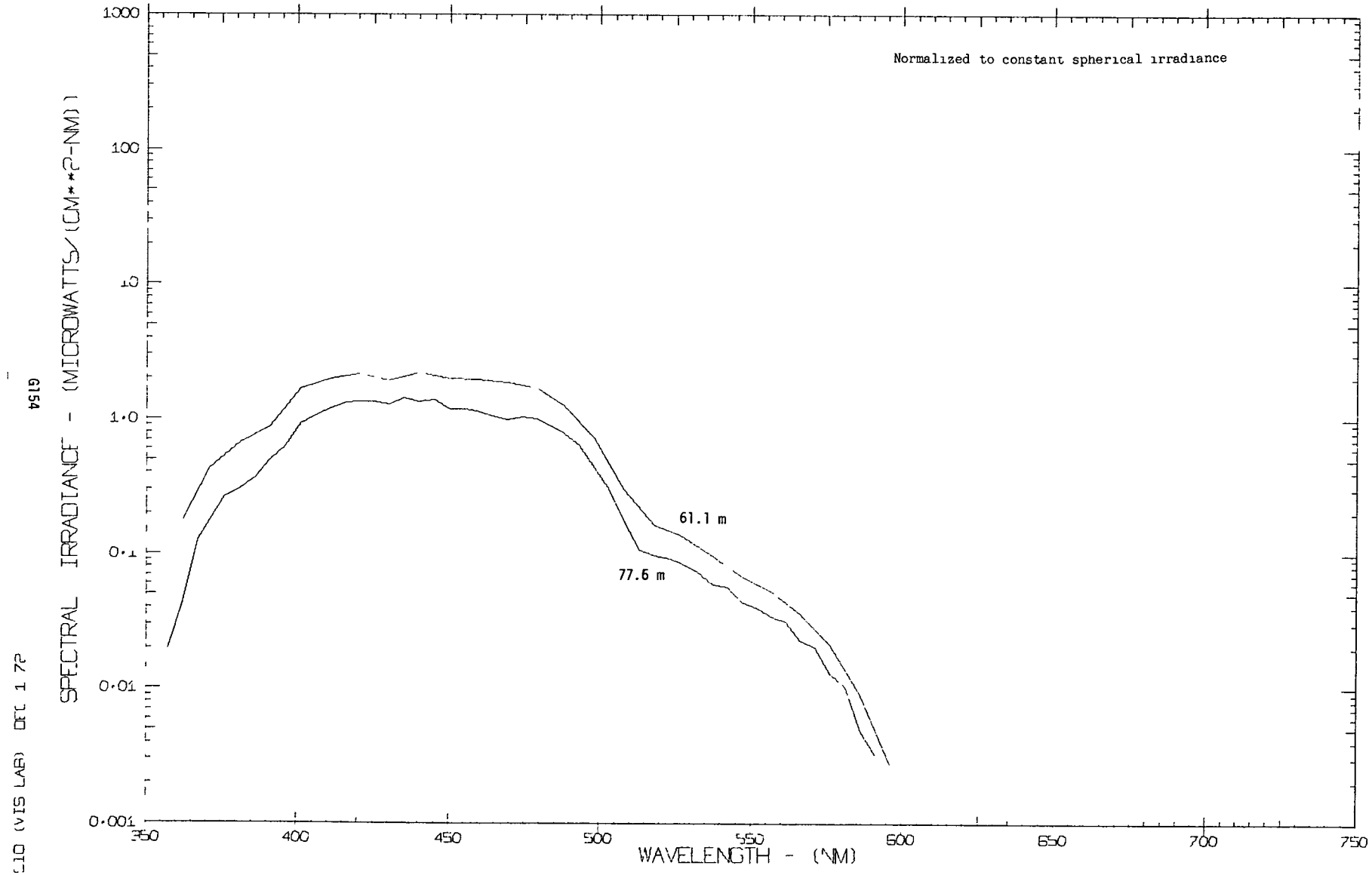


SIO (VIS LAB) DEC 1 72

6153

DISCOVERER JUNE 1, 1970

UPWELLING

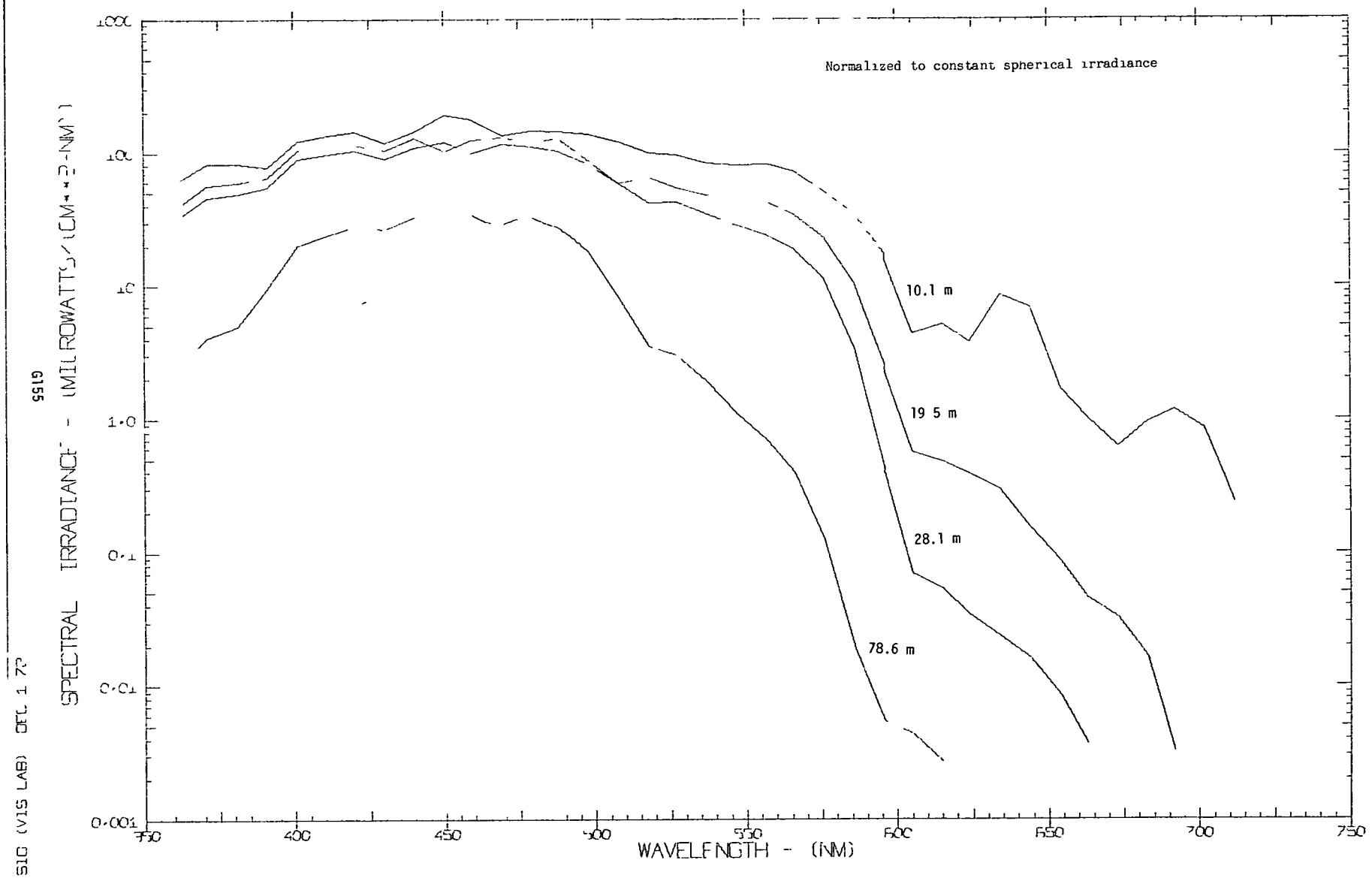


G154

C10 (VIS LAB) DEC 1 72

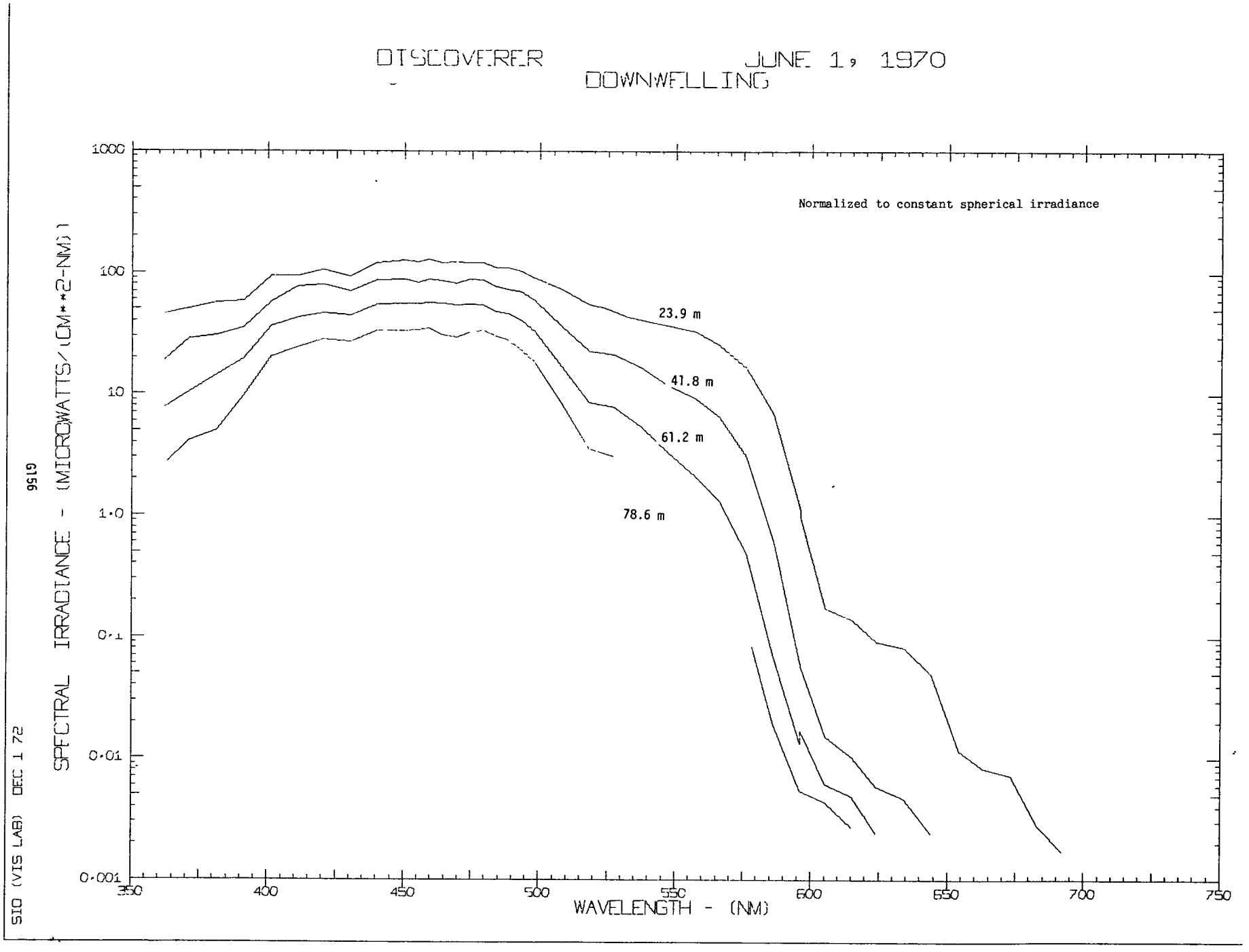
DISCOVERER [illegible] 1970

DOWNWELLING



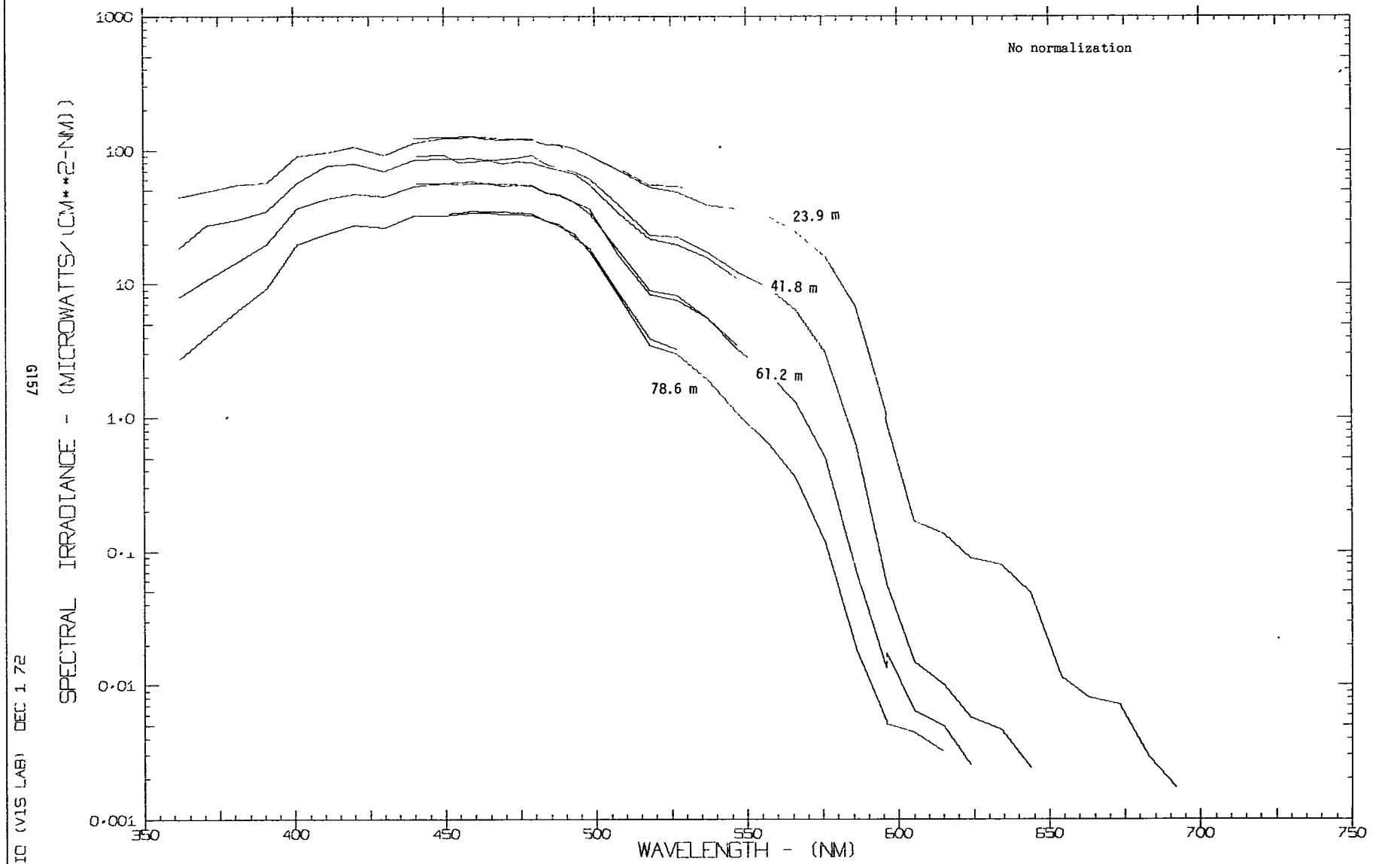
6155

SIO (VIS LAB) DEC 1 72


DISCOVERER
JUNE 1, 1970
DOWNWELLING
Normalized to constant spherical irradiance
23.9 m
41.8 m
61.2 m
78.6 m
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2-NM))
WAVELENGTH - (NM)
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
600
650
700
750
SIO (VIS LAB) DEC 1 72
9519
6156

DISCOVERER JUNE 1, 1970

DOWNWELLING

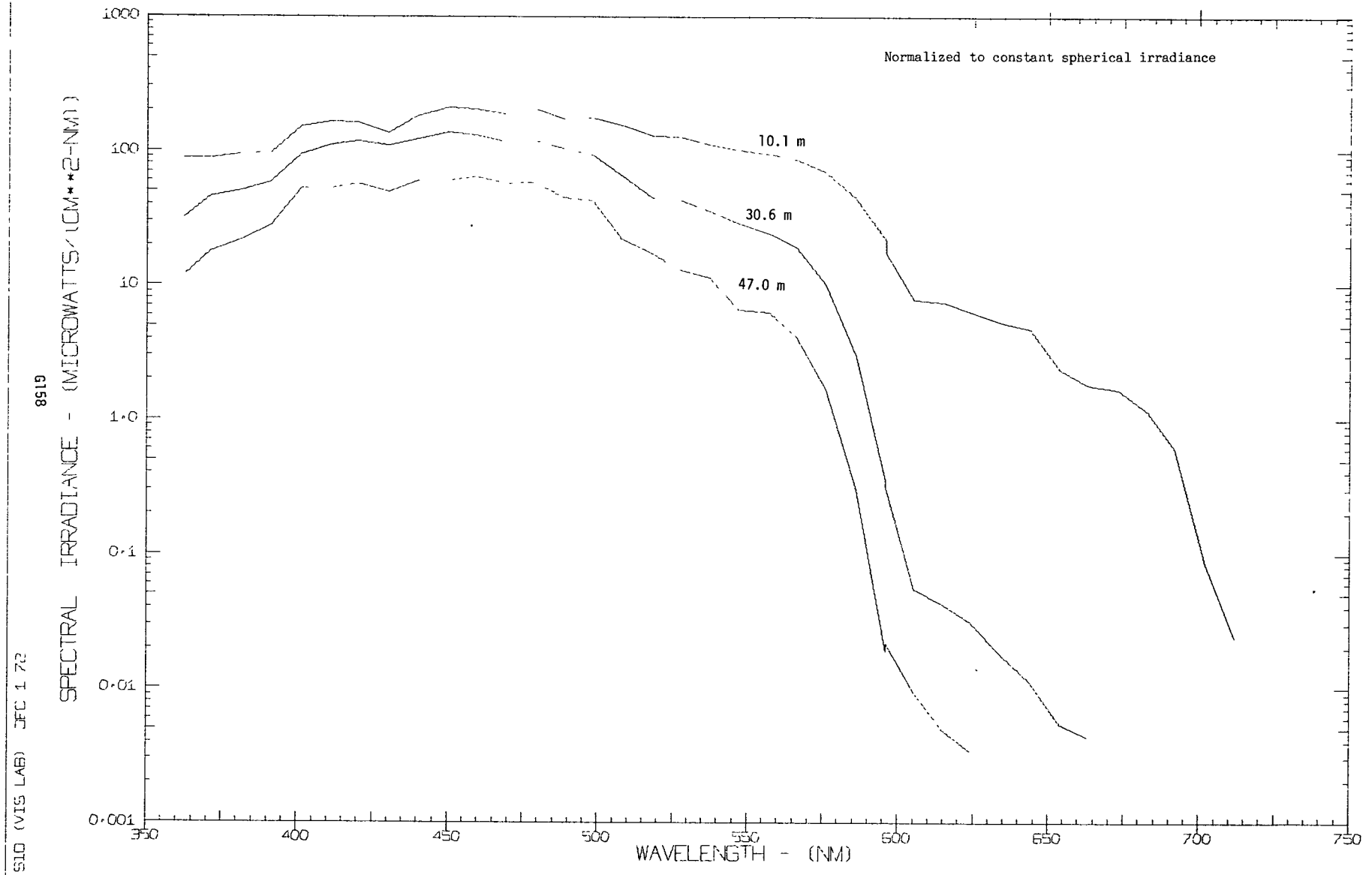


SIO (VIS LAB) DEC 1 72

6157

DISCOVERER JUNE 2, 1970

DOWNWELLING

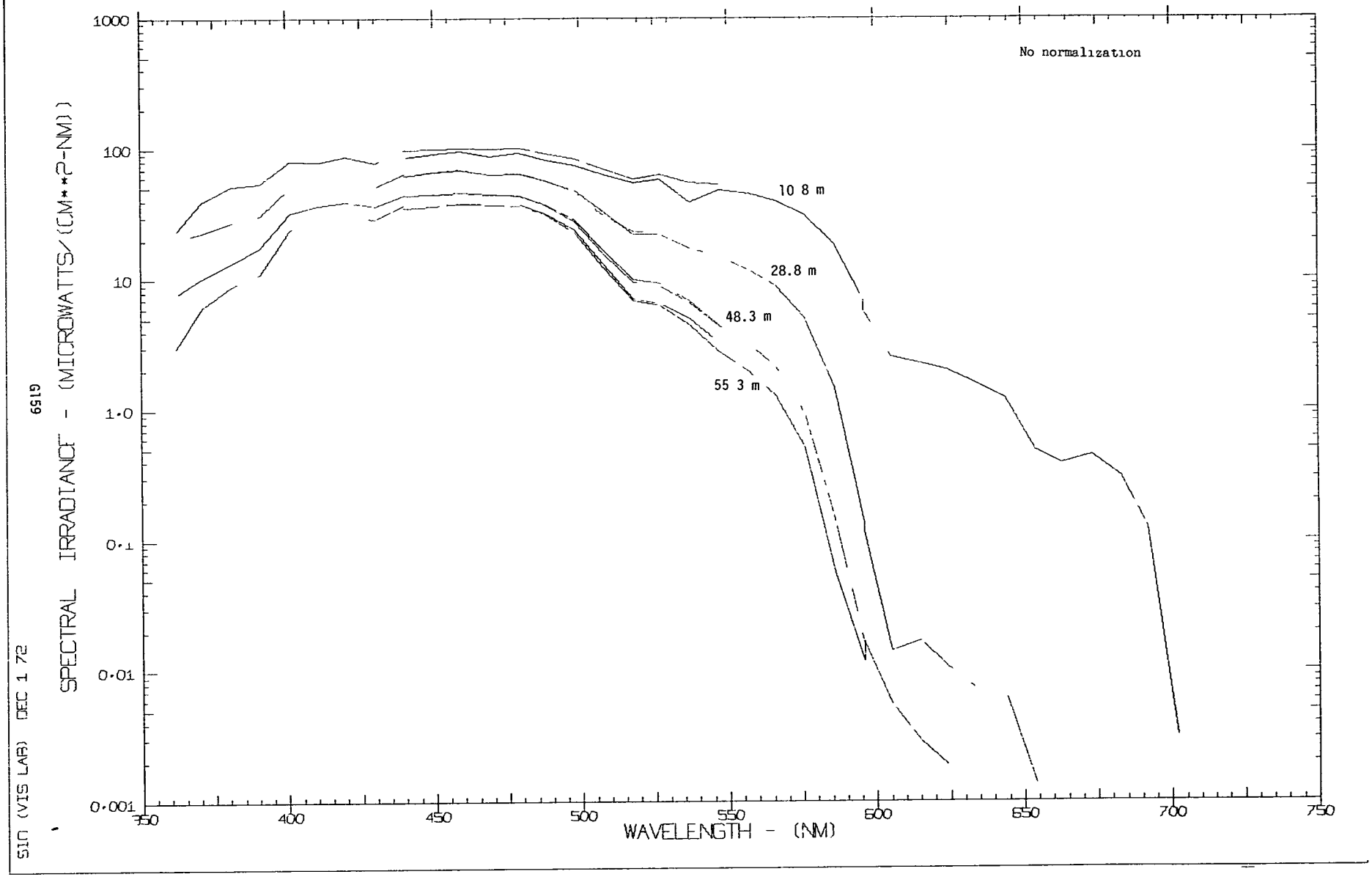


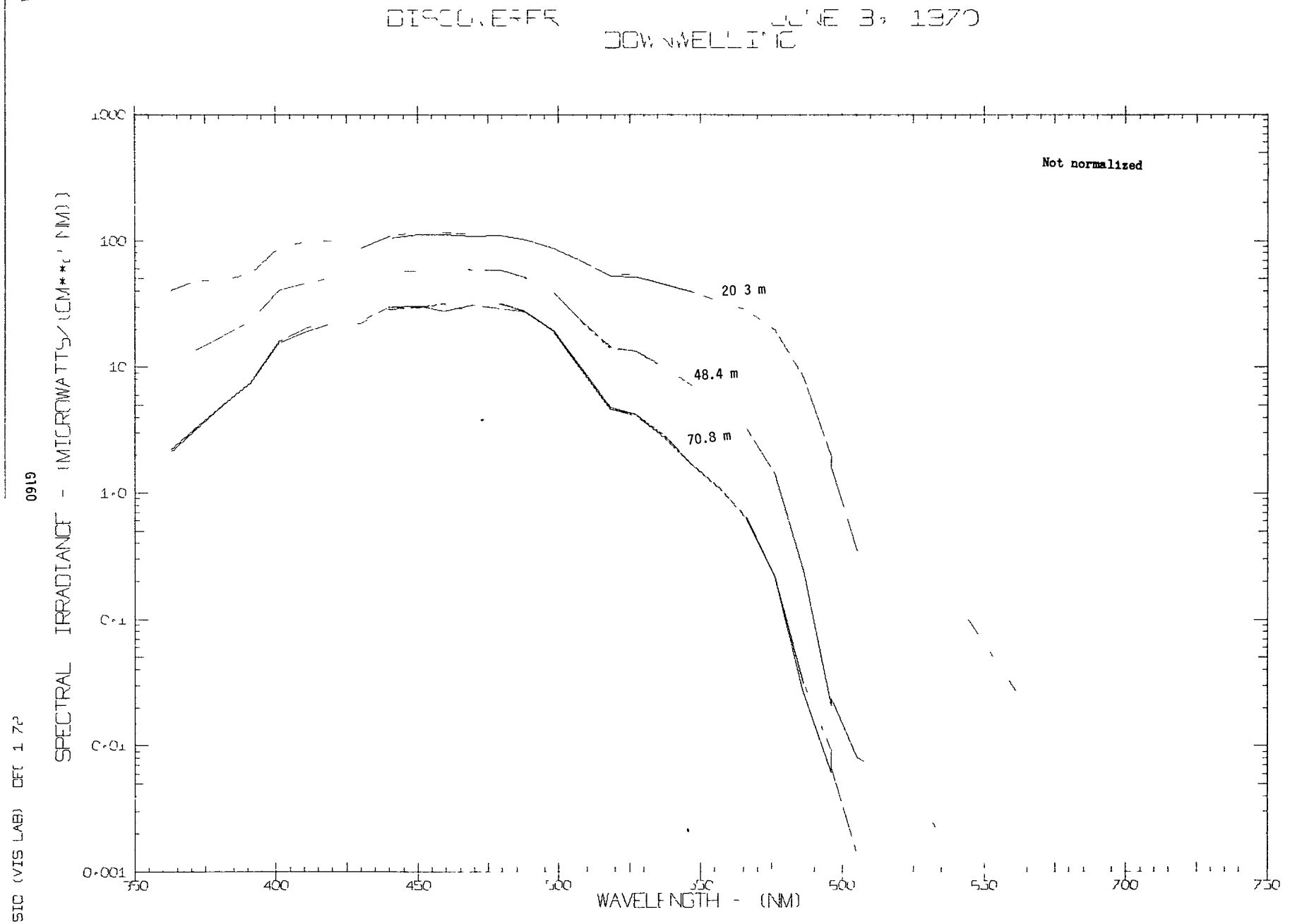
8519

SIO (VIS LAB) JFC 1 72

DISCOVERER JUNE 3, 1970

DOWNWELLING




DISCOVERER
DOWNWELLING
JUNE 3, 1970
Not normalized
20 3 m
48.4 m
70.8 m
SPECTRAL IRRADIANCE - (MICROWATTS/(CM**2 NM))
WAVELENGTH - (NM)
1000
100
10
1.0
0.1
0.01
0.001
350
400
450
500
550
700
750
0619
SIO (VIS LAB) OCT 1 72

S. C. O. R. DISCOVERER EXPEDITION

MAY 1970

Measurements of Radiant Energy at the Surface of the Ocean

Yu. E. Ochakovsky
assisted by
Anatol Susliaev

Radiant energy measurements at the surface of the ocean were obtained with three instruments; a calibrated pyranometer sensitive to radiant energy of all wavelengths; an Amici prism instrument which, by means of a template located in the spectrum formed by the Amici prism, restricted the bandwidth of the energy impinging on the phototube to the region from 400 to 700 nm, and provided equal sensitivity for all wavelengths within these limits; and a calibrated thermopile in conjunction with an electrolytic-type integrating meter. This latter instrument used the thermopile voltage for the electrolysis of H_2SO_4. The hydrogen thus produced caused a small mercury plug in a capillary tube to indicate against a scale calibrated in calories per m^2 (which have been converted to joules per m^2, in table 2).

The pyranometer and Amici prism instruments were connected to strip chart recorders and gave continuous recordings which in table 1 have been integrated over five-minute intervals.

The Amici prism instrument used a white diffusing plastic window for the measurement of irradiance. By means of a retaining ring, this collector was kept immersed in 5 cm of water in order to simulate the conditions to which the instrument is exposed when suspended in the ocean just below the water surface. This technique was employed in an effort to provide experimental correction for the immersion effect and for the losses of energy on passing through the air-water interface.

In table 1, column 1 gives sun time, column 2 gives the total watts per m^2 measured with a pyranometer, and column 3 gives the watts per m^2 within the bandwidth 400 to 700 nm. The values of accumulated power in columns 2 and 3 are for the five-minute intervals that appear to be bracketing each value. Blank entries in these tables are the result of spurious shadows or other effects, due to the presence of the ship which resulted in a recording that was not meaningful to the experimental work.

In table 2 are recorded the results obtained with the integrating thermopile. Column 1 is the time interval in sun time, column 2 gives the sun altitude measured with a navigational sextant, column 3 gives the sky conditions

(see below), and column 4 gives the total energy within the one hour intervals.

Sky conditions

0^2 the sun's disc is open

0 the sun is visible through the clouds and shadows are distinct

0° the sun is visible through a cover of dense clouds but poorly visible, shadows are not distinct

The fraction specifies the character of cloudiness, the numerator stands for total cloudiness, the denominator stands for the clouds of the lower layer. (Meteorological code in use through 1969)

Ci cirus

Cs cirro-stratus

Ac alto-cumulus

Sc strato-cumulus

Cu cumulus

N_b are both used for
C_b cumolonimbus

The symbol ≡ means fog

The symbol ═ means haze

Table 1
Station #1

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici Prism		Total	Amici prism		Total	Amici prism
I2.00	890	473	I4.00	748	378	I6.00	408	2II
05	640	284	05	734	378	05	388	I98
I0	566	272	I0	7I8	366	I0	374	I90
I5	494	260	I5	708	366	I5	354	I84
20	4I6	232	20	702	355	20	342	I79
25	478	260	25	686	343	25	334	I64
I2.30	508	253	I4.30	686	343	I6.30	3I6	I58
35	748	346	35	662	333	35	296	I46
40	-	-	40	662	333	40	278	I35
45	864	485	45	640	33I	45	264	I27
50	854	426	50	624	32I	50	244	II6
55	846	426	55	6I6	3I4	55	226	I08
I3.00	846	426	I5.00	594	300	I7.00	2I4	93
05	846	426	05	580	293			
I0	838	4I4	I0	566	289			
I5	832	4I4	I5	550	285			
20	822	4I4	20	536	276			
25	822	4I4	25	522	268			
I3.30	8I4	390	I5.30	508	260			
35	798	390	35	486	25I			
40	782	390	40	478	247			
45	782	390	45	464	238			
50	766	390	50	450	230			
55	748	46I	55	422	2I9			
I4.00			I6.00					

Table 1
Station # 2

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	890	437	14.00	782	384	16.00	308	160
05	898	437	05	772	378	05	290	160
10	890	437	10	748	371	10	348	160
15	882	437	15	748	371	15	334	171
20	864	437	20	724	363	20	303	127
25	882	437	25	708	363	25	200	118
12.30	882	437	14.30	708	356	16.30	284	148
35	872	437	35	686	352	35	316	162
40	864	437	40	678	348	40	252	82
45	864	425	45	662	344	45	238	122
50	864	437	50	550	287	50	200	112
55	872	437	55	464	249	55	290	122
13.00	846	425	15.00	436	232	17.00	226	108
05	854	425	05	408	224	05	226	103
10	846	425	10	422	236	10	220	99
15	832	414	15	408	215	15	200	84
20	822	414	20	368	196	20	172	82
25	814	414	25	522	274	25	164	78
13.30	814	414	15.30	550	268	17.30	-	-
35	806	414	35	464	224	35	-	-
40	798	414	40	430	209	40	94	40
45	798	414	45	396	198	45	70	34
50	838	402	50	348	164	50	58	29
55	788	390	55	296	148	55	52	24
14.00			16.00			18.00		

Table 1
Station #3

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	798	355	14.00	756	356	16.00	138	59
05	864	366	05	734	342	05	172	68
10	934	390	10	718	338	10	252	108
15	882	378	15	702	331	15	402	175
20	594	378	20	670	321	20	374	160
25	882	378	25	686	321	25	342	148
12.30	898	378	14.30	686	316	16.30	303	118
35	864	366	35	670	310	35	-	-
40	864	355	40	656	302	40	-	-
45	864	331	45	630	292	45	102	42
50	798	388	50	616	287	50	-	-
55	864	399	55	610	281	55	188	59
13.00	864	401	15.00	594	278	17.00	158	55
05	864	401	05	588	272	05	138	55
10	854	399	10	572	268	10	132	59
15	846	388	15	550	257	15	158	55
20	814	369	20	536	249	20	144	46
25	686	302	25	522	240	25	120	39
13.30	594	302	15.30	508	234	17.30	-	-
35	670	338	35	494	224	35	64	25
40	766	356	40	486	219	40	58	22
45	782	365	45	478	211	45	-	-
50	782	361	50	-	179	50	-	-
55	766	361	55	138	68	55	40	12
14.00			16.00			18.00		

Table 1

Station #6

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	694	268	14.00	766	325	16.00	374	160
05	624	268	05	740	312	05	348	156
10	594	243	10	656	276	10	342	150
15	648	278	15	566	230	15	296	143
20	522	253	20	472	181	20	290	133
25	354	175	25	550	230	25	278	120
12.30	670	310	14.30	430	213	16.30	238	114
35	854	342	35	508	245	35	244	103
40	1106	426	40	566	226	40	238	94
45	916	342	45	566	213	45	226	87
50	832	310	50	494	243	50	206	80
55	814	323	55	624	264	55	188	65
13.00	702	319	15.00	572	262	17.00	172	61
05	416	205	05	536	236	05	152	52
10	846	369	10	464	232	10	83	47
15	968	382	15	408	169	15	70	40
20	508	238	20	342	169	20	64	30
25	624	314	25	456	186	25	70	30
13.30	766	319	15.30	-	-	17.30	70	28
35	702	308	35	334	139	35	52	24
40	798	348	40	368	154	40	46	19
45	806	344	45	374	150	45	32	16
50	798	338	50	342	160	50	26	12
55	772	331	55	368	150	55	20	9
14.00			16.00			18.00		

Table 1
Station #8

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00			14.00			16.00		
	594	295		464	181		144	76
05			05			05		
	602	266		252	129		138	74
10			10			10		
	656	257		610	255		114	61
15			15			15		
	478	226		640	247		114	61
20			20			20		
	522	230		566	222		94	53
25			25			25		
	494	222		278	133		102	61
12.30			14.30			16.30		
	656	270		214	110		88	51
35			35			35		
	882	333		316	146		70	42
40			40			40		
	522	253		238	120		64	36
45			45			45		
	640	278		290	137		70	36
50			50			50		
	694	316		354	160		58	32
55			55			55		
	-	-		226	110		52	26
13.00			15.00			17.00		
	566	243		264	129		52	22
05			05			05		
	550	249		214	103		52	22
10			10			10		
	464	213		214	93		46	20
15			15			15		
	450	190		188	89		40	18
20			20			20		
	396	190		152	72		40	18
25			25			25		
	380	205		244	118		32	14
13.30			15.30			17.30		
	380	196		244	124		26	12
35			35			35		
	402	184		214	108		26	10
40			40			40		
	348	169		182	103		20	8
45			45			45		
	342	160		188	89		-	-
50			50			50		
	368	177		176	84		-	-
55			55			55		
	252	133		158	80		-	-
14.00			16.00			18.00		

Table 1
Station #9

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	567	234	14.00	380	177	16.00	132	68
05	580	293	05	402	188	05	106	59
10	708	243	10	342	160	10	102	55
15	832	342	15	316	152	15	102	55
20	832	380	20	308	150	20	106	55
25	748	257	25	284	139	25	106	55
12.30	670	287	14.30	238	120	16.30	102	42
35	686	302	35	226	114	35	102	41
40	640	268	40	200	103	40	88	36
45	864	346	45	214	108	45	88	36
50	670	293	50	238	116	50	76	30
55	580	257	55	220	112	55	70	27
13.00	587	257	15.00	214	108	17.00	52	23
05	486	222	05	214	106	05	46	18
10	522	240	10	200	101	10	32	14
15	494	224	15	188	97	15	32	14
20	472	217	20	188	95	20	26	12
25	408	192	25	176	86	25	26	12
13.30	422	198	15.30	172	84	17.30	-	-
35	494	232	35	164	82	35	-	-
40	478	217	40	164	82	40	-	-
45	436	200	45	152	78	45	-	-
50	436	196	50	152	76	50	-	-
55	380	177	55	144	72	55	-	-
14.00			16.00			18.00		

Table 1

Station #10

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	594	262	14.00	308	152	16.00	172	82
05	478	217	05	278	139	05	172	82
10	472	217	10	244	122	10	188	89
15	368	177	15	270	133	15	164	76
20	478	217	20	296	152	20	132	65
25	536	262	25	334	158	25	188	84
12.30	360	181	14.30	342	173	16.30	252	103
35	316	154	35	348	164	35	252	103
40	348	171	40	348	156	40	200	80
45	408	198	45	206	106	45	182	68
50	436	209	50	214	108	50	158	55
55	402	194	55	200	101	55	76	32
13.00	316	158	15.00	226	114	17.00	52	20
05	296	148	05	214	106	05	-	-
10	284	139	10	220	112	10	40	14
15	264	131	15	206	101	15	32	13
20	284	158	20	176	89	20	32	13
25	342	164	25	182	95	25	26	12
13.30	368	181	15.30	200	97	17.30	20	9
35	402	186	35	172	86	35	20	7
40	368	175	40	164	80	40	16	6
45	354	173	45	152	76	45	-	-
50	354	169	50	164	80	50	-	-
55	368	175	55	176	89	55	-	-
14.00			16.00			18.00		

Table 1
Section #11

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	238	112	14.00	656	272	16.00	126	52
05	436	173	05	640	268	05	102	45
10	252	118	10	624	262	10	94	45
15	550	262	15	616	255	15	76	32
20	748	365	20	610	251	20	76	32
25	-	-	25	-	-	25	88	38
12.30	380	158	14.30	-	-	16.30	64	30
35	-	-	35	610	249	35	64	27
40	126	65	40	450	251	40	46	21
45	188	93	45	436	190	45	32	13
50	316	129	50	380	152	50	32	17
55	1000	403	55	380	139	55	40	14
13.00	640	264	15.00	522	232	17.00		
05	-	-	05	522	232	05		
10	890	333	10	238	112	10		
15	782	319	15	200	106	15		
20	522	217	20	194	116	20		
25	724	302	25	172	72	25		
13.30	766	310	15.30	164	65	17.30		
35	748	314	35	164	78	35		
40	734	306	40	158	93	40		
45	694	291	45	158	78	45		
50	678	281	50	158	84	50		
55	662	276	55	126	55	55		
14.00			16.00			18.00		

Table 1

Station #12

Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism
12.00	814	338	14.00	756	302	16.00	144	68
05	806	344	05	662	272	05	316	141
10	806	346	10	610	253	10	102	55
15	806	346	15	630	253	15	102	38
20	846	352	20	624	257	20	200	84
25	798	335	25	630	251	25	102	44
12.30	788	333	14.30	616	247	16.30	70	27
35	782	333	35	602	238	35	88	32
40	782	333	40	580	232	40	102	40
45	814	338	45	542	219	45	120	48
50	832	335	50	572	232	50	126	59
55	772	327	55	508	207	55	138	55
13.00	766	321	15.00	594	234	17.00	152	55
05	766	321	05	624	249	05	58	27
10	772	323	10	226	108	10	70	22
15	782	316	15	316	164	15	40	15
20	748	310	20	368	129	20	46	15
25	756	310	25	278	112	25	40	17
13.30	740	306	15.30	522	209	17.30	32	12
35	766	310	35	226	99	35	26	10
40	522	196	40	200	76	40	20	8
45	766	319	45	226	89	45	-	-
50	670	293	50	342	129	50	-	-
55	766	306	55	152	68	55	-	-
14.00			16.00			18.00		

Table 1
Station #13

Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism
I2.00	8I4	344	I4.00	396	I8I	I6.00	322	I43
05	8I4	346	05	380	I86	05	308	I39
I0	8I4	344	I0	408	I52	I0	290	I33
I5	8I4	342	I5	486	I92	I5	270	I24
20	8I4	342	20	464	205	20	252	II4
25	798	342	25	464	2I7	25	238	I08
I2.30	798	342	I4.30	478	234	I6.30	226	99
35	798	342	35	594	245	35	206	89
40	788	335	40	602	247	40	I94	78
45	734	3I6	45	580	240	45	I82	70
50	734	333	50	450	234	50	I52	6I
55	788	342	55	522	222	55	88	46
I3.00	798	346	I5.00	328	I48	I7.00		2I
05	798	342	05	290	I35	05		I4
I0	748	335	I0	270	I20	I0		I3
I5	702	333	I5	252	II6	I5		I0
20	656	28I	20	238	II4	20		I0
25	464	257	25	238	II4	25		8
I3.30	380	209	I5.30	252	II4	I7.30		
35	368	I98	35	290	I20	35		
40	368	I88	40	328	I33	40		
45	368	I88	45	354	I69	45		
50	408	200	50	354	I62	50		
55	456	209	55	342	I50	55		
I4.00			I6.00			I8.00		

Table 1
Station #14

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	610	268	14.00	566	213	16.00	368	167
05	494	198	05	640	253	05	354	152
10	656	249	10	670	272	10	290	135
15	594	306	15	494	217	15	252	120
20	494	196	20	594	268	20	226	110
25	-	-	25	436	196	25	220	99
12.30	450	205	14.30	594	262	16.30	176	86
35	656	333	35	450	196	35	152	70
40	508	186	40	408	192	40	126	59
45	670	285	45	380	179	45	126	57
50	702	378	50	354	171	50	160	55
55	522	209	55	328	137	55	102	42
13.00	522	209	15.00	316	129	17.00	76	33
05	640	245	05	342	164	05	64	25
10	550	285	10	316	129	10	64	23
15	640	240	15	328	152	15	52	22
20	508	232	20	360	141	20	40	16
25	640	240	25	436	177	25	32	13
13.30	686	327	15.30	422	188	17.30	26	10
35	566	251	35	354	164	35	16	8
40	550	270	40	214	112	40	16	3
45	594	255	45	380	129	45	10	3
50	702	236	50	368	133	50		
55	542	217	55	396	184	55		
14.00			16.00			18.00		

Table 1
Station #15

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	756	342	14.00	756	298	16.00	138	59
05	756	306	05	766	306	05	252	118
10	656	285	10	594	240	10	252	108
15	594	278	15	686	262	15	252	112
20	624	245	20	522	240	20	188	76
25	798	310	25	580	304	25	138	55
12.30	702	285	14.30	522	217	16.30	102	38
35	890	359	35	422	196	35	114	54
40	864	342	40	328	143	40	316	124
45	670	302	45	258	116	45	120	48
50	550	247	50	278	118	50	126	48
55	594	238	55	328	156	55	126	46
13.00	756	316	15.00	232	101	17.00	88	29
05	864	329	05	214	89	05	64	23
10	686	338	10	206	91	10	76	27
15	594	262	15	238	101	15	88	38
20	380	141	20	238	101	20	76	28
25	702	342	25	188	72	25	52	19
13.30	798	338	15.30	106	40	17.30	46	17
35	772	321	35	83	40	35	32	11
40	772	321	40	138	72	40	26	9
45	798	321	45	172	76	45	20	6
50	-	-	50	176	76	50		
55	782	316	55	164	63	55		
14.00			16.00			18.00		

Table 1

Station #16

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	838	352	14.00	590	266	16.00	354	198
05	832	352	05	702	289	05	380	202
10	832	352	10	694	274	10	354	190
15	832	352	15	702	296	15	303	169
20	832	350	20	594	253	20	328	169
25	832	350	25	566	247	25	328	165
12.30	814	350	14.30	594	262	16.30	308	146
35	822	348	35	494	226	35	290	124
40	822	348	40	508	217	40	264	106
45	832	350	45	542	217	45	214	88
50	832	358	50	508	209	50	214	84
55	822	348	55	494	190	55	214	80
13.00	840	342	15.00	368	173	17.00	152	63
05	798	340	05	264	127	05	126	48
10	798	335	10	290	127	10	114	44
15	788	333	15	322	137	15	126	40
20	782	333	20	422	186	20	102	40
25	772	333	25	450	202	25	126	44
13.30	782	333	15.30	464	198	17.30	83	34
35	782	333	35	422	196	35	64	25
40	782	325	40	436	192	40	52	21
45	734	289	45	380	186	45	46	17
50	594	247	50	380	186	50	40	14
55	522	217	55	368	186	55	26	9
14.00			16.00			18.00		

Table 1

Station #17

Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism
12.00	748	373	14.00	756	323	16.00	316	160
05	814	373	05	772	325	05	422	164
10	898	365	10	748	285	10	396	156
15	864	325	15	782	329	15	374	148
20	670	240	20	718	262	20	360	141
25	494	262	25	724	298	25	342	133
12.30	316	114	14.30	702	285	16.30	328	124
35	-	-	35	670	285	35	328	114
40	864	369	40	694	287	40	252	108
45	748	329	45	316	133	45	278	93
50	882	359	50	278	129	50	244	86
55	854	367	55	450	173	55	244	84
13.00	702	293	15.00	616	253	17.00	226	84
05	734	333	05	588	243	05	188	68
10	734	293	10	566	236	10	176	59
15	724	306	15	550	232	15	158	48
20	748	329	20	536	222	20		
25	814	352	25	522	215	25		
13.30	798	321	15.30	508	211	17.30		
35	814	344	35	500	202	35		
40	814	342	40	478	196	40		
45	798	338	45	444	188	45		
50	766	329	50	450	205	50		
55	748	321	55	508	181	55		
14.00			16.00			18.00		

Table 1

Station #18

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	832	342	14.00	748	310	16.00	354	148
05	864	352	05	740	306	05	252	110
10	806	335	10	718	302	10	188	84
15	872	354	15	686	287	15	138	59
20	872	354	20	686	283	20	126	46
25	864	354	25	686	283	25	120	35
12.30	864	356	14.30	580	232	16.30	114	34
35	854	354	35	594	249	35	106	32
40	798	338	40	594	253	40	102	32
45	806	338	45	624	257	45	106	34
50	898	325	50	624	255	50	106	32
55	822	342	55	610	251	55	102	30
13.00	814	346	15.00	594	245	17.00	102	29
05	814	338	05	572	236	05	94	28
10	822	342	10	580	236	10	88	27
15	822	340	15	550	226	15	88	25
20	814	338	20	536	217	20	83	29
25	814	338	25	558	217	25	76	25
13.30	798	333	15.30	580	234	17.30	64	22
35	798	329	35	522	217	35	64	19
40	788	327	40	342	148	40	58	17
45	782	325	45	278	116	45	58	15
50	772	319	50	238	99	50	52	14
55	766	316	55	252	108	55	64	16
14.00			16.00			18.00		

Table 1

Station #19

Time	Radiation W/m²		Time	Radiation W/m²		Time	Radiation W/m²	
	Total	Amici prism		Total	Amici prism		Total	Amici prism
12.00	864	359	14.00	740	308	16.00	416	177
05	864	359	05	734	304	05	402	171
10	864	359	10	718	300	10	402	171
15	864	359	15	708	295	15	402	171
20	864	359	20	702	291	20	328	137
25	846	359	25	686	287	25	380	158
12.30	846	356	14.30	670	283	16.30	214	101
35	846	359	35	656	278	35	220	68
40	846	352	40	648	272	40	152	63
45	846	350	45	640	264	45	188	89
50	846	350	50	624	259	50	138	59
55	846	348	55	610	253	55	106	42
13.00	846	346	15.00	594	249	17.00	102	41
05	832	344	05	580	243	05	102	55
10	832	342	10	566	234	10	83	27
15	822	340	15	550	228	15	152	54
20	814	338	20	536	222	20	176	65
25	806	333	25	522	217	25	102	44
13.30	798	331	15.30	514	213	17.30	88	33
35	788	327	35	522	217	35	102	42
40	782	325	40	342	148	40	83	32
45	766	321	45	316	129	45	94	37
50	766	319	50	380	152	50	64	27
55	748	312	55	444	186	55	40	14
14.00			16.00			18.00		

Table 1

Station #21

Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism	Time	Radiation W/m² Total	Amici prism
12.00	890	365	14.00	882	306	16.00		179
05	898	369	05	832	325	05		173
10	898	367	10	822	316	10		65
15	916	376	15	832	321	15		99
20	898	369	20	748	340	20		169
25	916	376	25	748	306	25		162
12.30	864	378	14.30	814	302	16.30		108
35	882	363	35	808	302	35		116
40	872	359	40	786	287	40		116
45	864	359	45	748	276	45		141
50	864	359	50	694	293	50		108
55	898	369	55	686	272	55		89
13.00	898	378	15.00	708	276	17.00		80
05	916	373	05	624	249	05		36
10	854	356	10	610	240	10		27
15	882	365	15	594	238	15		68
20	872	346	20	594	234	20		61
25	898	373	25	522	196	25		48
13.30	882	346	15.30	522	196	17.30		48
35	846	338	35	550	215	35		42
40	846	336	40	522	211	40		38
45	832	333	45	508	196	45		34
50	864	331	50	494	194	50		27
55	916	356	55		184	55		25
14.00			16.00			18.00		

Table 2

Station #1

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00–I3.00	85^o–75^o	0^2 Ac , Cu 6/2 – 0^2 Ac , Cu 4/2	270,0·I0^4
I3.00–I4.00	75^o–$6I^o$	0^2 Ac , Cu 4/2 – 0^2 Cu 2/2	2I5,0·I0^4
I4.00–I5.00	$6I^o$–47^o	0^2 Cu 2/2 – 0^2 Cu 2/2	254,0·I0^4
I5.00–I6.00	47^o–32^o	0^2 Cu 2/2 0^2 Cu 3/3	22I,0·I0^4
I6.00–I7.00	32^o–$I9^o$	0^2 Cu 3/3 – 0^2 Cu 3/3	I39,3·I0^4
I7.00–I8.00	–	–	–

Table 2

Station #2

Time	h_o	Sun and clouds	Total energy (joule/m^2 for an hour of integration
I2.00–I3.00	88^0–76^0	0^2 Ci , Cu 4/2 - 0^2 Ci , Cu 4/2	37I,0·I0^4
I3.00–I4.00	76^0–$6I^0$	0^2 Ci , Cu 4/2 -	346,0·I0^4
I4.00–I5.00	$6I^0$–47^0	- 0, Ac , Cu 6/2	297,0·I0^4
I5.00–I6.00	47^0–32^0	0 Ac , Cu , 6/2 - 0 Ac , Cu 8/2	I85,5·I0^4
I6.00–I7.00	32^0–$I9^0$	0 Ac , Cu 8/2 - 0^2 Ac , Cu 6/2	I36,0·I0^4
I7.00–I8.00	$I9^0$–$I2^0$	0^2 Ac , Cu 6/2 0^0 Cu 8/8	49,3·I0^4

Table 2
Station #3

Time	h_o	Sun and clouds	Total energy (joule/m²) for an hour of integration
I2.00-I3.00	89^0-76^0	0^0, 0, 0^2 Sc , Cu 8/8- 0^2, 0 Sc, Cu 6/6	$371,0 \cdot 10^4$
I3.00-I4.00	76^0-$6I^0$	0^2, 0 Sc , Cu 6/6 - 0^2, 0 Sc , Cu 6/6	$322,0 \cdot 10^4$
I4.00-I5.00	$6I^0$-47^0	0^2, 0 Sc , Cu 6/6 - 0^2 Sc , Cu 4/4	$297,0 \cdot 10^4$
I5.00-I6.00	47^0-32^0	0^2 Sc , Cu 4/4 - 0^2, 0^0 Sc , Cu 4/4	$I98,0 \cdot 10^4$
I6.00-I7.00	32^0-$I8^0$	0^2, 0^0 Sc , Cu 4/4 - 0^2, 0 Sc , Cu 4/4	$99,0 \cdot 10^4$
I7.00-I8.00	$I8^0$-4^0	0^2, 0 Sc , Cu 4/4 - 0^2, 0 Sc , Cu 4/4	$49,3 \cdot 10^4$

Table 2
Station #6

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
12.00-13.00	80^0-72^0	0, 0^0 Ac 8/0 - 0, 0^2 Ac 8/0	$278,5 \cdot 10^4$
13.00-14.00	72^0-59^0	0, 0^2 Ac 8/0 - 0^2 Ci , Ac 6/0	$254,5 \cdot 10^4$
14.00-15.00	59^0-45^0	0^2 Ci , Ac 6/0 - 0^2, 0 Ci , Ac 6/0	$246,0 \cdot 10^4$
15.00-16.00	45^0-31^0	0^2, 0 Ci , Ac 6/0 - 0^2, 0 Ci 4/0	$180,0 \cdot 10^4$
16.00-17.00	31^0-17^0	0^2, 0 Ci 4/0 - 0^2 Ci 4/0	$114,7 \cdot 10^4$
17.00-18.00	17^0-2^0	0^2 Ci 4/0 - 0^2 Ci 4/0	$32,2 \cdot 10^4$

Table 2
Station #8

Time	h_o	Sun and clouds	Total energy (joule/m²) for an hour of integration
I2.00–I3.00	69^0– disc not visible	0 ≡ IO/IO – 0^0 ≡ IO/IO	I55,6·IO^4
I3.00–I4.00	disc not visible	0^0 ≡ IO/IO – 0^0 ≡ IO/IO	I72,5·IO^4
I4.00–I5.00	–"–	0^0 ≡ IO/IO – 0^0 ≡ IO/IO	I64,0·IO^4
I5.00–I6.00	–"–	0^0 ≡ IO/IO – 0^0 ≡ IO/IO	94,5·IO^4
I6.00–I7.00	–"–	0^0 ≡ IO/IO – 0^0 ≡ IO/IO	4I,0·IO^4
I7.00–I8.00	–"–	0^0 ≡ IO/IO – 0^0 ≡ IO/IO	I3,8·IO^4

Table 2
Station #9

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00-I3.00	68^0-63^0	⊙, ⊙° Ac , Cu 9/6 ⊙, ⊙° Ac , Cu 9/6	303,0·I0^4
I3.00-I4.00	63^0- disc not visible	⊙, ⊙° Ac , Cu 9/6 ⊙° .. 10/10	205,0·I0^4
I4.00-I5.00	disc not visible	⊙° ··· I0/I0 - ⊙° ·· I0/I0	I3I,5·I0^4
I5.00-I6.00	-"-	⊙° ·· I0/I0 - ⊙° ·· I0/I0	82,0·I0^4
I6.00-I7.00	-"-	⊙° · I0/I0 - ⊙° — I0/I0	43,6·I0^4
I7.00-I8.00	-"-	⊙° · — I0/I0 -	I6,3·I0^4

Table 2
Station #10

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00-I3.00	66° - disc not visible	0°, 0 Ac , Cu , Nb I0/9 - 0° -	I97,0·I0^4
I3.00-I4.00	disc not visible	⊙° - ⊙°, ⊙	I64,0·I0^4
I4.00-I5.00	-"-	⊙°, ⊙ - 0° -	I3I,5·I0^4
I5.00-I6.00	-"-	⊙° - 0° -	73,7·I0^4
I6.00-I7.00	disc -I3° not visible	0° - 0° Cu , Nb 5/5	77,0·I0^4
I7.00-I8.00	I3°-0°	0 Cu , Nb 5/5 -	I0,45·I0^4

Table 2
Station #11

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00-I3.00	63^0-59^0	0, 0^2 Cu , Nb 7/7 - 0^0,0, 0^2 Cu , Nb 8/8	I88,3·I0^4
I3.00-I4.00	59^0-50^0	0^0,0, 0^2 Cu ,Nb 8/8 - 0^2 Cu , Nb 4/4	286,7·I0^4
I4.00-I5.00	50^0-39^0	0^2 Cu ,Nb , 4/4 - 0, 0^2 Cu 5/5	230,0·I0^4
I5.00-I6.00	39^0- disc not visible	0, 0^2 Cu 5/5 - 0^0 Cu , Nb 8/8	III,0·I0^4
I6.00-I7.00	disc not visible	0^0 Cu , Nb 8/8 - 0^0 Cu , Nb 8/8	28,4·I0^4
I7.00-I8.00	disc -0^0 not visible	0^0 Cu , Nb 8/8 - 0^0 Cu , Nb 8/8	5,86·I0^4

Table 2
Station #12

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00-I3.00	65^o-$6I^o$	0, 0^2 Cu 5/5 - 0^2 Ci , Cu 5/4	328,0·$I0^4$
I3.00-I4.00	$6I^o$-$5I^o$	0^2 Ci , Cu 5/4 - 0^2, 0 Ci , Cu 7/5	3I2,0·$I0^4$
I4.00-I5.00	$5I^o$-40^o	0^2, 0 Ci , Cu 7/5 - 0^2 Ci , Cu 5/3	254,5·$I0^4$
I5.00-I6.00	40^o- disc not visible	0^2 Ci , Cu 5/3 - 0^o Cu , Nb 8/8	I39,3·$I0^4$
I6.00-I7.00	disc -$I2^o$ not visible.	0^o Cu , Nb 8/8 0^2 Cu , Nb 6/6	65,7·$I0^4$
I7.00-I8.00	$I2^o$-0^o	0^2 Cu , Nb 6/6 -	I5,5·$I0^4$

Table 2
Station #13

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00-I3.00	67^0-63^0	0^2 0/0 - 0, 0^2 Cu 5/5	334,0·I0^4
I3.00-I4.00	63^0-disc not visible	0, 0^2 Cu 5/5 - 0^0, 0 Cu , Nb I0/I0	238,0·I0^4
I4.00-I5.00	disc -4I^0 not visible	0^0, 0 Cu , Nb I0/I0 0^0,0,0^2 Cu 7/7	2I5,0·I0^4
I5.00-I6.00	4I^0-27^0	0^0, 0, 0^2 Cu 7/7 0, 0^2 Ci ,Cu 5/3	II4,7·I0^4
I6.00-I7.00	27^0-disc not visible	0, 0^2 Ci ,Cu 5/3 0^0 Cu , Nb 9/9	I3I,5·I0^4
I7.00-I8.00	disc -0^0 not visible	0^0 Cu ,Nb 9/9 Cu ,Nb 9/9	8,8·I0^4

Table 2
Station #14

Time	h_o	Sun and clouds	Total energy (joule/m²) for an hour of integration
I2.00-I3.00	67^0 - disc not visible	0, 0^0 Sc , Cu 9/9 - 0^0 Sc IO/IO	$254,5 \cdot IO^4$
I3.00-I4.00	disc - 53^0 not visible	0^0 Sc IO/IO - 0^0 Sc IO/IO	$254,5 \cdot IO^4$
I4.00-I5.00	53^0 - disc not visible	0^0 Sc IO/IO - 0^0 Sc , Cu IO/IO	$213,0 \cdot IO^4$
I5.00-I6.00	disc - 27^0 not visible	0^0 Sc , Cu IO/IO - 0^2 Ci , Cs , Cu 6/3	$I64,0 \cdot IO^4$
I6.00-I7.00	27^0 - disc not visible	0^2 Ci, Cs, Cu 6/3 - 0^0 Ci, Cs, Cu 9/5	$98,5 \cdot IO^4$
I7.00-I8.00	disc - 0^0 not visible.	0^0 Ci, Cs, Cu 9/5 - -	$IO,4 \cdot IO^4$

Table 2
Station #15

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00-I3.00	75^0-69^0	0^0, 0, 0^2 Ac , Cu , Nb 8/5 - 0, 0^2 Ci , Ac , Cu , 8/5	3I2,0·I0^4
I3.00-I4.00	69^0-57^0	0,0^2 Ci , Ac , Cu 8/5 - 0^2 Ac , Cu 6/3	258,0·I0^4
I4.00-I5.00	57^0- disc not visible	0^2 Ac , Cu 6/3 - 0, 0^0 Ac , Cu , Nb 9/8	22I,5·I0^4
I5.00-I6.00	disc not visible	0, 0^0 Ac , Cu , Nb 9/8 - 0^0 Ac , Cu , Nb I0/9	82,0·I0^4
I6.00-I7.00	-"-	0^0 Ac , Cu , Nb I0/9 - 0, 0^0 Ac , Cu 8/7	73,0·I0^4
I7.00-I8.00	disc-0^0 not visible	0,0^0 Ac , Cu 8/7 - 0^0, Ac , Nb I0/9	I3,4·I0^4

Table 2

Station #16

Time	h_o	Sun and clouds	Total energy (joule/m²) for an hour of integration
I2.00-I9.00	76^0-70^0	0^2 Ci , Ac , Cu 6/3 - 0^2 Ci , Ac , Cu 6/3	$336,0 \cdot I0^4$
I3.00-I4.00	70^0-58^0	0^2 Ci , Ac , Cu 6/3 - ⊙ Ci , Ac , Cu 8/4	$336,0 \cdot I0^4$
I4.00-I5.00	58^0-45^0	⊙ Ci , Ac , Cu 8/4 - ⊙ Ci , Ac , Cu 8/4	$246,0 \cdot I0^4$
I5.00-I6.00	45^0-$3I^0$	⊙ Ci , Ac , Cu 8/4 - 0^2 Ci , Ac , Cu 6/4	$I72,5 \cdot I0^4$
I6.00-I7.00	$3I^0$-$I6^0$	0^2 Ci , Ac , Cu 6/4 - 0^2 Ci , Ac , Cu 5/3	$II9,0 \cdot I0^4$
I7.00-I8.00	$I6^0$-0^0	0^2 Ci , Ac , Cu 5/3 0^2 Ci , Nb , Cu 5/3	$35,2 \cdot I0^4$

Table 2
Station #17

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
I2.00–I3.00	86^0–75^0	0^0, 0, 0^2 Ci , Cu 7/6 – 0^2, 0 Ci , Cu 7/5	$265,0 \cdot I0^4$
I3.00–I4.00	75^0–$6I^0$	0^2, 0 Ci , Cu 7/5 – 0^2, 0 Ci , Cu 7/5	$303,0 \cdot I0^4$
I4.00–I5.00	$6I^0$–48^0	0^2, 0 Ci , Cu 7/5 – 0^2, 0 Cu , Nb 6/6	$253,0 \cdot I0^4$
I5.00–I6.00	48^0–34^0	0^2, 0 Cu , Nb 6/6 – 0, 0^0 Cu , Nb 6/6	$203,5 \cdot I0^4$
I6.00–I7.00	34^0–20^0	0, 0^0 Cu , Nb 6/6 – 0^2 Cu , 5/5	$I24,0 \cdot I0^4$
I7.00–I8.00	20^0–6^0	0^2 Cu 5/5 – 0^2 Cu 3/3	$44,3 \cdot I0^4$

Table 2
Station #18

Time	h_o	Sun and clouds	Total energy (joule/m^2) for an hour of integration
12.00-13.00	88^0-76^0	0^2, 0 Ci , Cu 4/3 0^2, 0 Ci , Cu 4/3	$353,0 \cdot 10^4$
13.00-14.00	76^0-62^0	0^2, 0 Ci , Cu 4/3 0^2 Ci , Cu 3/2	$336,0 \cdot 10^4$
14.00-15.00	62^0-48^0	0^2 Ci , Cu 3/2 0^2 Ci , Cu 3/2	$303,0 \cdot 10^4$
15.00-16.00	48^0-34^0	0^2 Ci , Cu 3/2	$213,0 \cdot 10^4$
16.00-17.00	34^0 -	0 Ci , Ac , Cu 7/4 0^0Ac , Cu 6/4	$62,0 \cdot 10^4$
17.00-18.00	- 8^0	0^0Ac , Cu 6/4 0 Ac , Cu 5/3	$27,0 \cdot 10^4$

Table 2
Station #19

Time	h_o	Sun and clouds	Total energy (joule/m²) for an hour of integration
I2.00–I3.00	88^0–76^0	$\odot^2$ Cu 2/2 – $\odot^2$ Cu 3/3	37I,0·I0⁴
I3.00–I4.00	76^0–62^0	$\odot^2$ Cu 3/3 – $\odot^2$ Cu 3/3	346,0·I0⁴
I4.00–I5.00	62^0–48^0	$\odot^2$ Cu 3/3 – $\odot^2$ Cu 4/4	303,0·I0⁴
I5.00–I6.00	48^0–34^0	$\odot^2$ Cu 4/4 – $\odot^2$, O Ac , Cu 6/4	22I,0·I0⁴
I6.00–I7.00	34^0 –	$\odot^2$, O Ac , Cu 6/4 $\odot^0$ Ac , Sc , Cb 8/3	I23,0·I0⁴
I7.00–I8.00	– 7^0	$\odot^0$ Ac, Sc, Cb 8/3 $\odot^2$ Ac, Sc, Cb 6/3	53,6·I0⁴

Table 2
Station #21

St.21, 1 June 1970. Lat.25°44,05'N Long.65°38'W

Time	h_o	Sun and clouds	Total energy (joule/m²) for an hour of integration
12.00-13.00	88°-76°	0^2 Cu 4/4 - 0^2 Cu 4/4	$371,0 \cdot 10^4$
13.00-14.00	76°-61°	0^2 Cu 4/4 - 0, 0^2 Cu 6/6	$346,0 \cdot 10^4$
14.00-15.00	61°-49°	0, 0^2 Cu 6/6 - 0^2 Cu, Cb 5/5	$322,0 \cdot 10^4$
15.00-16.00	49°-36°	0^2 Cu, Cb 5/5 - 0^2 Cu, Cb 5/5	$221,0 \cdot 10^4$
16.00-17.00	36°-22°	0^2 Cu, Cb 5/5 - 0^2 Cu, Cb 5/5	$156,0 \cdot 10^4$
17.00-18.00	22°-8°	0^2 Cu, Cb 5/5 - 0^2 Cu, Cb 6/6	$59,5 \cdot 10^4$

S. C. O. R. DISCOVERER EXPEDITION
MAY 1970

DIRECT MEASUREMENT OF QUANTA

K. Nygård

Assisted by N. Højerslev

1. Introduction

Altogether 6 quantameters, constructed according to the recommendations of the Working Group, (1,2) were supplied to and used by members of Working Group 15 during the DISCOVERER expedition.

Three (Nos. FC 9, FC 17 and FC 23) were used by H. Jitts. Their relative spectral response curves (as supplied) are reproduced in Fig. 1. Jitts used his quantameters with collectors of his own manufacture. This has probably changed the spectral response, particularly for wavelengths shorter than approximately 400 nm, and also the immersion factor.

One (No. FC 21) was used by Saijo. Its spectral response curve is reproduced in Fig. 2.

Two (Nos. FC 5 and FC 31) were used by Nygård. Their response curves are given in Fig. 3. This report is only concerned with measurements made with the last mentioned two instruments.

2. Instruments and experimental procedures

a. Quantameter FC 5

This instrument was mounted in gimbals and was generally used for quick lowerings to obtain quanta as a function of depth, usually in the mornings and the late afternoons. At some stations, indicated in the tables, it was tied to the French quantameter for intercalibration. During the main intercalibration effort at Stations 22 and 23 it was tied to the Scripps spectroradiometer. Apart from the gimballed mounting and a new depth gauge, the FC 5 is identical to the quantameter (Q 3) used during Working Group 15 Sea Trials in Baja California in May - June 1968. The calibration has remained unchanged since 1968, within the experimental uncertainty.

b. Quantameter FC 31

Throughout the expedition this instrument was tied to the Scripps spectroradiometer with its optical collector at the same depth as the collector for the Scripps instrument. The combined instruments were used in two different modes:

1. Quick, or relatively quick, lowerings to obtain quanta as a function of depth. In this use the FC 31 measured quantum irradiance at nominally specified depths and the spectroradiometer measured irradiance at one or a few selected wavelengths.

2. Stationary at selected depths for several minutes while complete irradiance spectra were obtained. In this use the FC 31 continuously measured quantum irradiance.

Unfortunately the depth gauge associated with quantameter FC 31 broke down after Station 6. For the rest of the expedition it was necessary to rely on depth data obtained by the gauge built into Scripps spectroradiometer.

c. Sun monitor

During the whole expedition a simple deck photometer mounted in gimbals was operated as a sun monitor. The sun monitor was fitted to the port railing of the DISCOVERER adjacent to the Soviet spectroradiometers.

At Stations 1 through 7 no continuous record was made. Sun monitor data given in the tables were obtained with an indicating current amplifier at irregular intervals.

From Station 8 to the end of the expedition a continuous record of deck photometer reading was made on a separate potentiometer recorder. In addition, whenever the FC 31 was in the water, a continuous, parallel record of deck irradiance was made on the 2-channel potentiometer recorder used for recording quantum irradiance.

3. Presentation of data. Corrections

a. Time

Sun time according to the laboratory clock.

b. Depths

Depths stated for data obtained with quantameter FC 5 are always measured with the depth gauge built into the instrument. They have been corrected according to calibration data obtained in Copenhagen after the expedition.

To obtain an internally consistent data set, all depths given for data obtained with quantameter FC 31 are referred to Scripps depth gauge.

For Stations 1 to 6 depths have been corrected in accordance with intercalibration data obtained at Station 1 and Station 2.

For the remaining stations, depths stated are those provided by R. C. Smith from time to time during the experiments. They have been corrected by means of calibration data supplied by Dr. Smith.

c. Quantum irradiance

The absolute calibration used is the mean of two calibrations performed in Copenhagen before and after the expedition against a calibrated Eppley thermopile and the calibration made on board the DISCOVERER, using a Standard of Spectral Irradiance provided by the Scripps group. Calibrations agree within the expected experimental uncertainty. The data given in the tables are short-time (10 - 30 s.) average values read from the continuous record.

Data have not been "corrected" or normalized to a standard value of surface irradiance.

The reason for this is that the correlation between changes in above-surface irradiance and changes in irradiance at depth may be very low and even negative, especially when the above-surface irradiance is fluctuating rapidly. The correct correction factor is, therefore, not known and will be variable depending on atmospheric conditions and also on depth.

Data for quantum irradiance (Q) given for 0 (zero) depth are extrapolated from measured values above the surface, taking into account the immersion factor and the theoretical (Fresnel) reflexion coefficient. They are therefore valid immediately below the surface.

d. Sun monitor

Data given are relative. Since the sun monitor was originally only intended to keep track of fluctuation in surface irradiance during an experiment, slight shifts in scale factor may occur from station to station. This applies in particular to Station 14 and Station 15 when the current amplifier was used for other purposes. Data presented should therefore not be depended on for comparisons between stations.

References

1. Report of the second meeting of the joint group of experts on photosynthetic radiant energy, Karuizawa 15 - 19 August 1966. Unesco technical papers in marine science No. 5.

2. A Quanta and Energy Meter for Photosynthetic Studies, Jerlov, N. G. and K. Nygård. Rep. No. 10, University of Copenhagen, Institute of Physical Oceanography, 1969.

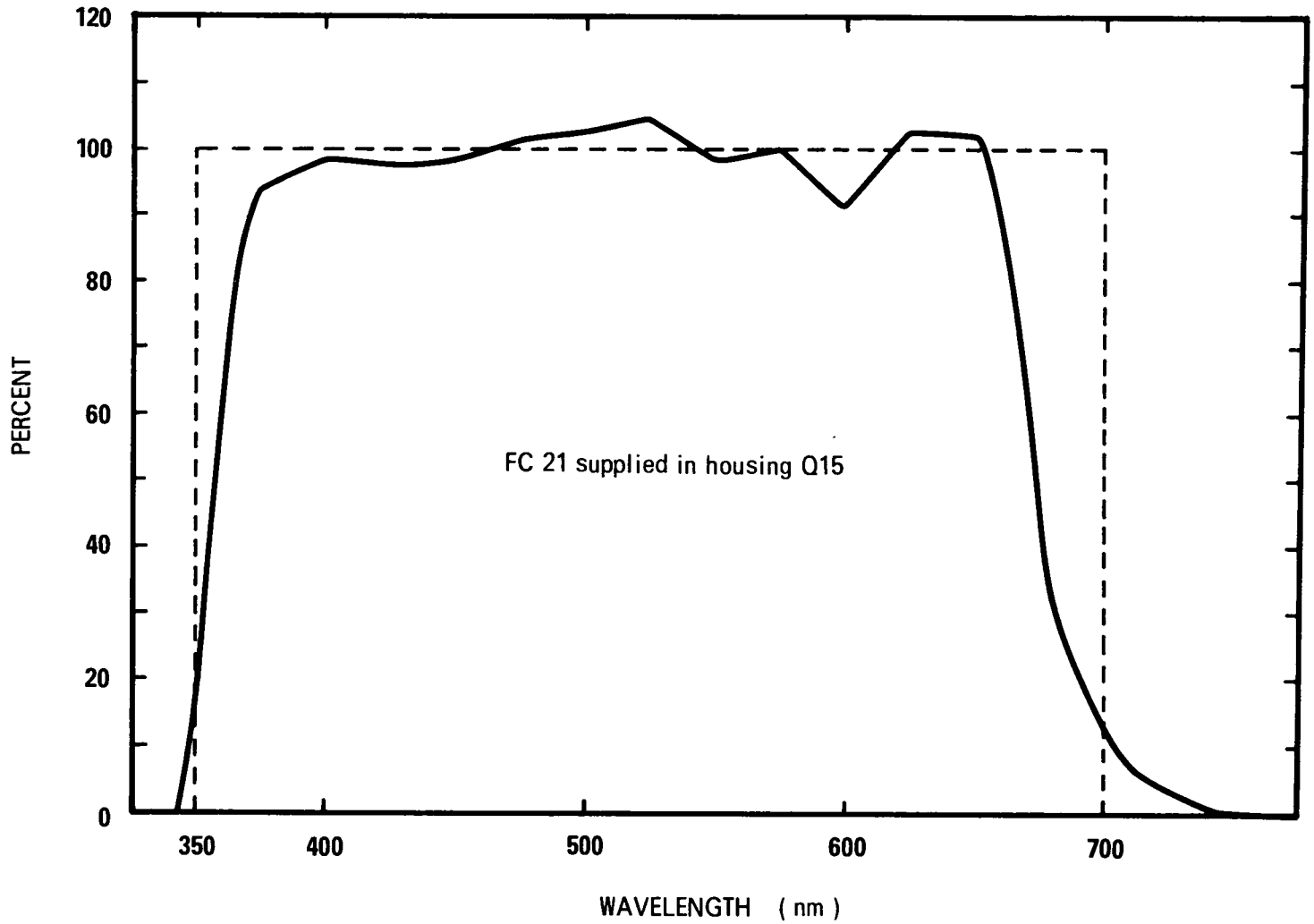

120
100
80
60
40
20
0
PERCENT
FC 21 supplied in housing Q15
350
400
500
600
700
WAVELENGTH (nm)

Fig. 1

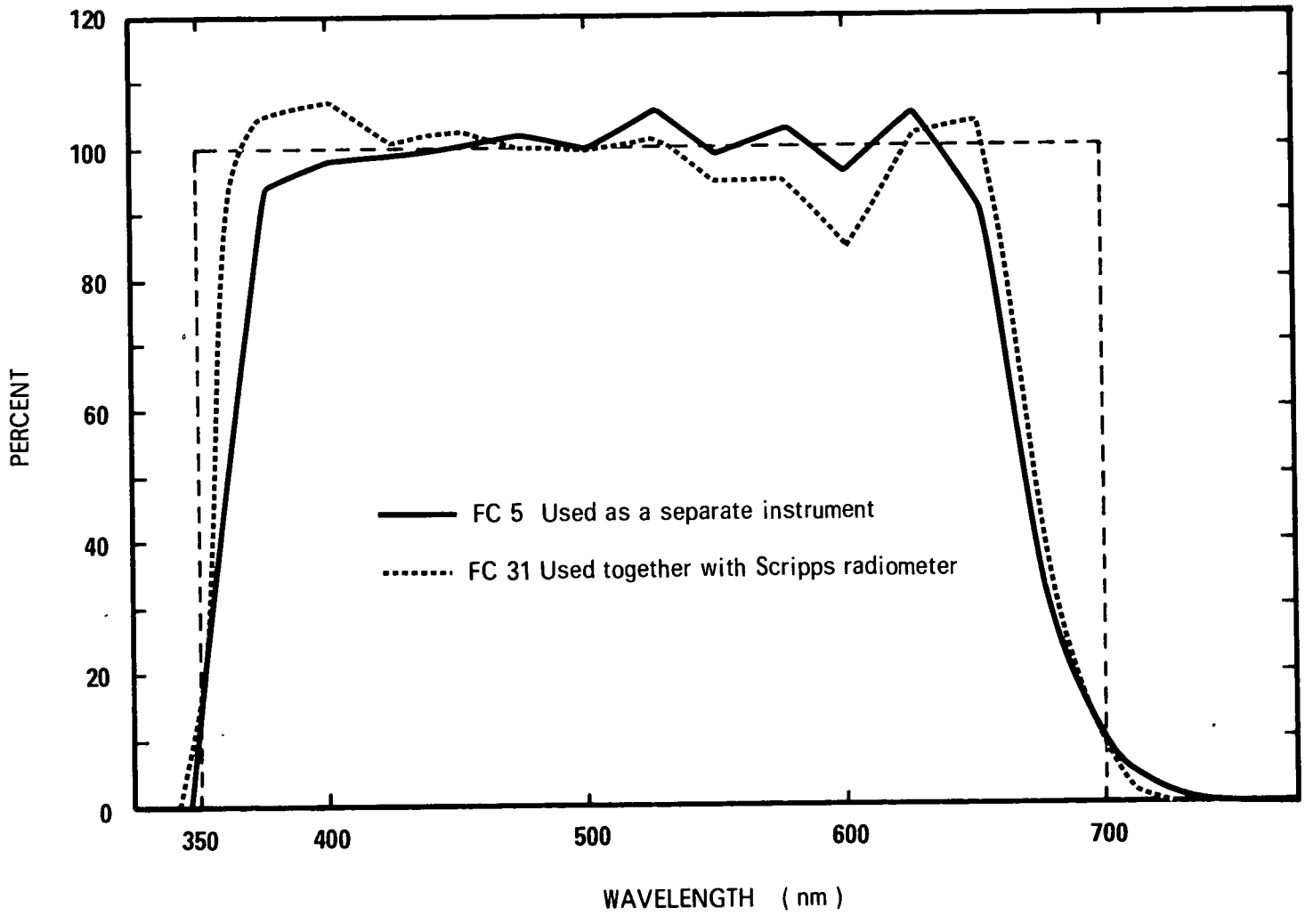

120
100
80
60
40
20
0
PERCENT
350
400
500
600
700
WAVELENGTH (nm)
FC 5 Used as a separate instrument
FC 31 Used together with Scripps radiometer

Fig. 2

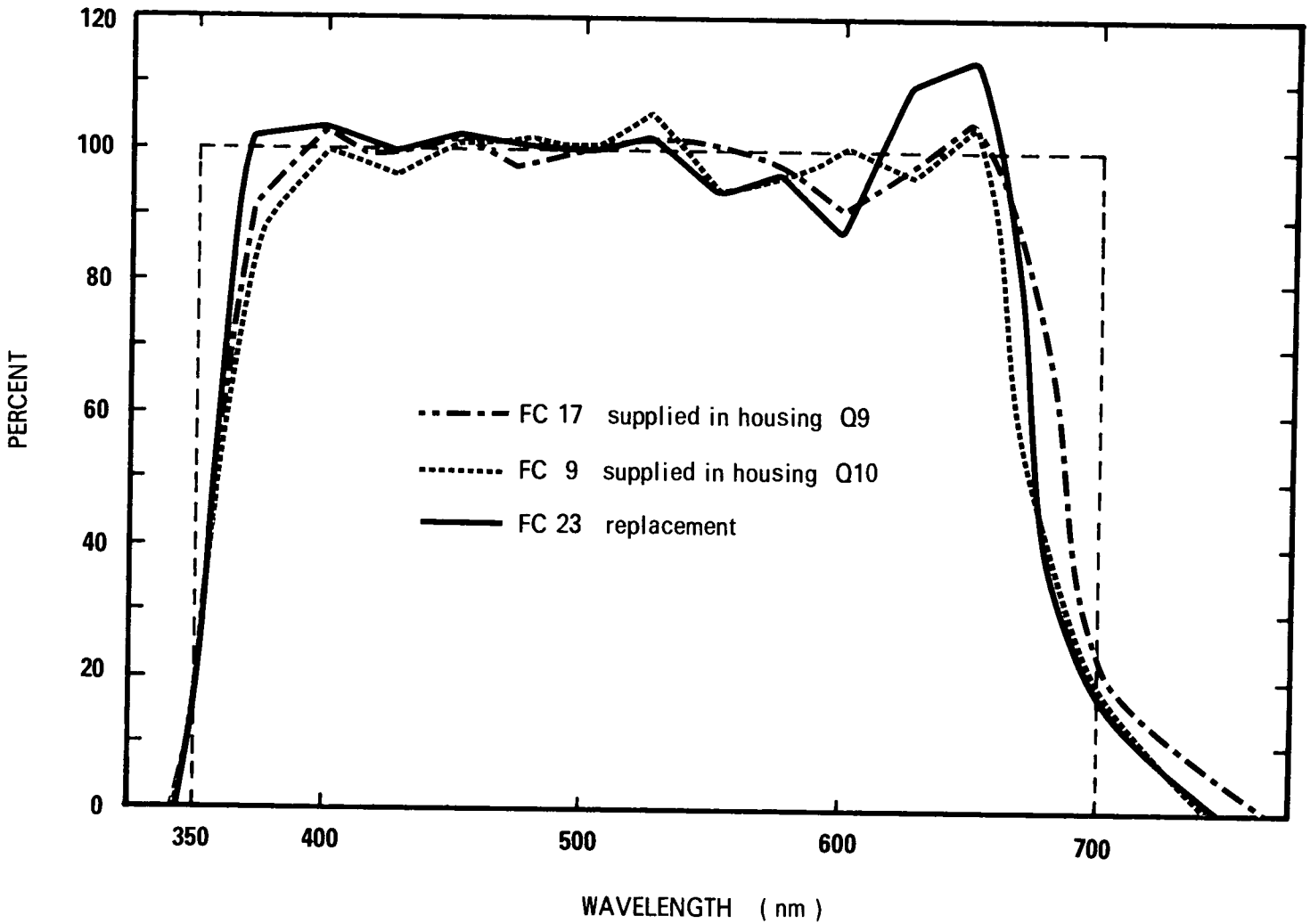

120
100
80
60
40
20
0
PERCENT
350
400
500
600
700
WAVELENGTH (nm)
FC 17 supplied in housing Q9
FC 9 supplied in housing Q10
FC 23 replacement

Fig. 3

Station No. 1 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	06	0	1140	57	Instruments:
	11	10.7	456	55	Quantameter FC 31
	13		420	55	together with
	15		453	55	Scripps radiometer
	17		447	55	
	19		420	55	
	21		438	54	
	23		438	54	
	25		450	54	
	27		426	54	
	29		384	54	
	31	10.7	390	54	
	34	30.0	189	54	
	36		195	54	
	38		198	54	
	40		198	53	
	42		191	53	
	44		194	52	
	46		192	52	
	48	30.0	194	52	
	57	59.6	41	50	
13	59		41	50	
14	01		40	50	
	03		39	50	
	05		39	49	
	07		38		
	09		38		
	11		37	48	
	13	59.6	36	48	
	17	89.1	9.3	48	
14	19		8.9	48	

Station No. 1 · DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	21	89.1	9.2	48	Instruments:
	23		8.7		Quantameter FC 31
	25		8.5		together with
	27		9.2		Scripps radiometer
	29		8.6		
	31	89.1	8.8		
	33	89.2	8.5		
	35	78.7	14.2		
	36	68.3	23		
	37	59.2	34		
	39	48.3	56		
	41	40.0	99		
	42	29.1	152		
	43	19.9	234		
	45	11.1	342		
14	46	0	879		

Station No. 1 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot$ m^{-2} $\cdot$ s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	43	0	554	32	Instrument:
	44	0.5	543		Quantameter FC 5
	45	10.7	235		
	46	19.0	144		
	47	28.8	94		
	48	38.7	58		
	49	49.4	29		
	50	59.0	18		
	52	69.5	11		
	54	79.5	6.9		
	55	88.2	4.3		
15	56	99.5	2.5		
16	00	88.2	4.1	26	
	01	79.5	6.5		
	02	69.5	10		
		58.2	16		
	03	49.4	27		
	04	38.3	50		
	05	28.8	78		
	07	15.9	138		
		10.7	189		
	09	0.5	437		
16	10	0	470	24	

Station No. 2 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
11	57	0	1130	58	Instrument:
		1.2	874		Quantameter FC 5
		6.5	492		
	58	10.3	443		
	59	19.4	345		
		29.0	253		
12	00	39.0	189		
	01	49.0	129		
	02	58.6	94		
	03	69.1	66		
		79.1	45		
	04	87.1	26		
		96.8	13.3		
	05	107.3	7.5		
	10	101.3	10.1		
		84.6	28		
	11	81.7	36		
	12	72.3	57		
	13	62.2	80		
		53.4	108		
	14	45.2	139		
		37.1	193		
	15	28.0	251		
	16	19.0	322		
	17	9.9	442	58	
		5.7	552		
	18	0.4	846		
12	20	0	1115		

Station No. 2 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth	Quanta	Sun monitor (relative units)	Remarks
12	33	0	1176	58	Instruments:
	35	9.2	460	57	Quantameter FC 31
	37		474	58	together with
	39		483	57	Scripps radiometer
	41		489	57	
	43		474	56	
	45		495	57	
	47		501	57	
	49		525	57	
	51	9.2	483	57	
	54	19.0	366	57	
	56		372	57	
12	58		366	57	
13	00		381	56	
	02		366	57	
	04		378	57	
	06		377	57	
	08	19.0	363	59	
	12	28.1	261	56	
	14		258	56	
	16		245	54	
	18		246	55	
	20		240	55	
	22		246	55	
	24		243	55	
	26	28.1	242	54	
	32	56.3	60	55	
	34		65	55	
	36		62	54	
	38		59	54	
13	40	56.3	60	53	

Station No. 2 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	42	56.3	55	54	Instruments:
	44		51	54	Quantameter FC 31
	46	56.3	52	54	together with
	51	87.0	(22.5)	55	Scripps radiometer
	53		(39)	53	
	55		(24)	51	
	57		12.3	50	
13	59		11.7	50	
14	01		11.4	49	
	03		12.0	49	
	05		12.3	49	
14	07	87.0	12.6	49	

Station No. 2 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	26	0	528	28	Instrument:
		0.4	515		Quantameter FC 5
	27	6.2	345		
	28	10.7	280		
	29	19.8	200		
		28.8	143	34	
	30	38.7	99	34	
	31	48.6	63	34	
		58.2	43		
	32	69.1	26	34	
		78.6	14	34	
	33	86.8	7.4	34	
		97.6	3.3		
	34	108.0	1.7	34	
		117.5	1.0		
	35	106.2	1.8	32	
		94.2	4.0		
	36	84.5	8.3	31	
		75.5	15.4	30	
	37	66.3	25	29	
		56.6	37	28	
	38	47.3	55	26	
		37.9	80		
	39	28.8	115	26	
		18.6	167	26	
	40	9.9	255	26	
	41	6.0	343	27	
		0.4	497	27	
15	42	0	528		

Station No. 2 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth	Quanta	Sun monitor (relative units)	Remarks
16	32	0.4	313	16	Instrument:
		5.3	212	15	Quantameter FC 5
	33	9.9	153	16	
		18.6	101	8	
	34	28.0	69	8	
		37.8	44	18	
	35	47.7	29	17	
	36	56.6	20	18	
	37	66.3	12.2	17	
	38	76.4	7.1	17	
		84.8	3.7	10	
	39	94.2	1.8	10	
	40	10.7	0.65		
	42	100.4	0.92		
	43	89.4	1.9		
	44	81.0	3.3	9	
		73.1	5.8	9	
	45	63.7	8.5		
	46	55.0	12.4	9	
		46.1	19.4		
	47	37.1	40	9	
	48	28.0	56	8	
	49	18.3	84	9	
		9.9	127	9	
	51	5.3	156		
	52	0.4	246		
16	53	0	270		

Station No. 3 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot$ m^{-2} $\cdot$ s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	35	0	1165		Instruments:
	40	10.5	522		Quantameter FC 31
		18.7	340		together with
	43	21.6	300	58	Scripps radiometer
	45	29.0	228		
	46	38.7	150	58	
	48	48.2	95	55	
	50	57.5	63		
	52	65.8	44	54	
	54	75.0	29		
	55	85.0	16	58	
	56	85.4	14.7	58	
12	58		13.8	58	
13	00		13.8		
	02		14.6	58	
	04		14.1	58	
	06		13.7		
	08	85.4	13.7	58	
	10	57.4	64		
	12		60	58	
	14		64		
	16		67	58	
	18		62	57	
	20		56		
13	22	57.4	57	56	

Station No. 3 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time		Depth	Quanta	Sun monitor	Remarks
h	min.	m	Q	(relative units)	
13	24	28.9	173		Instruments:
	26		149	48	Quantameter FC 31
	28		164	50	together with
	30		162	49	Scripps radiometer
	32		141	41	
	34		134	37	
	36		158	46	
	38		171	49	
	40		150	50	
	42		131	50	
	44		138		
	46	28.9	120		
	50	9.6	430	53	
	52	19.0	195	53	
		28.7	113	54	
	53	38.2	77	53	
	54	47.4	55		
	55	57.4	40		
	56	65.8	30	52	
	57	74.1	21	52	
13	58	84.2	12	52	
14	00	75.0	20	51	
		66.4	30	52	
	01	56.6	42	53	
		47.4	58	53	
	02	37.8	79		
		29.1	106		
	03	19.5	171	53	
	04	9.7	348	52	
		5.5	552	52	
14	05	0	1007	52	

Station No. 3 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	31	0	393		Instrument:
	32	0.8	317		Quantameter FC5
	33	5.0	193		
		9.5	129		
	34	19.0	73		
		28.0	46		
	35	37.9	29		
		47.7	19		
	36	57.4	11.9	7 - 14	
		68.2	7.5		
		78.4	4.1		
	37	87.5	1.8	7 - 14	
	38	97.7	0.8	7 - 14	
	40	106	0.35	9	
		96.4	0.6		
	41	91.6	0.9		
		88.6	1.2		
		85.3	1.6		
	42	78.6	3.2	10 - 11	
	43	67.3	6.3		
		56.6	9.8		
		46.8	14.3		
	44	37.5	22		
		31.5	28		
		27.1	36		
	45	17.5	55		
		9.1	90		
	46	3.8	150	6 - 10	
	47	0.8	202	6 - 9	
16	50	0	246		

Station No. 4 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot$ m^{-2} $\cdot$ s^{-1}

Time		Depth	Quanta	Sun monitor	Remarks
h	min.	m	Q	(relative units)	
11	53	0	1152	61	Instruments:
	54	5.8	600		Quantameter FC 31
	55	10.6	471	54 - 62	together with
	56	20.5	320	62	Scripps radiometer
	57	30.0	225		
11	58	36.7	156	62	
12	00	48.0	100	62	
	01	42.6	131		
	02	57.4	59		
	03	65.9	37	61	
	04	69.9	29	62	
	05	74.8	23		
12	06	82 3	15	62	

Station No. 4 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot m^{-2} \cdot m^{-1}$

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	08	81.6	16	61	Instruments:
	10		17	62	Quantameter FC 31
	12	80.6	17	62	together with
	14		18		Scripps radiometer
	16		17		
	18	81.6	16	61	
	20	80.6	17	60	
	22		18	61	
	26	54.9	79	62	
	28		25	17	
	30		71		
	32		71		
	34	55.7	70		
	36		70		
	38		70	59	
	40	55.7	70		
	44	29.2	231		
	46		228	59	
	48		215	58	
	50		212		
	52		221		
	54	29.2	135	cloud	
	56		224	62	
12	58		219		
13	00	29.2	66	cloud	
	02	19.4	330		
	04		315		
	06		312		
	08		309		
	10	19.6	303		
13	12	19.6	291	56	

Station No. 4 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . m^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	14	19.6	285	56	Instruments:
	16		279		Quantameter FC 31
	18	19.6	276		together with
	20	9.9	468	56	Scripps radiometer
	22		462		
	24		432	56	
	26		480		
	28		456		
	30		444		
	32		504		
	34		480		
	36		498		
	38		438		
	40		444		
	42		435		
	44		442		
	46	9.9	456	54	
	48	0	1036	52	

Station No. 4 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . m^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	08	0	1022	50	Instruments:
	09	5.7	534		Quantameter FC 31
	10	10.5	396	36 - 52	together with
	11	20.3	288	44 - 54	Scripps radiometer
	12	27.4	213	48 - 55	
	13	38.3	114	50 - 54	
	14	48.3	72	52 - 57	
	15	57.4	27	26	
	16	65.8	8.6	18	
	17	75.0	16	44 - 50	
	18	82.3	9.7	50	
	23	70.8	4.8	13 - 14	
	24	61.6	33	28 - 43	
	25	53.2	53	48	
	26	44.1	85	47	
	27	36.8	128	50	
	28	28.2	198		
	29	19.9	99	16 - 18	
	30	9.9	405	14	
	31	5.7	522	46	
14	32	1.0	810		

Station No. 6 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	32	0	1086	56	Instrument:
	33	1.5	782		Quantameter FC 5
	34	5.3	458	54	
	38	21.1	105	55	
	39	27.2	58	57	
		34.9	23		
	40	40.6	10.4		
		46.5	5.4		
	41	51.0	2.6	56	
		53.4	1.8		
	42	58.6	1.2		
	43	62.7	0.8	57	
		70.3	0.4		
	44	65.5	0.6		
		56.6	1.3		
	45	48.6	3.4	53	
		44.4	5.4		
	46	40.0	8.7		
		35.0	16.3	42	
	47	31.0	27	41	
	48	23.1	67	46	
		17.5	125	52	
	49	13.7	196	54	
		9.9	292	53	
	50	5.3	432		
10	52	0	860	44	

Station No. 6 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	22	0	364		Instrument:
	23	0.8	304		Quantameter FC 5
	24	6.1	143		
		10.7	80	16	
	25	17.9	30	16	
	26	19.8	24		
	27	28.8	6.2		
		37.1	1.7		
		43.5	0.6		
	30	51.8	0.2		
	31	41.0	0.7	15	
		35.7	1.9	15	
		27.2	6.8	14	
	35	19.0	23	14	
		10.7	74		
		6.1	129	14	
		0.8	267	14	
16	41	0	284	14	

Station No. 7 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
11	07	0	1348	66	Instrument:
		0.5	1224	68	Quantameter FC 5
	08	5.4	635		
		9.9	405		
	09	14.7	262		
		18.7	163		
	10	27.2	75		
		34.7	38	74	
	11	39.8	25	72	
	12	46.0	13.7	55 - 68	
	13	57.2	5.6	36 - 71	
	14	64.3	3.3	74	
	15	56.4	55	56 - 62	
	16	48.4	10.6	50	
	17	44.0	16.8	66	
		40.4	24	44 - 56	
	18	35.7	33		
	19	29.5	56		
	20	25.6	90	65	
	21	17.9	186	66	
		14.1	267	65	
	22	9.5	386	74	
		5.3	607	58	
	23	1.0	1104		
11	25	0	1333	75	

Station No. 8 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	28	0	618	34	Instruments:
		7.0	300	35	
	29	10.9	166	31	Quantameter FC 31
		15.8	101	33	together with
	30	21.0	63	35	Scripps radiometer
		29.3	29	42	
		39.2	12.3	40	
	31	48.2	6.2	39	
	32	56.2	3.7	43	
	33	64.2	2.3	40	
	34	69.5	1.9	46	
	35	74.9	1.3	47	
	40	72.3	1.4	38	
	42		1.2	38	
	44		1.0	31	
	46		0.9	33	
	48		1.5	40	
	50	72.3	1.8	41	
	52	61.7	4.5	46	
	54		2.6	35	
	56		2.2	34	
12	58		2.5	44	
13	00		3.0	43	
	02		3.3	37	
	04		2.4	32	
	06	61.7	1.9	26	
	08	45.6	8.1	36	
	10		7.4	36	
	12		3.6	17	
	14		8.7	39	
13	16	45.6	8.3	35	

Station No. 8 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	18	45.6	7.8	36	Instruments:
	20		4.5	21	Quantameter FC 31
	22		5.3	25	together with
	24	45.6	6.5	31	Scripps radiometer
	26	30.1	28	30	
	28		21	27	
	30		15	20	
	32		22	31	
	34		23	30	
	36		28	30	
	38		23	27	
	40		19	24	
	42	30.1	26	34	
	44	11.1	150	27	
	46		123	22	
	48		132	22	
	50		138	24	
	52		135	26	
	54		153	26	
	56		120	20	
13	58		99	17	
14	00		114	19	
	02		168	29	
	04		120	21	
	06	11.1	98	17	
14	07	6.2	156	16	

Station No. 8 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	09	0	642	29	Instruments:
	10	0.7	654	36	Quantameter FC 31
	11	6.1	288	32	together with
	12	11.1	199	38	Scripps radiometer
	13	16.4	112	38	
	14	20.9	69	40	
	15	30.6	22	37	
	16	39.8	10.3	35	
	17	49.0	7.2	39	
	18	57.7	4.0	34	
	19	66.4	3.0	35	
	20	72.9	2.6	37	
	21	79.5	2.4	38	
	22	70.6	2.5	27	
	23	62.5	3.1	27	
	24	53.9	3.8	24	
	25	46.6	5.6	21	
	26	38.0	8.8	19	
	27	29.5	14.6	18	
	28	21.1	32	18	
	29	16.5	49	16	
	30	11.3	83	16	
	31	6.8	147	16	
		0.8	294	14	
	32	0	333	13	
	43	0	173	14	on deck
	49	0	214	18	-
	55	0	185	15	-
14	58	0	182	15	-

Station No. 9 · DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	20	4.9	630	66	Instruments:
	21	10.1	384	64	Quantameter FC 31
	22	15.1	189	56	together with
	23	20.2	101	53	Scripps radiometer
	24	30.4	19	40	
	25	38.8	4.6	36	
	26	48.4	3.7	55	
	27	56.6	2.3	64	
	28	66.4	1.2	58	
	29	74.1	0.5	46	
	30	82.0	0.3	48	
	33	77.0	0.3	42	
	35		0.3	40	
	37		0.4	48	
	39		0.4	50	
	41		0.5	41	
	43		0.5	50	
	45		0.5	57	
	47	77.0	0.4	53	
	49	62.3	1.1	48	
	51		0.9	45	
	53		0.6	38	
	55		0.6	38	
	57		0.5	39	
12	59		0.7	39	
13	01	62.3	0.8	44	
	03	54.2	1.2	38	
	05	46.1	2.8	40	
	07		2.0	35	
	09		2.0	36	
13	11	46.1	2.0	40	

Station No. 9 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	13	46.1	1.7	37	Instruments:
	15		1.8	38	Quantameter FC 31
	17		2.0	36	together with
	19	46.1	2.0	34	Scripps radiometer
	21	37.2	6.2	35	
	23	29.1	25	34	
	25		21	32	
	27		15	29	
	29		15	30	
	31		17	31	
	33		18	31	
	35		20	31	
	37	29.1	23	32	
	39	20.1	74	37	
	41		71	36	
	43		67	34	
	45		65	33	
	47		62	31	
	49		62	31	
	51		62	31	
	53		62	31	
	55		55	29	
	57	20.1	52	28	
13	59	15.4	81	27	
14	01	10.5	143	27	
	03		144	27	
	05		153	29	
	07	10.5	156	29	
	09		149	28	
	11		138	26	
14	13	10.5	126	25	

Station No. 9 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	15	5.4	215	24	Instruments:
	17	0	485	23	Quantameter FC 31
	20	0	480	23	together with
	21	0.5	408	23	Scripps radiometer
	22	5.6	195	23	
		10.4	107	23	
	23	15.4	64	23	
	24	20.2	39	23	
	25	30.1	10.0	22	
		39.7	2.2	22	
	26	48.7	0.7	22	
	27	58.0	0.3	21	
	35	61.0	0.2	18	
	36	55.9	0.3	18	
	37	51.9	0.4	17	
	38	47.3	0.7	16	
	39	43.2	1.1	16	
	40	38.6	2.3	16	
	41	34.7	4.6	16	
	42	30	9.5	16	
	43	24.3	17	15	
		19.6	30	16	
	45	15.0	49	16	
	46	10.1	83	16	
		5.3	147	16	
	47	1.8	245	16	
	48	1.1	280	16	
14	49	0	347	17	

Station No. 9 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	33	0	257	12.8	Instruments:
	34	0.7	204	12.4	Quantameter FC 31
	35	6.2	94		together with
	36	11.3	55	12	Scripps radiometer
		16.2	32	12	
	37	21.9	17.5	12	
		31.1	6	12	
	39	41.1	1.1	12	
	41	50.8	0.4	12	
	42	40.9	1.1	12	
	43	31.4	5.6	11.6	
		21.4	17	11.6	
	45	16.8	28	11.2	
	48	11.8	47	11.2	
	49	7.0	79	11.2	
	50	0.8	186	11.2	
	51	0	234	11.2	
	57	0	226	10.8	
	58	0.7	185	10.4	
15	59	5.7	85	10.4	
16	00	10.7	47	10	
	01	15.5	28	10	
	02	20.2	17	10	
	03	30.4	5.1	9.6	
16	04	40.0	1.1	9.6	

Station No. 9 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1} -

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	05	48.7	0.4	9.2	Instruments:
	06	39.4	1.1	8.8	Quantameter FC 31
	07	29.0	5.3	8.4	together with
	08	19.9	14.3	8.0	Scripps radiometer
	09	15.7	23	7.6	
	10	10.2	38	7.6	
	11	5.6	62	7.6	
	12	0.9	126	7.6	
16	13	0	152	7.6	
17	38	0	21	0.90	
		0.2	18	0.87	
	39	5.5	7.8	0.84	
	40	10.3	4.1	0.78	
		15.1	2.3	0.74	
	41	19.8	1.4	0.72	
	42	30.0	0.4	0.68	
	43	39.6	0.1	0.62	
	44	29.2	0.4	0.56	
	45	19.3	1.0	0.52	
		15.0	1.6	0.49	
	46	9.7	2.6	0.46	
		4.8	4.3	0.44	
		0.5	7.6	0.41	
17	47	0	8.5	0.38	

Station No. 10 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	12	0	565	37	Instruments:
	13	1.0	546	37	Quantameter FC 31
	14	6.8	304	37	together with
	15	11.2	191	35	Scripps radiometer
	16	15.2	131	33	
	17	19.9	91	31	
	18	28.8	50	31	
	19	38.7	26	31	
	20	48.5	15	33	
	21	56.8	8.9	35	
		63.7	5.0	37	
	22	69.6	3.3	42	
	24	72.3	2.3	42	
	25	66.4	4.9	48	
	26	59.8	10.1	50	
	27	52.3	15.9	46	
	28	45.1	25	42	
	29	35.2	44	41	
		27.0	73	39	
	30	18.3	122	38	
	31	15.2	155	36	
		10.6	203	34	
	32	5.4	282	32	
	33	1.4	414	68	
	34	0	527	28	
	35	6.1	234	28	
	37		219	27	
	39		228	28	
	41		237	29	
	43		246	30	
12	45	6.1	258	32	

Station No. 10 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	47	6.1	273	35	Instruments:
	49		273	35	Quantameter FC 31
	51		276	36	together with
	53		288	37	Scripps radiometer
	55		282	36	
	57		270	34	
12	59		264	33	
13	01		240	30	
	03	6.1	207	26	
	05	15.6	96	26	
	07		97	25	
	09		95	25	
	11		96	25	
	13		89	24	
	15		85	23	
	17		85	23	
	19		93	25	
	21		100	26	
	23		107	29	
	25	15.6	112	30	
	27	29.2	44	29	
	29		47	29	
	31		47	30	
	33		53	32	
	35		52	33	
	37		52	33	
	39		55	32	
	41		50	31	
	43		49	31	
	45	29.2	47	30	
13	47	45.1	16.8	30	

Station No. 10 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time		Depth	Quanta	Sun monitor	Remarks
h	min.	m	Q	(relative units)	
13	49	45.1	16.8	30	Instruments:
	51		17.4	29	Quantameter FC 31
	53		16.1	30	together with
	55		15.2	31	Scripps radiometer
	57		17.6	31	
13	59		17.3	29	
14	01		14.1	26	
	03		14.7	26	
	05	45.1	14.2	26	
	07	61.8	2.7	25	
	09		2.7	22	
	11		2.8	21	
	13		3.0	21	
	15		3.8	22	
	17		3.8	22	
	19		4.1	23	
	21		3.8	24	
	23	61.8	4.7	26	
	24	70.9	2.0	28	
	25	62.6	4.2	29	
	26	53.6	9.5	28	
	28	44.6	17	27	
	29	34.1	32	27	
	30	26.9	53	27	
	31	19.5	85	28	
	32	15.6	113	28	
	33	10.9	167	30	
	34	6.1	255	30	
	35	1.5	447	31	
14	37	0	561	30	

Station No. 10 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	29	0	292	16	Instruments:
	30	0.7	255	17	Quantameter FC 31
		5.1	147	17	together with
	31	6.0	148	17	Scripps radiometer
	32	10.3	100	17	
		15.7	65	16	
	33	19.3	46	15	
	34	29.2	23	15	
	36	38.0	12.3	14	
		47.0	7.0	14	
	37	55.6	3.8	14	
	39	63.3	1.7	14	
	40	69.3	1.0	13	
	41	59.4	2.2	13	
	42	51.7	4.3	13	
	43	43.8	7.9	13	
	44	35.2	13.4	13	
	45	26.8	24	13	
	46	18.2	41	12	
		14.4	52	12	
	47	10.4	73	12	
		5.1	110	12	
	48	1.4	173	12	
15	49	0	238	12	

Station No. 10 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
17	14	0	59	3.0	Instruments:
		5.0	28	2.8	Quantameter FC 31
	15	10.0	18	2.7	together with
		14.8	12.2	2.6	Scripps radiometer
	16	19.7	8.4	2.6	
	17	28.8	4.1	2.6	
	18	37.6	2.2	2.5	
	20	46.5	1.0	2.4	
	21	53.6	0.4	2.3	
	22	60.6	0.2	2.2	
	25	58.9	0.2	2.2	
		55.0	0.3	2.1	
	26	47.8	0.6	1.9	
	27	40.2	1.1	1.8	
	28	34.8	1.9	1.7	
	29	27.3	2.9	1.6	
	30	19.0	5.1	1.5	
	31	14.5	6.9	1.4	
	32	9.9	9.5	1.4	
	33	5.5	13.2	1.3	
	34	1.2	18.8	1.2	
17	35	0	23.3	1.2	

Station No. 11 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot$ m^{-2} $\cdot$ s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	23	0	1151	66	Instrument:
		1.5	1076	59 - 68	Quantameter FC 5
		6.9	626	66 - 68	
		11.0	432		
	24	15.6	294		
		19.6	196		
	25	28.0	104		
		38.3	58	68	
	26	46.5	35	70	
	27	55.8	20	68 - 71	
	28	79.5	1.3	20	
		85.0	0.8	22	
	29	90.5	1.9	48	
		81.7	1.8	35	
	30	72.3	3.8	30 - 35	
	31	64.7	5.5	31	
	32	56.4	7.9	29 - 31	
		49.2	22	44 - 48	
	33	42.7	25	31	
		35.3	91	70 - 81	
	34	28.0	122	62 - 79	
		19.0	198	64 - 77	
	35	11.1	198	33	
		1.9	414	27 - 29	
12	36	1.2	430	20 - 27	
13	00	0	518	26	Instruments:
	01	1.6	858	55	Quantameter FC 31
	02	5.5	636	75	together with
		10.3	420	48 - 62	Scripps radiometer
	03	15.3	151	30	
13	04	19.4	210	42 - 63	

Station No. 11 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	05	27.2	45	24	Instruments:
	07		120	63	Quantameter FC 31
	09		78	32	together with
	11		68	32	Scripps radiometer
	13		134	59	
	15		131	57	
	17	27.2	129	58	
	19	18.7	255	59	
	21		228	60	
	23		222	56	
	25		216	54	
	27		207	53	
	29		216	54	
	31	18.7	219	55	
	32	14.4	312	57	
	33	9.6	432	57	
	35		432	56	
	37		420	55	
	39		408	53	
	41		420	53	
	43		402	52	
	45	9.6	384	51	
	46	5.2	540	51	
	47	1.3	805	50	
13	48	0	975	50	

Station No. 12 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot$ m^{-2} $\cdot$ s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	17	0	1152	59	Instruments:
	18	5.1	900	59	Quantameter FC 31
	20	10.1	605	59	together with
	21	13.9	432	59	Scripps radiometer
	22	19.6	231	60	
	23	32.5	120	61	
	24	39.7	64	61	
		45.4	36	61	
	25	56.4	19	61	
	26	63.0	10.8	60	
	27	70.0	6.9	59	
	29	56.1	12.3	58	
	30	46.8	27	58	
	32	38.3	55	58	
		31.6	82	58	
	33	25.7	114	58	
	34	17.7	185	58	
	35	13.7	243	56	
	36	9.0	318	57	
		4.6	486	58	
	37	0.8	696	57	
12	39	0	1164	59	

Station No. 12 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	44	0	1117	58	Instruments:
		1.1	855	58	
	45	5.8	600	58	Quantameter FC 31
		9.9	414	56	together with
		4.9	294	58	Scripps radiometer
	46	19.8	222	58	
	47	27.7	125	58	
	48	36.6	72	59	
	49	44.8	39	61	
	50	52.0	22	63	
	51	59.9	10.7	63	
	53	68.3	6.0	60	
	57	59.9	10.1	57	
12	59		9.7	56	
13	01		9.3	56	
	03	61.3	9.0	56	
	05		7.9	56	
	07	65.0	7.2	56	
	09	65.4	7.2	56	
	10	56.8	13.2	56	
	11	48.0	28	56	
	13		23	56	
	15	49.7	21	56	
	17	49.3	27	56	
	19		24	58	
	21		26	55	
	23		22	54	
	25		25	55	
	27		23	55	
	29	49.7	23	55	
	30	41.4	48	56	
13	31	33.2	84	56	

Station No. 12 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	33	36.5	65	54	Instruments:
	35		68	54	Quantameter FC 31
	37	35.6	69	54	together with
	39		72	55	Scripps radiometer
	41		68	56	
	43		20	18	
	45		67	56	
	47		64	54	
	49	35.6	69	56	
	51	27.6	120	59	
	53		105	53	
	55		96	45	
	57		108	53	
13	59		108	56	
14	01		108	54	
	03	28.2	101	54	
	05	18.9	195	52	
	07		179	49	
	09		168	47	
	11		165	44	
	13		167	45	
	15	18.9	155	44	
	17	9.8	310	44	
	19		310	45	
	21		309	47	
	23		291	46	
	25		294	45	
	27		291	45	
	29	9.8	291	45	
	32	0	843	44	
14	33	0.7	650	45	

Station No. 12 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	34	5.3	396	44	Instruments:
		9.8	279	44	Quantameter FC 31
	35	14.8	200	44	together with
		20.0	135	44	Scripps radiometer
	36	28.1	74	42	
	37	37.3	39	44	
	38	45.2	19	43	
		54.6	7.9	43	
	39	63.1	3.7	42	
	40	70.0	2.2	42	
	41	60.7	4.9	43	
		49.1	12.9	42	
	42	39.3	32	41	
	43	33.5	49	41	
	44	25.5	84	41	
		18.7	143	41	
	45	14.4	195	41	
		10.0	288	41	
	46	4.7	432	41	
		1.0	564	41	
14	47	0	867	40	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	05	0	1080	59.5	Instruments:
	07	0.8	1050	59.5	Quantameter FC 31
	08	5.8	540	59.5	together with
		10.5	354	59.5	Scripps radiometer
		15.1	234	59.5	
	09	20.3	144	59.5	
	10	25.6	81	59.5	
	11	30.3	46	59.5	
	12	35.5	30	59.5	
	13	40.3	21	59.5	
	14	45.1	15	59.5	
	15	49.4	11.3	59.5	
	16	55.4	8.4	59.5	
	17	60.5	6.4	59.5	
	18	65.1	5.0	59.5	
	19	69.6	3.9	59.5	
		75.1	3.1	59.5	
	20	79.3	2.4	59.5	
	22	84.8	1.7	59.5	
	23	84.8	1.7	59.0	
	25		1.6	59.0	
	27		1.6	59.0	
	29	84.6	1.8	59.0	
	31	84.2	1.7	58.6	
	33		1.6	59.0	
	34	80.6	2.1	59.0	
	35	74.2	2.6	59.0	
	37	68.5	3.5	59.9	
	39		3.8	59.5	
	41		3.9	64.8	
12	43	68.5	3.6	41.5 - 60.8	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	45	68.5	3.5	61.7	Instruments:
	47	68.5	2.6	45.4 - 59.5	Quantameter FC 31
	50	54.1	7.6	61.7	together with
	52		5.7	44.5 - 57.3	Scripps radiometer
	54		7.2	53.8 - 61.7	
	56		4.3	37.5	
12	58		7.2	55.5	
13	00	54.1	6.8	50.7	
	02	48.7	9.9	58.2	
	03	43.7	14.1	60.0	
	05	38.2	20	52.0	
	07		24	55.5	
	09		28	67.0	
			10	26.9	
	11	38.2	26	61.3	
	13		22	66	
	15		10	29.5	
	17		24	58.2	
	19		13	34.8	
	21	38.2	17	46.7	
	23	28.9	46	44.1	
	25		47	50.7	
	27		25	30.9	
	29		35	37.9	
	31		23	26.9	
	33		40	49.8	
	35	28.9	27	34.8	
	37		29	33.9	
	39		22	27.3	
	41		21	26.0	
	43	28.9	26	29.5	
13	44	24.7	45	33.1	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	45	19.6	57	26.0	Instruments:
	47		51	24.2	Quantameter FC 31
	49		61	29.5	together with
	51		77	33.1	Scripps radiometer
	53		59	27.3	
	55		74	33.9	
	57		65	28.2	
13	59	19.6	89	40.5	
14	13	10.3	159	31.3	
	15		254	54.2	
	17		281	49.8	
	19		240	41.9	
	21		243	40.5	
	23		236	37.9	
	25		204	40.1	
	27		186	37.9	
	29		330	62.1	
	31		192	37.0	
	33	10.3	219	37.5	
	35	5.8	303	38.4	
	37	1.5	468	34.4	
14	39	0	974	45.4	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth	Quanta	Sun monitor (relative units)	Remarks
10	47	0	925	62.5	Instrument:
	48	0.4	883		Quantameter FC 5
	49	5.7	442		
		10.3	294		
	50	14.9	166		
		19.4	121		
		23.9	86		
		28.4	46		
	51	33.3	29		
		38.3	18		
	52	47.7	7.4		
		57.4	3.1		
	53	68.2	1.5		
		78.0	0.7		
	54	86.7	0.4		
	55	96.5	0.2	57.5	
	56	86.0	0.4		
	57	76.8	0.7		
		65.9	1.6		
	58	55.8	3.5		
		46.5	8.4		
	59	37.1	22		
		31.9	39		
		27.2	63		
11	00	23.1	97		
		18.7	147		
		14.5	235		
	01	10.7	359		
		5.3	534	45 - 50	
		0.8	754		
	02	0	955		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	21	0	670		Instruments:
	22	0.8	618		Quantameter FC 31
		6.4	336	39 - 40	together with
	23	10.7	180		Scripps radiometer
		15.9	113	43	
	24	20.2	67	37.5	
		24.9	48	42	
	25	28.4	42	51	
	26	33.3	38	86	
		38.2	11.6	41	
	27	43.0	6.6	40	
	28	49.2	4.0	43	
		58.3	3.5	89	
	29	68.2	1.8	85	
	30	77.6	0.5	48	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	33	77.6	0.3	33	Instruments:
	35		0.7		Quantameter FC 31
	37		0.5	39	together with
	39		1.0	55	Scripps radiometer
	41		0.5	41	
	43	77.6	0.4	33	
	49	58.2	1.9	46	
	51		3.7	80	
	53		3.4	76	
	55		2.0	40	
	57		2.0	44	
	59		2.5	54	
13	01	58.2	3.1	65	
	13	36.8	22	55	
	17		20	63	
	19		16	44	
	21		20	56	
	23		18	48	
	25	36.8	22	58	
	30	27.9	41	53	
	35		76	69	
	37		38	39	
	39		49	52	
	41		50	47	
	43		56	62	
	45		58	62	
	47	27.9	66	59	
	49	19.9	109	51	
	51		114	57	
	53		129	60	
	55		117	55	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	57	19.9	98	47	Instruments:
	59		117	53	Quantameter FC 31
14	01		140	64	together with
	03		135	62	Scripps radiometer
	05		149	66	
	07		149	68	
	09	19.9	128	56	
	11	10.6	240	61	
	13		360	73	
	15		360	73	
	17		258	46	
	19		207	42	
	21		324		
	23		312		
	25		234		
	27		259		
	29		186		
	31		288	62	
	33	10.6	234	50	
14	35	1.3	720	52	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	42	0	310	16	Instruments:
	43	1.2	271		Quantameter FC 5
		5.7	168		
	45	10.3	113		
		14.9	68		
		19.0	46		
		23.9	28		
	46	27.6	18		
		32.0	13.5		
		36.7	8.6	32	
	47	40.6	4.7		
	48	45.6	4.0		
		55.4	1.4	28	
	49	65.1	0.7		
	50	74.3	0.6		
		83.1	0.3		
		73.1	0.4		
	52	62.3	0.8		
		52.6	2.1		
		46.0	3.9		
	54	40.2	6.8		
		37.1	9.3	28	
		31.4	18		
	55	26.4	32		
		23.1	44		
	56	18.3	66	30	
	57	14.9	91		
		10.3	148		
		5.9	202		
	58	1.2	373		
15		0.4	654		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	09	0	462		Instrument:
		1.2	350		Quantameter FC 5
		5.7	198	24	
	10	10.3	119		
		13.0	71		
	11	19.0	47		
		23.5	29		
		28.4	18		
	12	32.7	11.0		
		39.9	5.7	23	
	13	42.7	3.4		
		47.7	2.0		
	14	57.0	1.0		
		67.8	0.5		
	15	77.7	0.3		
		67.3	0.4		
	16	56.6	0.8	20	
		46.5	2.1		
		41.9	3.4		
	17	36.4	6.9		
		31.4	11.0		
		26.8	17		
	18	22.7	28		
		18.3	41		
		14.5	47	10	
	19	10.3	78		
		5.7	168	18	
	20	1.2	326		
		0.4	451		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	43	0	1184		Instrument:
	44	0.6	1150		Quantameter FC 5
		5.7	713		
	45	9.9	460		
		14.5	350	68	
	46	18.7	265		
		23.5	174	68	
	47	28.6	138		
		38.1	49		
	48	42.7	29		
		47.3	17		
	49	56.0	8.4		
	50	66.0	4.1	60	
	51	74.8	2.8		
	52	82.3	2.3		
	53	72.5	4.2		
		61.9	8.7		
	54	52.6	16		
		44.4	20		
	55	40.2	50	64 - 66	
		35.2	72		
	56	32.3	114		
		27.8	156		
		24.5	168		
	57	18.6	251		
		14.7	331		
		9.9	483		
	58	5.7	607	55 - 68	
		2.9	828		
		1.0	1113		
11	00	0	1202		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot m^{-2} \cdot s^{-1}$

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	32	5.5	645	63	Instruments:
	33	10.1	348	57	Quantameter FC 31
		15.1	291	69	together with
	34	19.4	210	54	Scripps radiometer
	35	23.5	202	71 - 94	
		27.7	159	63 - 88	
	36	31.1	91	55 - 65	
	37	36.9	56	52 - 63	
	38	40.2	37	51 - 58	
		43.9	26	53 - 66	
	39	51.6	17	59 - 63	
	40	59.1	9.8	61.5 - 71	
	41	63.7	5.0	59 - 65	
	43	63.0	4.9	53 - 74	
	45	60.2	5.8	60 - 75	
	47		4.7	52 - 58	
	49	61.1	3.8	46 - 50	
	51		3.8	41 - 52	
	53	59.5	4.1	44 - 48	
	55		4.9	41 - 51	
	56	52.1	8.9	43 - 54	
	57	44.3	26	52 - 78	
12	58	47.7	16	46 - 70	
13	00		19	58 - 77	
	02		24	63 - 87	
	04		16	49 - 84	
	06		12	52 - 62	
	08	50.6	12	48 - 70	
	10	41.6	34	55 - 80	
	11	38.0	44	66 - 79	
13	12	34.6	55	43 - 63	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	14	34.6	54	52 - 62	Instruments:
	16		48	46 - 62	Quantameter FC 31
	18		74	62 - 75	together with
	20		25	25	Scripps radiometer
	22		69	75 - 77	
	24	34.6	24	25 - 40	
	30	27.4	128	66	
	32		131	65	
	34		125	62	
	36		117	62	
	38		125	62	
	40		120	62	
	42	27.4	120	62	
	44	22.5	159	62	
	46	19.2	220	62	
	48		236	66	
	50		62	17	
	52		246	71	
	54		98	24 - 56	
	56	19.2	230	65	
13	58	10.2	390	62	
14	00		402	62	
	02		372	61	
	04		366	58	
	06		396	59	
	08		402	61	
	10		120	17	
	12		150	21 - 24	
	13	10.2	456	73	
	14	5.3	690	67 - 72	
	15	0	416	23	
14	19	0	1152	62	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	20	0.9	900	61	Instruments:
	21	6.0	515	61	Quantameter FC 31
	23	24.2	132	63	together with
	24	28.0	88	61	Scripps radiometer
	25	33.9	15	17	
		37.9	33	63	
	26	42.5	20	63	
		47.3	12.3	62	
	27	56.2	5.3	60	
	28	65.3	1.4	25	
	29	73.0	1.4	33 - 64	
	30	63.6	1.8	34 - 61	
	31	53.9	2.8	25	
		45.2	11	33	
	32	41.0	18	42	
		36.7	30	41 - 48	
	33	30.9	49	32 - 57	
	34	27.7	34	21	
	35	22.6	50	21	
		18.8	76	22 - 30	
	36	14.7	165	37 - 53	
	37	10.2	273	44 - 53	
		5.7	372	43	
	38	1.0	486	34	
14	39	0	760	42	
15	37	0	128	6	Instrument:
		3.3	104		Quantameter FC 5
		6.1	65		
	38	10.3	44	6	
	39	19.0	26		
	40	23.9	20	10	
15	41	33.7	8.5		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	42	38.1	5.5	11	Instrument:
		42.7	3.8		Quantameter FC 5
	43	47.7	2.5	11 - 12	
		57.4	1.2		
	44	67.8	0.6	12	
		76.8	0.4		
	45	84.6	0.2		
	46	74.8	0.4	13.5	
		65.0	0.8		
	47	55.8	1.5	13.5	
	48	45.6	3.5	14	
		40.6	5.5		
	49	37.5	8.0	14	
		33.7	12.4		
		28.6	20		
	50	23.5	33	14.5	
	51	19.0	45	14.5	
	52	14.5	63	14.5	
		10.3	89		
	53	5.8	131	14.5	
	54	1.2	207	14.5	
15	58	0	211	11.5	
16	00	0	204	11.0	
	01	0.7	174	11.0	
		6.1	96		
	03	10.5	67	11.5	
		15.2	49		
	04	19.4	35	12.5	
		23.9	25		
	05	28.8	17	13.0	
16	06	33.7	10.8		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	06	38.7	6.9	14	Instrument:
		43.5	5.2		Quantameter FC 5
	07	48.1	3.9	14.5	
		58.2	1.5	15.5	
	08	68.2	0.8		
		76.8	0.6	17	
		64.6	0.7		
	10	55.2	1.9	17	
	11	46.0	4.0	17.5	
		42.7	6.1		
	12	37.5	10.1	17	
		32.3	25		
	13	27.2	28	16	
		23.2	38		
		18.7	52		
	14	14.9	69	16	
		10.3	96		
	15	5.7	138	15	
		0.7	251		
16	16	0	280	15	

Station No. 16 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
11	02	0	1130		Instrument:
	10	85.3	1.0	68.0	Quantameter FC 5
	11	79.6	1.2		
		69.5	1.7		
	12	58.2	2.9		
		49.0	4.8		
	13	44.0	7.0		
	14	38.7	11.1	68.0	
		34.1	18		
	15	29.0	31	68.0	
		23.9	55		
		19.0	102		
	16	14.7	202		
		9.9	368	68.0	
		5.7	580		
	17	1.0	1012		
11	18	0	1135	68.0	
12	23	0	1147		Instruments:
		1.4	975	68.4	Quantameter FC 31
	24	6.3	530	68.0	together with
	25	11.0	330	68.0	Scripps radiometer
	26	15.2	198	68.0	
	27	21.1	95	68.0	
	28	26.1	51	68.0	
	29	31.2	28	67.8	
		36.5	17	67.6	
	30	41.1	10.4	67.6	
	31	46.5	6.5	67.6	
	32	51.3	4.4	67.6	
	33	61.1	2.1	67.6	
	34	70.8	1.0	66.0	
12	36	80.8	0.5	68.0	

Station No. 16 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	37	90.8	0.3	67.6	
	39	90.6	0.3	67.6	Instruments:
	41		0.3	67.6	Quantameter FC 31
	43		0.3	67.6	together with
	45		0.3	67.2	Scripps radiometer
	47		0.3	67.6	
	49	90.6	0.3	68.0	
	51	80.4	0.5	69.6	
	53	70.5	1.2	75.9	
	55		1.1	67.2	
	57		1.1	69.6	
12	59		1.1	67.2	
13	01		0.9	54.7	
	03		1.1	65.7	
	05		1.0	65.7	
	07		1.1	66.0	
	09		1.1	65.6	
	11		1.1	65.5	
	13		1.0	66.0	
	15		1.0	64.9	
	17		1.0	64.9	
	19	70.5	1.0	64.7	
	20	60.9	1.9	64.5	
	21	51.3	4.0	64.5	
	23		3.9	64.1	
	25	51.4	3.7	64.7	
	27		3.6	63.7	
	29		3.4	62.9	
	31		3.3	63.3	
	33	51.4	3.3	63.7	
13	34	45.8	5.2	63.7	

Station No. 16 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	35	41.2	8.2	63.7	Instruments:
		36.4	14	63.3	Quantameter FC 31
	36	31.1	24	63.7	together with
	37	31.1	24	63.7	Scripps radiometer
	39		24	63.3	
	41		24	64.5	
	43		24	64.5	
	45		23	64.5	
	47		22	61.7	
	49	31.1	15	44.2	
	51	26.2	38	62.1	
	52	21.2	65	53.1	
	53		59	44.6	
	55		45	39.9	
	57		55	45.7	
13	59		38	37.1	
14	01		62	53.5	
	03	21.2	72	57.8	
	08	11.1	225	58.6	
	09	11.1	225	58.6	
	11		216	55.9	
	13		213	58.2	
	15		216	50.8	
	17		201	53.1	
	19		225	58.6	
	21		222	59.4	
	22	6.5	381	59.0	
	23	2.0	648	48.0	
14	24	0	1164	62.5	
14	40	0	736	44.2	
	41	1.8	509	42.2	
14	42	6.6	262	44.0	

Station No. 16 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot m^{-2} \cdot s^{-1}$

Time		Depth	Quanta	Sun monitor	Remarks
h	min.	m	Q	(relative units)	
14	43	11.6	147	43.0	Instruments:
	44	15.8	76	40.3	Quantameter FC 31
	45	21.2	39	44.2	together with
	46	26.2	21	46.5	Scripps radiometer
	47	31.5	11	46.5	
	48	36.3	5.8	46.1	
	49	40.7	2.9	42.6	
	50	46.1	1.8	43.8	
		50.9	1.0	44.2	
	51	60.8	0.4	44.2	
	52	70.4	0.2	43.0	
	56	70.1	0.1	42.2	
	57	60.8	0.4	41.8	
	58	50.6	0.9	39.9	
		41.2	2.4	37.5	
14	59	30.8	8.2	35.2	
15	00	26.2	14	32.2	
	01	46.2	1.1	31.6	
	02	40.6	2.0	30.5	
	03	36.1	3.7	31.3	
	04	30.9	7.9	34.8	
		26.3	14	32.4	
	05	21.3	25	29.3	
	06	16.2	50	27.4	
		11.3	84	25.4	
	07	6.6	140	23.1	
	08	1.6	321	25.0	
15	09	0	418	25.0	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	57	0	503		Instrument:
		0.8	386		Quantameter FC 5
	58	5.5	182	29	
		10.3	107		
15	59	14.8	56	28	
		19.1	26		
16	00	24.3	12.4	26	
		29.2	6.0		
		34.5	3.0		
	02	39.4	1.9	28	
	03	44.0	1.3		
	04			29	
	05	49.4	0.8		
	06	59.5	0.5	29	
		70.3	0.3		
	07	58.6	0.5		
		48.9	0.8		
		43.8	1.4		
	08	39.0	2.1	29	
		34.1	3.8		
	09	29.0	7.0		
16	10	24.7	12		
		19.2	28		
	11	14.7	55	26	
		10.1	98		
	12	5.7	182		
		1.2	359		
16	13	0	474	26	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	38	0	364		Instrument:
	39	0.5	290		Quantameter FC 5
		5.7	124		
	40	10.5	70		
		14.8	36		
	41	19.9	16		
		24.7	7.7		
	42	29.6	4.0	17.5	
		34.3	1.8		
		39.8	1.2		
	43	44.8	0.6		
	44	49.4	0.4		
	45	59.5	0.2	17	
	46	49.4	0.4		
		44.0	0.6		
	47	39.0	1.1		
		34.1	2.0		
		29.0	3.8		
	48	24.3	7.1		
		19.4	15		
	49	15.0	33		
		10.3	59		
	50	5.9	105	14	
		1.0	191		
16	51	0	282		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	44	0	1064	59.0	Instrument:
	45	0.8	966		Quantameter FC 5
	46	5.7	589	61.0	
		9.9	451		
		14.1	368		
	47	18.3	306		
		23.1	260		
	48	27.2	207	62.0	
	49	32.3	179		
		36.8	154		
	50	40.6	132	65.5	
		45.6	98		
	51	55.6	67		
	52	65.0	42	64.0	
		75.6	24		
	53	83.1	15		
	54	91.5	9.0	61.0	
	55	100.4	5.3		
	56	97.3	6.5	47.0	
	57	87.5	11.6		
		78.8	21		
		69.9	34		
	58	60.4	52	61	
		51.6	81		
10	59	43.1	114		
		35.3	159		
11	00	26.8	212	62	
	01	17.9	336		
		9.5	460		
	02	0.4	938	59	
11	03	0	1092		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	44	0	1164	63.2	Instruments:
	46	1.8	960	56.8	Quantameter FC 31
	47	6.3	526	57.9	together with
		10.8	432	58.2	Scripps radiometer
	49	15.4	396	61.8	
		20.1	336	61.1	
	50	24.8	276	63.9	
	51	29.5	246	66.0	
	52	34.7	201	65.7	
		39.4	159	64.3	
	53	43.0	46	63.6	
	54	46.3	120	64.6	
	55	57.1	78	65.0	
	56	66.5	47	63.6	
	57	74.5	32	64.3	
12	58	73.3	32	63.2	
13	00		31	58.6	
	02	75.3	26	57.5	
	04		24	55.7	
	06		27	58.9	
	08		28	56.0	
	10		29	56.8	
	12		26	54.3	
	14	77.0	24	56.8	
	16		25	58.9	
	17	72.1	31	54.0	
		63.2	50	55.4	
	19	53.7	75	57.5	
	20	53.7	82	58.2	
	22		80	54.6	
	24		83	58.2	
13	26	53.8	83	63.6	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	28	53.8	80	55.7	Instruments:
	30	53.8	77	55.7	Quantameter FC 31
	31	46.6	119	57.9	together with
	32	37.4	162	60.0	Scripps radiometer
	34		168	58.9	
	36		170	60.4	
	38		168	60.0	
	40		170	60.0	
	42		170	60.0	
	44	37.4	173	61.4	
	45	27.9	237	60.0	
	46		240	59.6	
	48		255	59.3	
	50		183	47.1	
	52		225	57.9	
	54		225	57.1	
	56	27.9	222	56.8	
13	58	19.6	324	56.8	
14	00		318	55.7	
	02		330	56.8	
	04		321	57.1	
	06		324	57.5	
	08	19.6	312	57.5	
	10	10.2	324	34.0	
	12		474	59.3	
	14		174	21.8	
	16		480	58.9	
	18		498	61.4	
	20		204	28.6	
	22		516	55.4	
14	24	10.2	216	21.8	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	09	90.4	5.0	42.5	Instruments:
	10	80.2	10.2	42	Quantameter FC 5
	11	72.3	16	41.5	together with
	12	63.1	25	41.5	french quantameter
	13	53.8	40	41.5	
		44.8	59		
	14	40.6	71	41.0	
	15	36.0	89	41.0	
		31.4	109		
	16	26.0	138	41.0	
		21.5	175		
	17	17.5	207	40.5	
	18	13.6	265	40.5	
	19	9.1	350	40	
	20	5.0	460	40	
	21	0.8	575	39.5	
15	23	0	747	39	
16	12	86.4	2.8	28	
	13	77.6	5.1	27.5	
		69.3	8.2		
	14	62.9	13	27.5	
	15	51.4	21	27	
		43.5	31		
	16	34.9	47		
	17	26.0	72	26.5	
	18	21.9	90	26.5	
	19	17.5	120	26	
	20	13.7	150	27	
		9.5	189		
	21	5.4	255	26.5	
	22	0.8	386	26	
16	23	0	428	25.5	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	54	89.9	1.1	17	Instruments:
	55	79.8	2.5	16.5	Quantameter FC 5
	56	71,9	4.1	16	together with
	57	61.9	7.2	16	french quantameter
		52.8	12		
	58	44.0	18	15.5	
16	59	36.0	26	15	
17	00	26.8	41	15	
		22.3	51		
	01	17.9	65	15	
	02	14.1	86	15.5	
		9.7	117		
	03	5.7	154	16.5	
	05	0.8	255	15	
17	06	0	295		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	26	0	819	58.0	Instrument:
		5.2	580		Quantameter FC5
		9.7	469		
	28	13.4	350		
		18.1	255		
	29	22.5	212		
		27.0	174	58.5	
	30	31.6	146		
		36.7	122		
		40.0	106		
		44.4	88		
		52.4	67		
	34	60.0	51		
		68.7	33		
	35	76.3	24		
		84.2	12		
	38	89.3	8.7	59	
		85.9	11	59	
	40	78.0	24		
		70.1	34		
	41	60.2	46		
		52.8	60		
	42	45.8	82		
		40.0	104		
		36.8	121		
		33.9	139		
	44	30.2	159		
		26.2	193	60	
	45	21.5	228		
		17.1	269		
10	46	13.0	354		

Station No. 18 DISCOVERING EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	46	8.6	428	60	
		4.0	580		
	47	0	837		
12	30	0	1165		Instruments:
	31	5.8	732	64.0	Quantameter FC 31
	32	11.1	558	64.0	together with
		16.1	450	64.0	Scripps radiometer
	33	20.8	366	64.0	
	34	25.8	293	64.0	
	35	30.1	246	64.0	
	36	35.1	201	64.0	
		39.6	172	63.8	
	37	44.0	146	63.3	
	38	47.6	125	63.3	
	39	54.9	95	62.7	
	40	61.5	71	61.5	
	43	67.6	55	60.4	
12	45	66.1	58	60.4	
	47		59	60.8	
	49		58	60.0	
	51		55	55.0	
	53		59	60.4	
	55		58	61.1	
	57	66.1	57	60.8	
12	59	50.3	112	61.2	
13	01	50.2	108	61.2	
	03		104	60.8	
	05		107	61.5	
	07		105	61.5	
	09		107	61.3	
13	11	50.2	107	61.2	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time		Depth	Quanta	Sun monitor	Remarks
h	min.	m	Q	(relative units)	
13	13	50.2	105	61.5	
	15	37.7	180	61.5	
	17		176	61.3	
	19		171	61.2	
	21		173	61.0	
	23		174	60.8	
	25		174	60.6	
13	27		173	60.4	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	26	90.8	9.4	39	Instruments:
	27	85.7	12.3	39	Quantameter FC 5
	29	.			together with
	30	79.6	16	39	french quantameter
	31	69.9	23	39	
	32	63.9	31	39	
	33	55.6	44	41	
	34	51.4	51	41	
		42.9	71		
	35	39.2	80	40	
	36	35.3	98	41	
	37	30.5	116	39	
	38	25.6	132	27	
	39	21.5	129	28	
	40	16.8	163	28	
		12.6	179		
	41	8.4	214	25	
	42	4.0	283	25	
	43	0.5	441	24.5	
15	44	0	477	24.5	
16	43	69.7	5.2	6.0	
		58.4	7.7	6.0	
	44	50.4	11	6.0	
	45	43.7	15	6.0	
	46	34.5	21	6.0	
	47	25.9	30	6.0	
	48	22.1	36	6.2	
	49	17.4	45	6.4	
	50	13.4	56	6.4	
		9.0	73	6.2	
	51	4.8	94		
16	52	0	150	6.2	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	22	0	1145	60	Instruments:
		5.2	588		Quantameter FC 31
	24		624	60.5	together with
	26		612		Scripps radiometer
	28		600		
	30		588	61.0	
	32		642		
	34		618		
	36		552		
	38	5.2	528		
	40	9.9	474	61.5	
	42		504		
	44		522		
	46		522		
	48		528		
	50		516	62.5	
	52		528		
	54		522		
	56	9.9	516		
10	58	14.8	402		
11	00		402	63.0	
	02		396		
	04		404		
	06		351		
	08		405		
	10		411	63.5	
	12	14.8	408		
	13	29.6	198		
	14		206		
	16		206		
11	18	29.6	206		

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
11	20	29.6	207	64.0	Instruments:
	22		215		Quantameter FC 31
	24		213		together with
	26	29.6	212		Scripps radiometer
	30	44.7	118	64.5	
	31	49.8	98		
	32	59.5	67		
	40	59.5	68	65.0	
	47	59.5	68		
	48	74.6	38		
11	50	88.9	20	65.0	
12	00	88.9	20	65.0	
	10	88.9	19	65.0	
12	16	88.9	19	65.0	

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Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	16	88.9	19	65	Instruments:
		83.5	24		Quantameter FC 31
		78.3	30		together with
	17	73.7	37	65	Scripps radiometer
	18	68.8	46	65	
		63.8	56		
	19	59.5	67	65	
		54.2	80		
	20	49.1	98	65	
	21	44.4	119	65	
		39.0	146		
	22	34.2	182		
		29.4	225		
	23	24.4	273		
	24	19.5	345	65	
	25	14.9	402		
		9.7	528		
	26	4.9	642	65	
	27	1.1	1013	65	
12	28	0	1176	65	

Station No. 19 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Upwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	47	5.2	15.6	62.7	Instruments:
13	03	5.2	15.8	62.0	Quantameter FC 31
	05	10.3	13.2	62.0	together with
	19	10.3	13.0	60.5	Scripps radiometer
	21	19.7	9.2	60.5	
	35	19.7	8.8	59.0	
	37	39.4	4.1	58.3	
	48	39.4	4.1	57.2	
13	50	59.3	1.6	56.8	
14	04	59.3	1.6	55.0	

Station No. 19 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	12	0	1093		Instruments:
	13	0.9	815	54.0	Quantameter FC 31
	14	5.2	570	53.5	together with
	15	10.4	416	53.1	Scripps radiometer
	16	15.3	326	52.8	
		20.2	262		
	17	25.1	213	52.6	
	18	29.8	168	52.4	
	19	34.7	133	52.2	
		39.7	111		
	20	44.8	89	52.0	
	21	49.6	73	52.9	
	22	59.4	47	51.8	
	23	69.3	31	51.7	
	24	78.8	20	51.5	
	25	88.4	13	51.3	
	26	77.9	21	51.3	
	27	68.0	33	51.7	
	28	58.6	49	50.9	
		49.0	72		
		44.4	87		
	30	38.4	111	50.6	
		34.3	134		
		29.6	164		
	32	24.4	198	50.2	
		19.7	258		
	33	14.7	324	50.2	
	34	9.9	411	50.0	
	35	5.0	565	49.8	
	36	1.1	795	49.5	
14	37	0	962	49.2	

Station No. 19 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
15	42	0	699	24 - 28	Instruments:
	44	96.2	2.0	21 - 26	Quantameter FC 5
	46	86.4	4.1	21 - 27	together with
	47	77.2	6.3	21 - 42	french quantameter
	48	66.8	13.3	18 - 41	
	49	56.6	30	16 - 22	
	50	47.3	19	16 - 37	
	51			17	
	52	42.0	30	39	
	53	37.5	74	21 - 34	
	55	32.3	86	35	
		27.6	106		
	56	22.7	127	35	
		17.9	156		
		13.7	200		
	57	9.2	271	34	
	58	5.6	354		
15	59	0	529	32	
16	09	95.1	4.1	30	
		84.6	5.3	30	
	10	75.6	9.4	30	
		65.5	16	30	
	11	56.0	26	29.5 - 30	
	12	46.5	38	29.5 - 30	
		42.3	45		
	13	37.1	55	29.5	
		32.5	67		
	14	27.6	82		
		23.0	103	29.5	
	15	17.9	132	29.5	
16	16	13.6	170	29.5	

Station No. 19 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	Time min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
16	17	9.3	215	29 - 30	Instruments:
	18	4.8	312	28 - 30	Quantameter FC 5
16	20	0	481	23 - 25	together with
17	10	48.3	10.5	8.0	french quantameter
		42.7	12.8		
	11	37.5	16	7.5	
		32.9	19		
		27.5	22		
		24.7	28		
	12	18.3	33	7.0	
		14.1	40		
	13	9.2	53	7.0	
		5.3	71		
17	16	0	133	7.5	

Station No. 21 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time h	min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
10	38 - 40	0	1045	59.0	Instruments:
	40 - 42	5.0	630	59.3	Quantameter FC 31
	42 - 44	10.0	540	59.0	together with
	44 - 46	10.0	540	59.6	Scripps radiometer
	46 - 48	10.0	210	23.6	
	48 - 50	10.0	216	20.4	
		10.0	612	66.4	
	50 - 52	10.2	570	63.2	
	52 - 54	10.2	564	64.6	
	54 - 56	10.1	228	26.8	
	56 - 58	15.4	564	65.7	
10	58-1100	15.9	132	29.3	
11	00 - 02	19.5	132	20.7	
	02 - 04	19.5	230	26.8	
	04 - 06	19.5	405	64.3	
	06 - 08	19.6	390	62.5	
	08 - 10	19.6	378	61.0	
	10 - 12	19.5	384	61.4	
	12 - 14	19.5	378	60.0	
	14 - 16	19.5	390	60.4	
	16 - 18	19.5	390	60.4	
	18 - 20	23.6	324	60.7	
	20 - 22	27.6	306	62.5	
	22 - 24	28.1	297	61.1	
	24 - 26	28.2	303	60.7	
	26 - 28	28.3	291	60.7	
	28 - 30	28.1	312	60.4	
	30 - 32	28.0	306	60.4	
	32 - 34	28.0	309	60.7	
	34 - 36	28.0	309	60.7	
11	36 - 38	28.0	300	60.5	

Station No. 21 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
11	38 - 40	83.4	62	60.7	Instruments:
	40 - 42	82.0	51	43.0	Quantameter FC 31
	42 - 44	81.0	37	30.0	together with
	44 - 46	78.4	67	61.5	Scripps radiometer
	46 - 48	78.0	70	62.5	
	48 - 50		70	61.5	
	50 - 52		72	61.5	
	52 - 54			61.0	
	54 - 56		69	61.0	
	56 - 58		65	61.0	
11	58-1200		67	61.0	
12	00 - 02		68	61.0	
	02 - 04		68	61.0	
	04 - 06		74	62.5	
	06 - 08	74.0	82.5	61.5	
	08 - 10	60.7	126	62.0	
	10 - 12		128	62.0	
	12 - 14		122	61.5	
	14 - 16		123	62.0	
	16 - 18		123	62.5	
	18 - 20		120	61.5	
	20 - 22	61.8	128	61.5	
	22 - 24		132	62.0	
	24 - 26		125	62.5	
	26 - 28	56.8	148	62.5	
	28 - 30	42.8	228	63.0	
	30 - 32		65	20.0	
	32 - 34		240	63.2	
	34 - 36		225	61.8	
	36 - 38	41.5	225	61.0	
12	38 - 40		221	60.7	

Station No. 21 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
12	40 - 42	41.4	226	62.0	Instruments:
	42 - 44		210	60.4	Quantameter FC 31
	44 - 46		216	60.0	together with
	46 - 48	32.8	285	60.4	Scripps radiometer
	48 - 50	23.8	378	60.4	
	50 - 52		357	60.0	
	52 - 54		366	60.8	
	54 - 56		369	60.4	
	56 - 58		368	62.5	
12	58-1300		369	61.5	
13	00 - 02	24.0	351	60.7	
	02 - 04		369	62.0	
	04 - 06	13.3	540	63.6	
	06 - 08	15.5	528	65.0	
13	08 - 10	0	1152	61.5	

Station No. 21 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Upwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta . m^{-2} . s^{-1}

Time h	min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
13	27	83.2	1.8	59.6	Instruments:
13	24 - 30	79.2	2.2	58.2	Quantameter FC 31
	30 - 32		2.5	58.6	together with
	32 - 34	75.7	2.9	58.2	Scripps radiometer
	34 - 36		2.8	57.9	
	36 - 38		2.7	57.5	
	38 - 40		2.7	56.8	
	40 - 42		2.6	57.5	
	42		1.4	35.4	
	42 - 44		2.6	56.8	
	44 - 46	77.7	2.6	56.8	
	46 - 48	78.2	2.4	56.8	
	48 - 50	78.3	2.5	55.7	
	50 - 52		2.6	56.4	
	52 - 54		2.7	58.9	
	54 - 56		1.7	26.5	
	56 - 58		1.0	20.0	
13	58-1400		1.0	19.6	
14	00 - 02		1.4	21.8	
	02 - 03		2.7	60.4	
14	03	60.0	5.6	58.6	
	04 - 06		4.9	56.8	
	06 - 08	60.7	4.9	55.4	
	08 - 10		5.0	54.6	
	10 - 12		4.9	54.3	
	12 - 14		4.3	55.0	
	14 - 16		4.6	55.4	
14	16 - 18		5.0	55.0	

Station No. 21 DISCOVERER EXPEDITION MAY 1970

Direct measurement of Quanta

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta $\cdot$ m^{-2} $\cdot$ s^{-1}

Time h	min.	Depth m	Quanta Q	Sun monitor (relative units)	Remarks
14	30 - 32	0	1129	54.6	Instruments:
		1.8	968	56.0	Quantameter FC 31
	32 - 34	1.8	330	20.0	together with
	34 - 36	6.4	630	53.6	Scripps radiometer
		12.0	492	52.5	
	36 - 37	16.4	390	51.4	
		20.9	336	50.7	
	37 - 38	25.6	273	49.3	
	38 - 39	31.2	237	49.3	
		35.4	203	49.3	
	39 - 40	39.5	183	49.6	
	40 - 41	43.6	162	49.6	
		47.9	138	50.0	
	41 - 42	55.8	104	48.6	
	42 - 43	65.9	75	47.9	
	43 - 44	74.3	52	47.5	
14	44 - 45	79.5	43	47.1	
15	46	96.0	14	34.5	Quantameter FC 5
	47	85.3	20	34.0	together with
	48	78.5	27	33.5	French quantameter
	49	71.0	35	33.5	
	50	62.0	48	33.0	
	50	53.4	64	33.0	
	51	45.1	82	32.5	
	51	35.6	112	32.5	
	52	26.4	150	32.0	
	52	22.3	168	32.0	
	53	17.5	200	31.5	
	53	13.0	244	31.5	
	54	8.8	304	31.0	
		5.0	386		
	55	0.8	529	31.0	
15	56	0	615	30.5	

S. C. O. R. DISCOVERER EXPEDITION
MAY 1970

TRANSMITTANCE, SCATTERING, AND OCEAN COLOR

R. W. Austin

INTRODUCTION

Measurements of the optical beam transmittance as a function of depth in the water column were obtained at S. C. O. R. Stations 02 through 23 inclusive. These continuous vertical profiles provided an immediate visual indication of the degree of optical homogeneity of the water column and more significantly, showed the precise depth where changes in the transmittance occurred. As changes in the beam transmittance in the open ocean usually correlate with changes in the concentration of biogenous material, these profiles are useful for locating the depth of potentially phytoplankton-rich water. The transmissometer used for these measurements was equipped with a temperature sensor and simultaneous records of temperature and transmittance versus depth were obtained. From one to seven profiles were obtained on each station with a total of 105 profiles for the cruise. Measurements were made in one of five spectral bands as indicated in Table I.

On seven stations measurements of the volume scattering function of the water were obtained at various selected depths from the surface to 80 meters. The depths were selected to provide data in water that showed particularly high or low transmittance values or other interesting characteristics in the vertical profiles obtained with the transmissometer. In all, 31 volume scattering function curves were obtained. Because of the vertical homogeneity at some stations, not all data were reduced. Twenty-seven of these functions are presented, two or more at each station.

An assessment of the water color was made at 20 of the stations by carefully obtaining a match between Munsell color swatches and the ocean water immediately surrounding the ship. Only the Munsell hue notation is given in Table I. Munsell chroma and value matches were highly dependent on the lighting and viewing situation which varied with sun position, cloud cover, ship heading, and windspeed, and were not, therefore, indicative of intrinsic water color.

S. C. O. R. DISCOVERER EXPEDITION
MAY 1970

TABLE I

Summary of Transmittance, Scattering, and Ocean Color Determinations

Station	Date (1970)	Transmissivity and Temperature vs. Depth — Wavelength - nm					Scattering Function vs. Angle	Water Color (Munsell Hue Notation)
		450	473	491	535	581		
1	4-V							5PB
2	5-V	2	1	1	1	1		5PB
3	6-V	2		3		2		
4	7-V	1	1	1	1	1		5PB
5	8-V	1	1	1	2			5B
6	9-V		2		1	1	6	5B/10BG
7	10-V					1		
8	12-V	1	1	1		1	4	
9	13-V		1			1	5	10B/5B
10	14-V	1	1	2	1	1		10B
11	15-V	1		1				2.5B/5B
12	16-V	2	1	1	1	1		10B
13	17-V	1	1	4	1	1	6	5B
14	18-V			3				10B/7.5B
15	20-V	1		2		1		10B/7.5B
16	21-V			3			5	5B/2.5B
17	28-V	1	1	3	1	1		5B
18	29-V	1	2	2	1	1	2	2.5PB/5PB
19	30-V	1	2	1	1	1		5PB
20	31-V		1					7.5PB/5PB
21	1-VI	1	2	2	1	1	3	7.5PB
22	2-VI	1	1	2	1	1		7.5PB
23	3-VI	1	1	1	1	1		7.5PB

The body of the table gives the number of determinations at each station and each wavelength.

TRANSMITTANCE MEASUREMENTS

The vertical profiles of transmittance were obtained with a transmissometer of the type in use at the Visibility Laboratory since 1967. The design has been described by Petzold and Austin (1968). Briefly, the instrument has a one-meter optical path length through the water. The light flux is confined to a right cylinder 19 millimeters in diameter. All the flux leaving the projector in either air or water is contained within this cylinder and, if not attenuated, will be collected and measured by the receiver. As a result, the instrument may be calibrated by making the proper adjustment to its sensitivity in air. The one meter of air is assumed to have unity transmittance; however, the reflectance of the glass surfaces in contact with water will increase when in air. Consequently, the air adjustment of instrument sensitivity must take this change into account. As the optical beam is folded by a porro prism at mid-path and there are four of these glass-water interfaces, the resultant air calibration setting is 0.855 for the particular glass used.

The transmissometer is equipped with a filter wheel containing 5 Wratten spectral filters. Figure 1 shows the relative spectral response of the transmissometer obtained by individually combining these filters with the spectral emittance of the 2500° K tungsten-iodide lamp, the spectral sensitivity of the silicon photocell, and the transmittance of the 2 millimeter Schott BG-18 infrared blocking glass filter used in this instrument. The centroid wavelengths, $\bar{\lambda}$, shown in Fig. 1, are slightly different than those shown on the individual curve sheets due to a recomputation using new filter measurements. The differences are not significant for most purposes considering the half power bandwidths, $\Delta\lambda$, of the filters.

The measurement procedure consisted of selecting a filter, carefully cleaning the windows, adjusting the instrument sensitivity to obtain an air reading of 0.855, noting the instrument reading for the internal reference path, and then lowering the instrument into the water on its self supporting electrical cable. During lowering, the instrument zero and reference readings were occasionally checked and changes either noted or corrected. During retrieval, the transmittance values were also observed. Occasionally changes in the location of transmittance minima were noted between lowering and retrieval, indicating a vertical movement of the water in the column as might be caused by the passing of internal waves. The lowering and retrieval was accomplished with an electro-hydraulic winch fitted with sliprings to allow the continuous operation of the instrument. A complete profile to a depth of 100 meters could be accomplished in as little as 7 minutes surface-to-surface. Under optimum conditions a complete set of profiles in the five spectral bands could be accomplished in less than one hour. On many stations, for various equipment or operational reasons, not all five spectral bands were used, or their use was spread over a period of six to eight hours. In the latter cases care must be exercised in attributing changes in the observed transmittance to changes in wavelength, as significant temporal and spatial variations in the water properties are almost certain to have occurred over the time period involved.

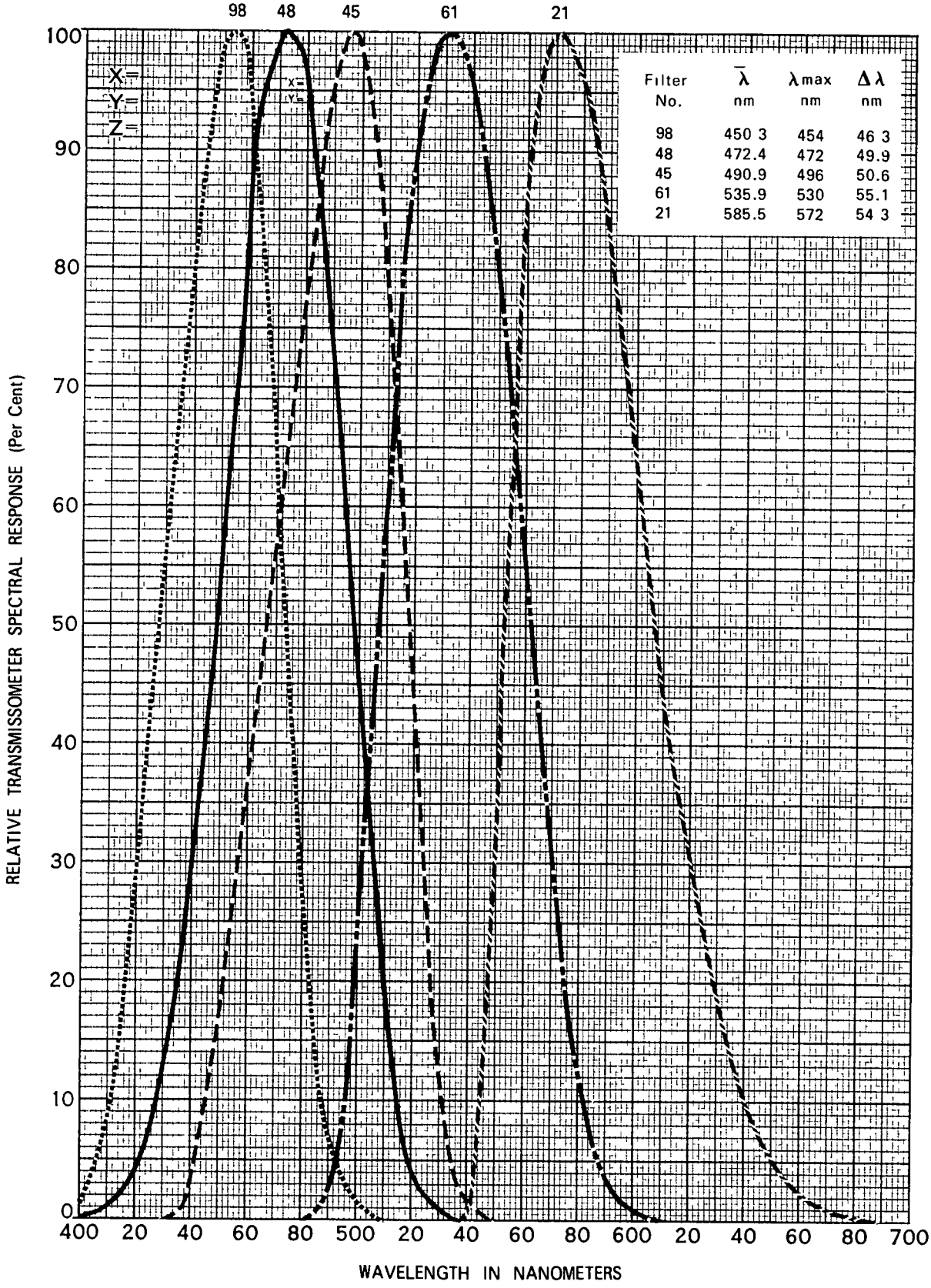

98
48
45
61
21
X=
Y=
Z=
Filter No.
$\bar{\lambda}$ nm
λmax nm
Δλ nm
98 450 3 454 46 3
48 472.4 472 49.9
45 490.9 496 50.6
61 535.9 530 55.1
21 585.5 572 54 3
RELATIVE TRANSMISSOMETER SPECTRAL RESPONSE (Per Cent)
100
90
80
70
60
50
40
30
20
10
0
400 20 40 60 80 500 20 40 60 80 600 20 40 60 80 700
WAVELENGTH IN NANOMETERS

Figure 1

The transmittance per meter (transmissivity) and temperature outputs were simultaneously recorded against depth on a two pen, flat bed x, y_1, y_2 recorder. A sample record from S. C. O. R. Station 13 is shown in Fig. 2. Each such curve sheet has been carefully retraced with fluctuations in transmittance reproduced in their essential detail. These fluctuations are not the result of instrumental noise but indicate the passage of discrete particles through the optical path causing a momentary reduction in transmittance. On various occasions visual inspection of the water surrounding the instrument either by in situ observation or by obtaining a sample from the depth in question, has shown a large number of zooplankton to be present.

On the left margin (0 meters depth) a mark was placed at 85.5%/meter showing the air calibration setting prior to immersion. At 79%/meter the internal reference ("REF") reading for that filter is shown. A mark at 0% meter shows that the instrument zero was in proper adjustment. At the right hand margin (100 meters depth) marks at 79% and 0% per meter show that no zero shift or change in sensitivity occurred during lowering. The accuracy of the transmissivity profiles was better than ±1% for the 491, 535, and 581 nanometer measurements. Due to a reduction in the sensitivity of the instrument at the shorter wavelengths there was a greater amount of gain and zero drift present in the instrument receiver at 473 and especially at 450 nanometers. As a result, the accuracy of the uncorrected transmissivity profiles for these wavelengths was somewhat less. On most of the profiles included here, however, corrections have been made to compensate for these drifts when tracing the original data sheets. Allowance should be made for residual error amounting in some instances to as much as a 2% decrease in the indicated transmissivity for 450 nanometers by the time the instrument reached a depth of 100 meters.

The temperature trace is useful for showing the location of thermoclines, inversions, etc. The absolute temperature accuracy was about ±0.5° C and the time constant of the thermistor sensor was 3.5 seconds. In water having a pronounced thermocline the rate of instrument descent was reduced in order to lessen the dynamic error in indicated temperature which this time constant introduced.

The transmissivity profile sheets are presented in chronological order. The temperature trace is identified on each sheet. In all cases it is the smoother of the two curves. In those few cases where portions of the data curves on the original charts were of doubtful value, dotted lines were faired in to show the probable transmissivity. Each curve is identified with the local apparent time (L. A. T.) of the lowering, the latitude and longitude of the station, the water depth in fathoms as provided by the ship, the centroid wavelength for the measurement and the surface water temperature as determined by a bucket thermometer.

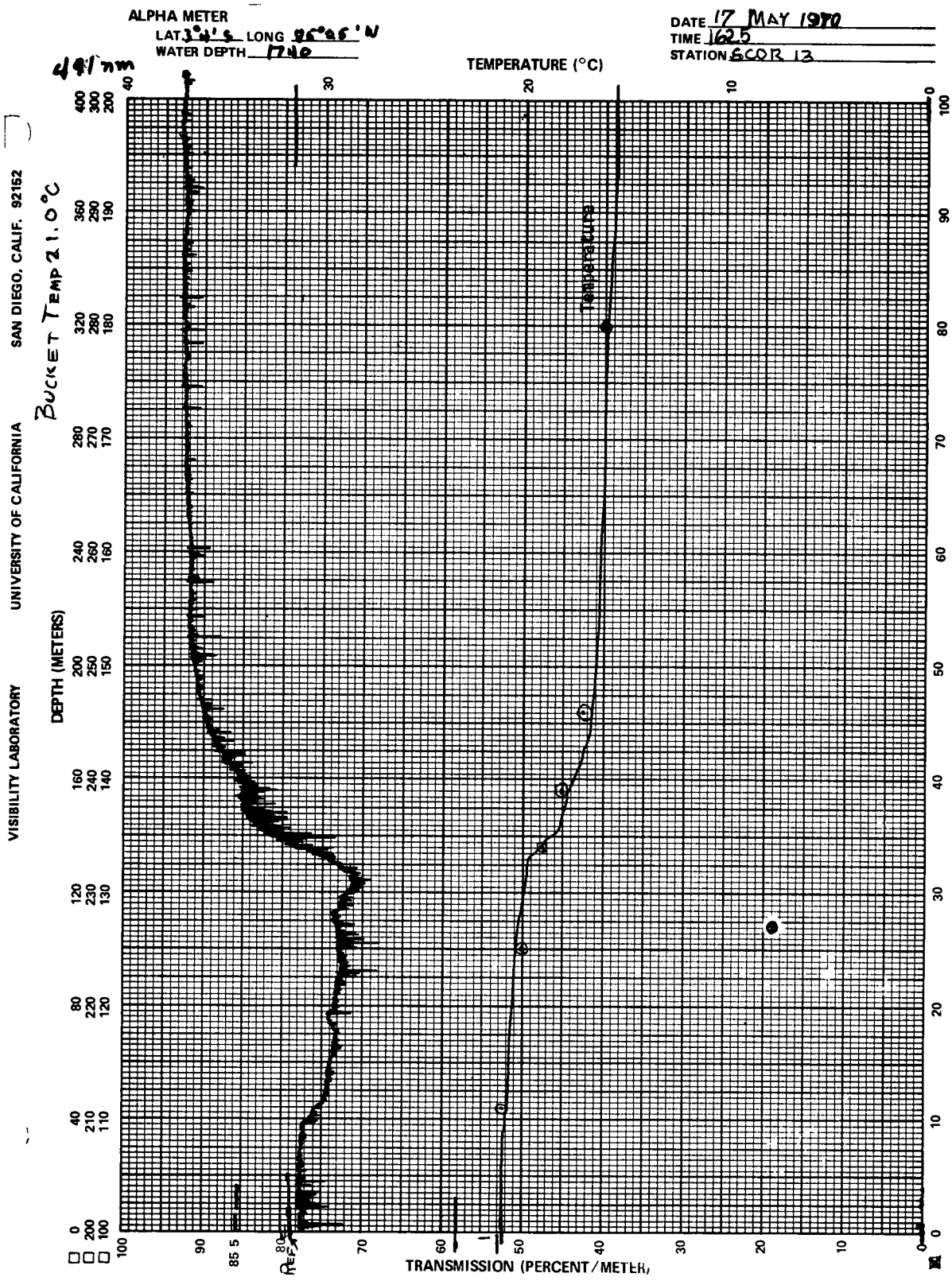

ALPHA METER
LAT 3°4' S LONG 85°05' W
WATER DEPTH 1740
DATE 17 MAY 1970
TIME 1625
STATION SCOR 13
491 nm
BUCKET TEMP 21.0°C
TEMPERATURE (°C)
TEMPERATURE
DEPTH (METERS)
TRANSMISSION (PERCENT/METER)
UNIVERSITY OF CALIFORNIA SAN DIEGO, CALIF. 92152
VISIBILITY LABORATORY

Figure 2

SCATTERING MEASUREMENTS

The volume scattering functions, $\sigma(\Theta)$ (or $\beta(\Theta)$ in the IAPO terminology), was measured with Visibility Laboratory General Angle Scattering Meter (GASM) described by Petzold (1972). The instrument measures the light flux scattered by a small volume of water over angles ranging from 10° to 170° from the direction of the incident beam. The sample volume is formed by the intersection of the projector beam, 20.1 mm high by 3.5 mm wide, with the receiver field of view 24.18 mm high and 7.57 mm wide. As the projector rotates about an axis lying in the center of the projector beam and receiver field of view, the size of the volume of intersection varies in a known way and the effect of its variation on the measured signal is accounted for in the data reduction. The projector arm actually rotates through a full 180°. When the projector is lined up with the receiver the output signal level provides a check on the overall instrument sensitivity. The total water path length is 188 mm. The method of calibration and data reduction removes first order attenuation effects caused by transmission through this water path. An analog signal from a linear potentiometer attached to the axis of rotation provides a measure of the scattering angle. The scattering signal is measured by a photomultiplier tube photometer operating with a logarithmic sensitivity to cover the required wide dynamic range. The tube is fitted with a Wratten 64 filter providing a centroid wavelength of 510 nanometers. A pressure transducer provides a signal proportional to instrument depth. The output is recorded on an x-y plotter either as σ versus Θ for a fixed depth or σ versus depth at a fixed angle, Θ.

The GASM was sensitive to ambient light as a result of its high sensitivity. Consequently it was not possible to operate near the surface in daylight. All data presented here were obtained after sunset (19:00 L.A.T. or later) after establishing that the ambient light signal was negligible. Transmittance profiles were used to obtain an indication of the vertical optical structure of the water column and to locate depths of potentially high or low scattering. The profile obtained latest in the day was used for this purpose.

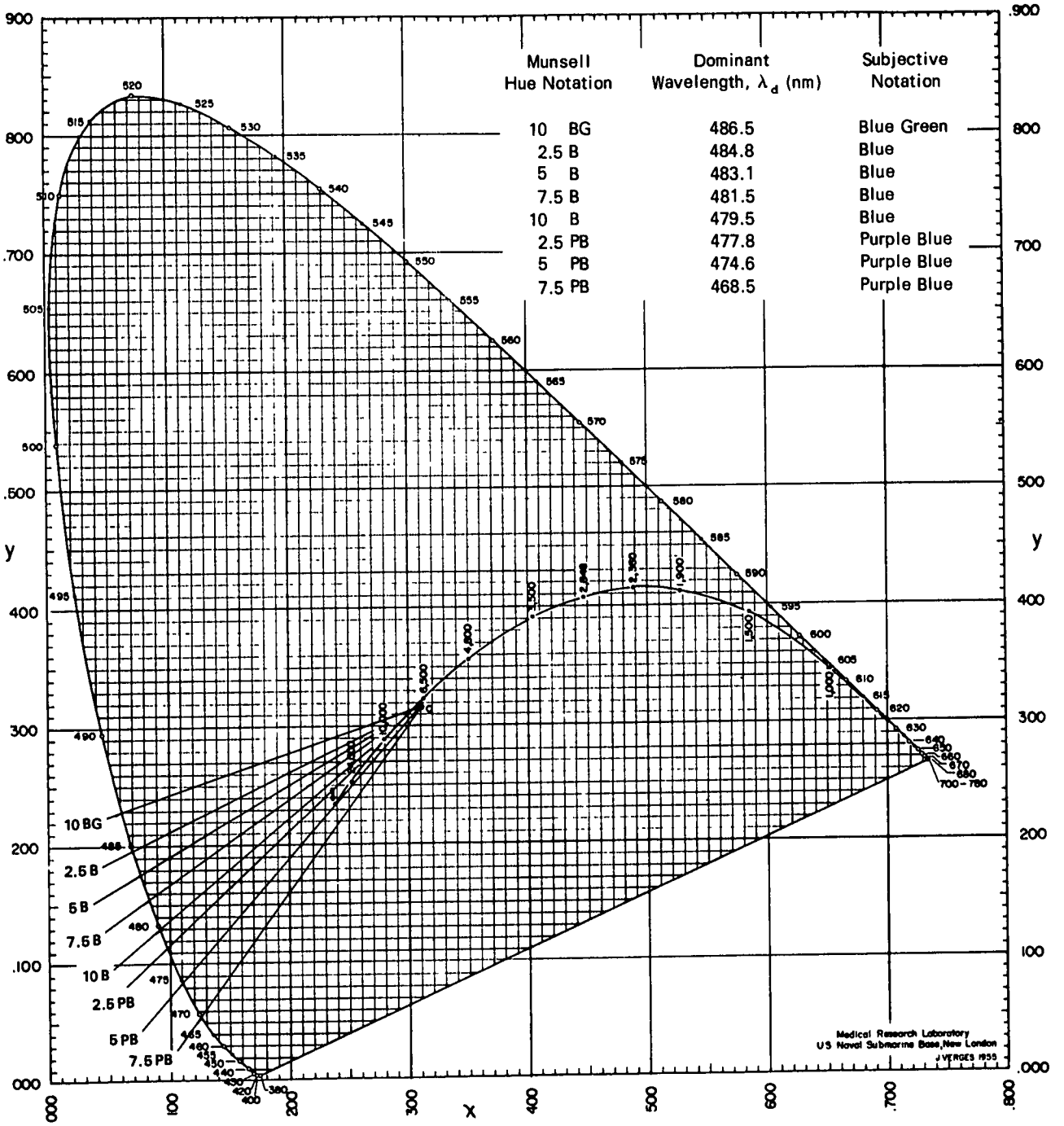
The resulting data are shown on computer-generated plots for each of the seven stations on which scattering was measured. The curve sheets show scattering function in absolute physical units ($meters^{-1} \cdot steradians^{-1}$) plotted against scattering angle in degrees. Both ordinate and abscissa scales are logarithmic. The plotting program uses a second order (parabolic) fit and forces the line to pass through each data point. As a consequence, no smoothing of the data is introduced. Following each curve sheet the data for that station are listed in tabular form. The scattering data at nineteen angles from 10° to 170° were read from the original raw data curve and the computed values of the volume scattering function at each depth are listed under the column heading "SIGMA." These are the data from which the composite plots were made by the computer.

OCEAN COLOR DETERMINATIONS

The specification of ocean color was obtained by visually matching the color of the water with one of a group of 28 Munsell color swatches arranged along the periphery of a rectangular clear-plastic color chart. These swatches were selected to bracket the various hues, values, and chromas (using the Munsell color system nomenclature)[1] found in the ocean. The illumination incident on the swatches was either full sunlight or skylight without sun, but never artificial light or light reflected from colored surfaces. Specular glare was reduced by the proper choice of the direction of view with respect to the sun and through the use of neutral polarizing spectacles. Stray light was reduced by restricting the field of view of the observer insofar as possible to the color chart and to the portion of the sea steeply downward from the observation point. Although the matching process resulted in a determination of hue, value, and chroma, the latter two characteristics were sensitive to the illumination and viewing conditions and were not, therefore, uniquely determined by intrinsic optical properties of the water. The hue determination, on the other hand, was reproducible under different lighting conditions and has been checked under various viewing situations by numerous observers. The match obtained seldom varied by more than one hue step on the scale of the color chart. Figure 3 shows the 1931 CIE chromaticity diagram with lines of constant dominant wavelength for the Munsell colors used in the water color chart. CIE standard source C is assumed as the illuminant. The table inset in Fig. 3 lists the Munsell hues, dominant wavelengths, and subjective color names for the swatches used in the chart during the S. C. O. R. DISCOVERER Expedition. The water color determinations obtained on 20 stations are listed in Table I.

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(1) See, for example, Wyszecki and Stiles (1967) for a description of the Munsell Color System and reference can be made to the Munsell Book of Color to sight the actual color swatches.



Dominant Wavelength of the Munsell Colors Used in the Ocean Color Chart.
1931 CIE Chromaticity Diagram.

Fig. 3

REFERENCES

1. Munsell Book of Color, Glossy Collection. Munsell Color Company, Inc., 2441 North Calvert Street, Baltimore, Maryland 21218, U. S. A., 1966.

2. Petzold, T. J. and R. W. Austin. An Underwater Transmissometer for Ocean Survey Work. S. I. O. Ref. 68-9, University of California, Scripps Institution of Oceanography, San Diego, California, U. S. A., April 1968.

3. Petzold, T. J. Volume Scattering Functions for Selected Ocean Waters. S. I. O. Ref. 72-78, University of California, Scripps Institution of Oceanography, San Diego, California, U. S. A., October 1972.

4. Wyszecki, Günter and W. S. Stites. Color Science. John Wiley and Sons, Inc., New York, U. S. A., 1967.

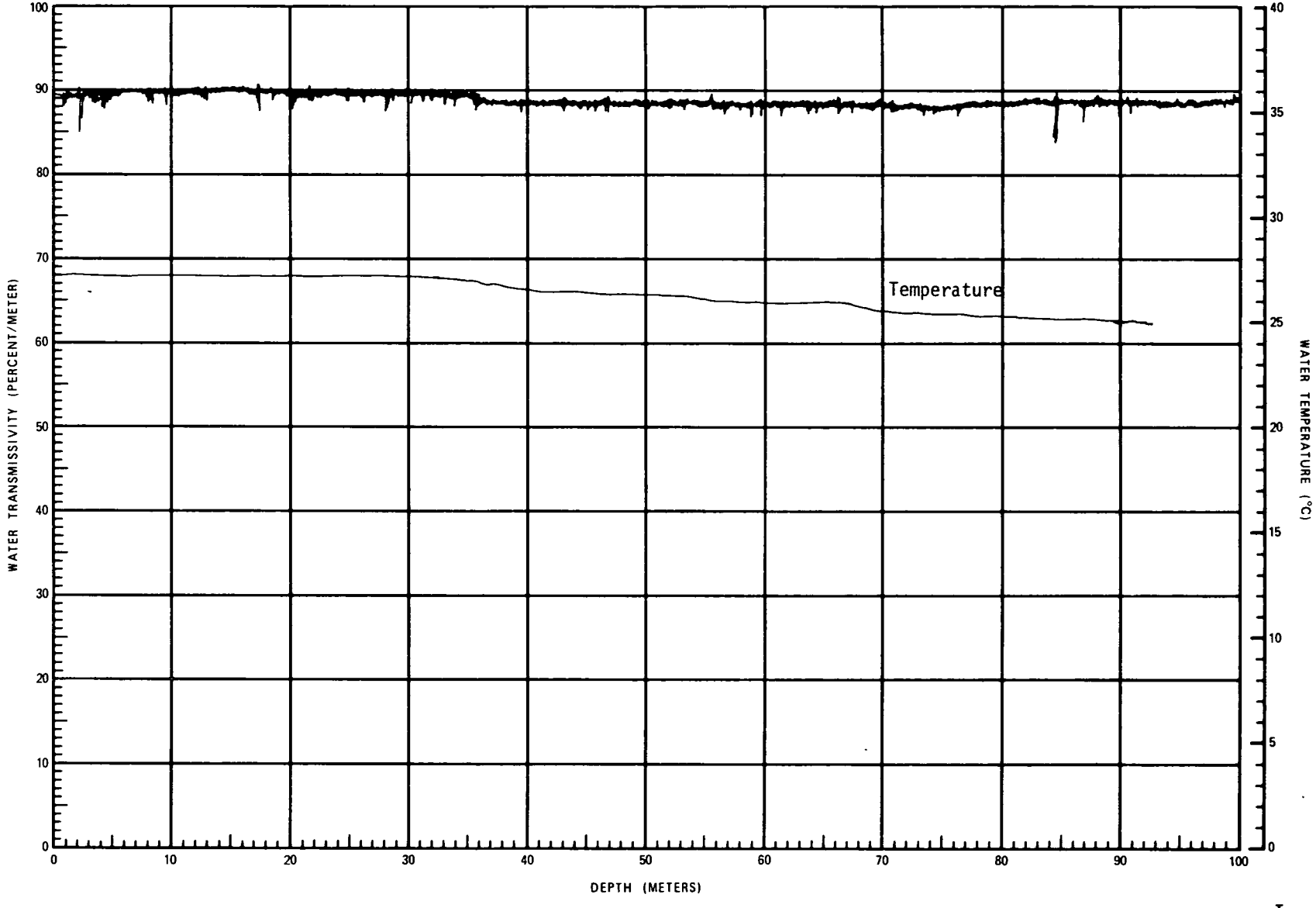
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 5 May 1970
TIME 0915-0930 L.A.T.
STATION SCOR 02

LAT 18°17' N
LONG 81°24' W
WATER DEPTH 2440 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 27.6° C

TRANSMISSIVITY PROFILE



T1 (3/72)

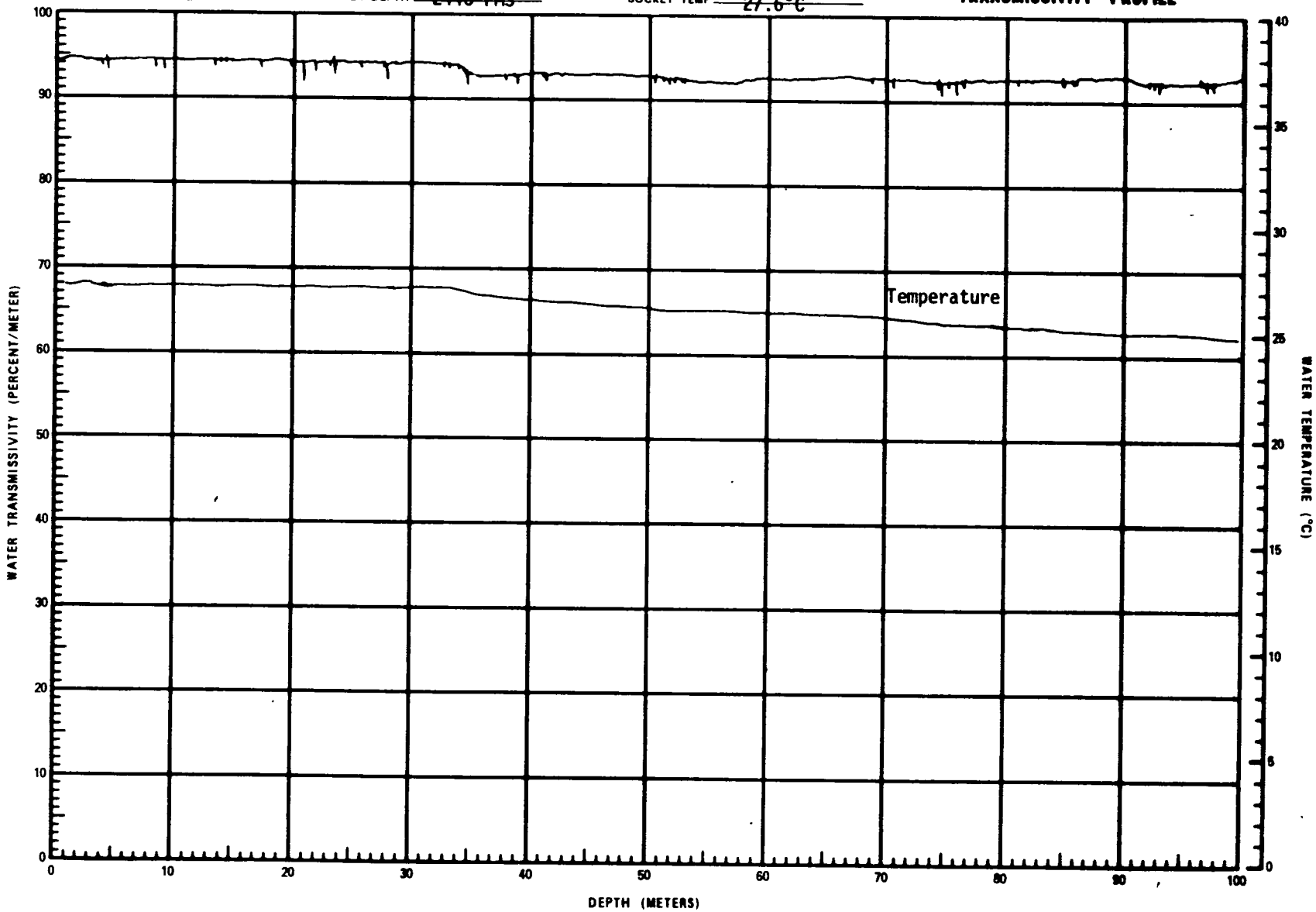
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DATE 05 May 1970
TIME 1000 L.A.T.
STATION SCOR 02

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LONG 81°24' W
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SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 27.6°C

TRANSMISSIVITY PROFILE



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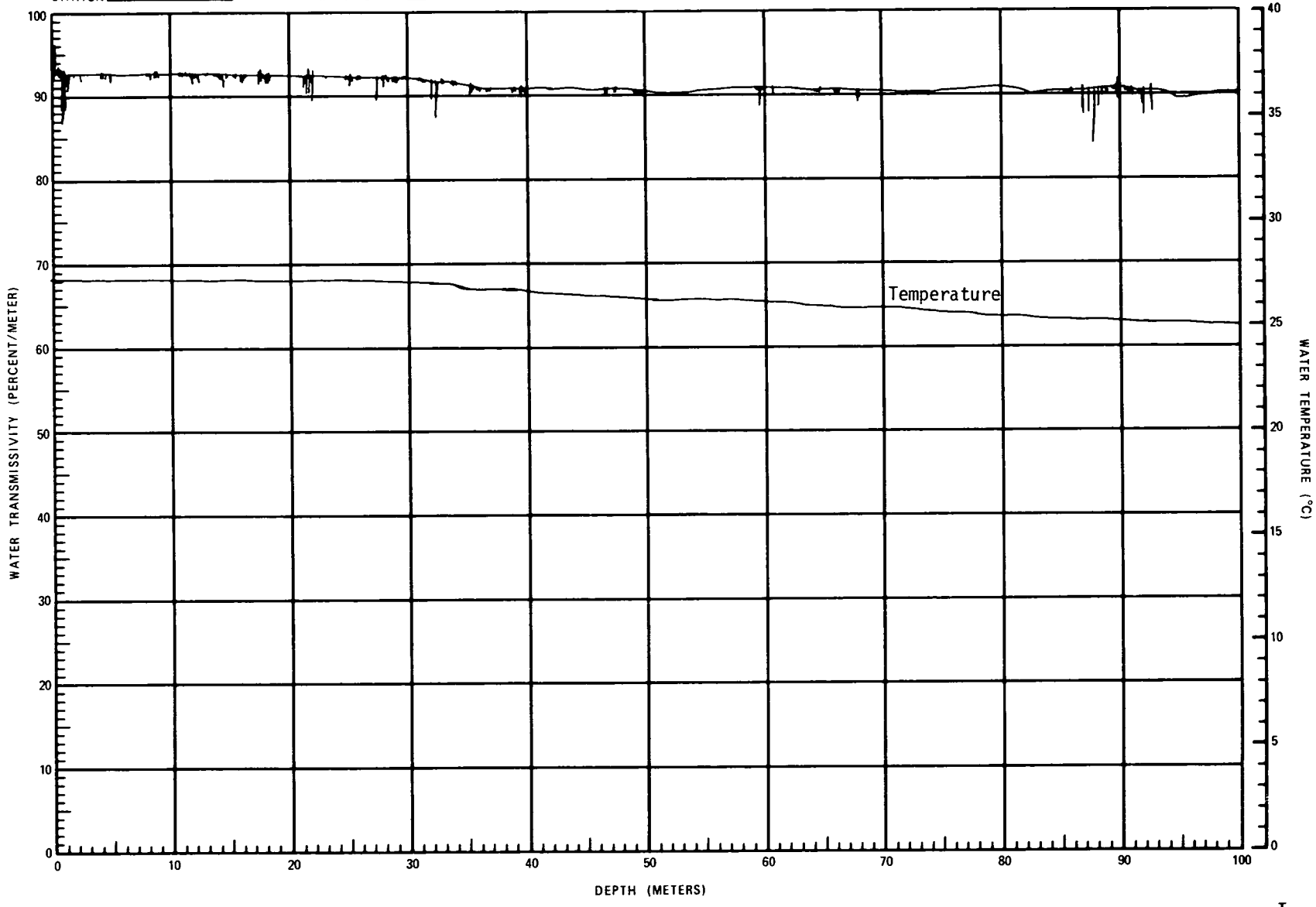
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DATE 5 May 1970
TIME 1030 L.A.T.
STATION SCOR 02

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SPECTRAL FILTER λ = 473 nm
BUCKET TEMP 27.6° C

TRANSMISSIVITY PROFILE



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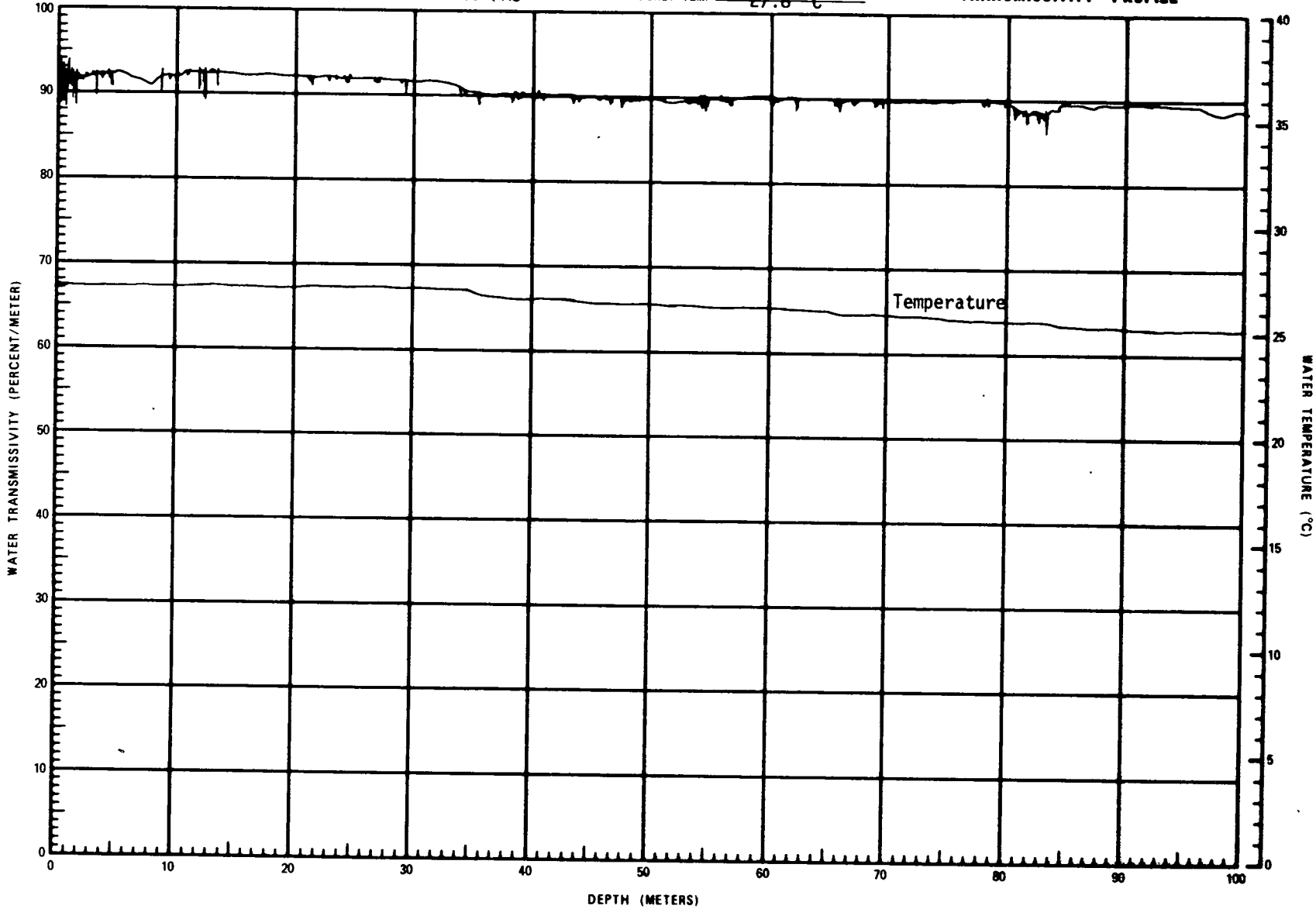
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DATE 5 May 1970
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STATION SCOR 02

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WATER DEPTH 2440 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 27.8° C

TRANSMISSIVITY PROFILE



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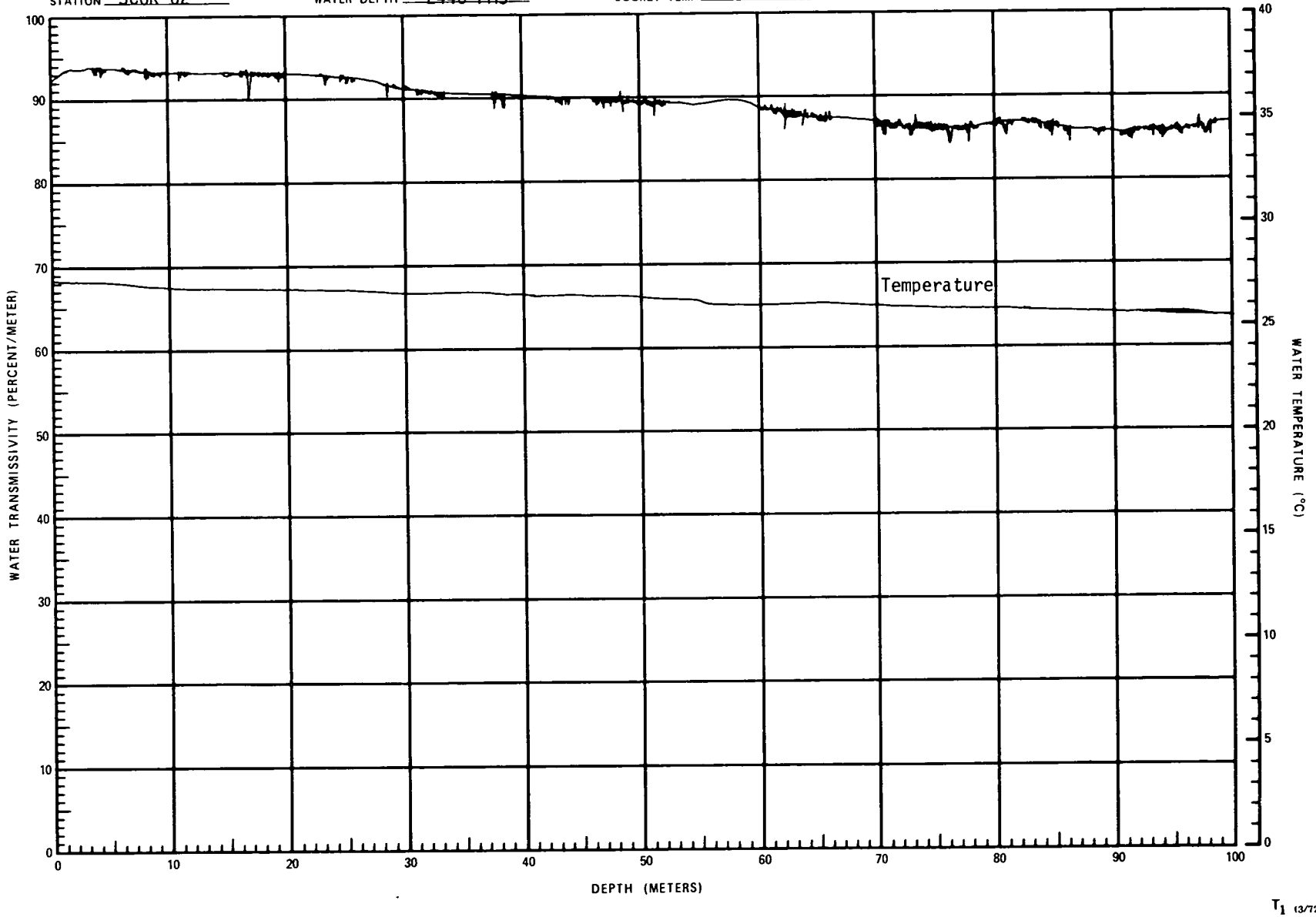
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 5 May 1970
TIME 1615 L.A.T.
STATION SCOR 02

LAT 18°17' N
LONG 81°24' W
WATER DEPTH 2440 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 28.8° C

TRANSMISSIVITY PROFILE



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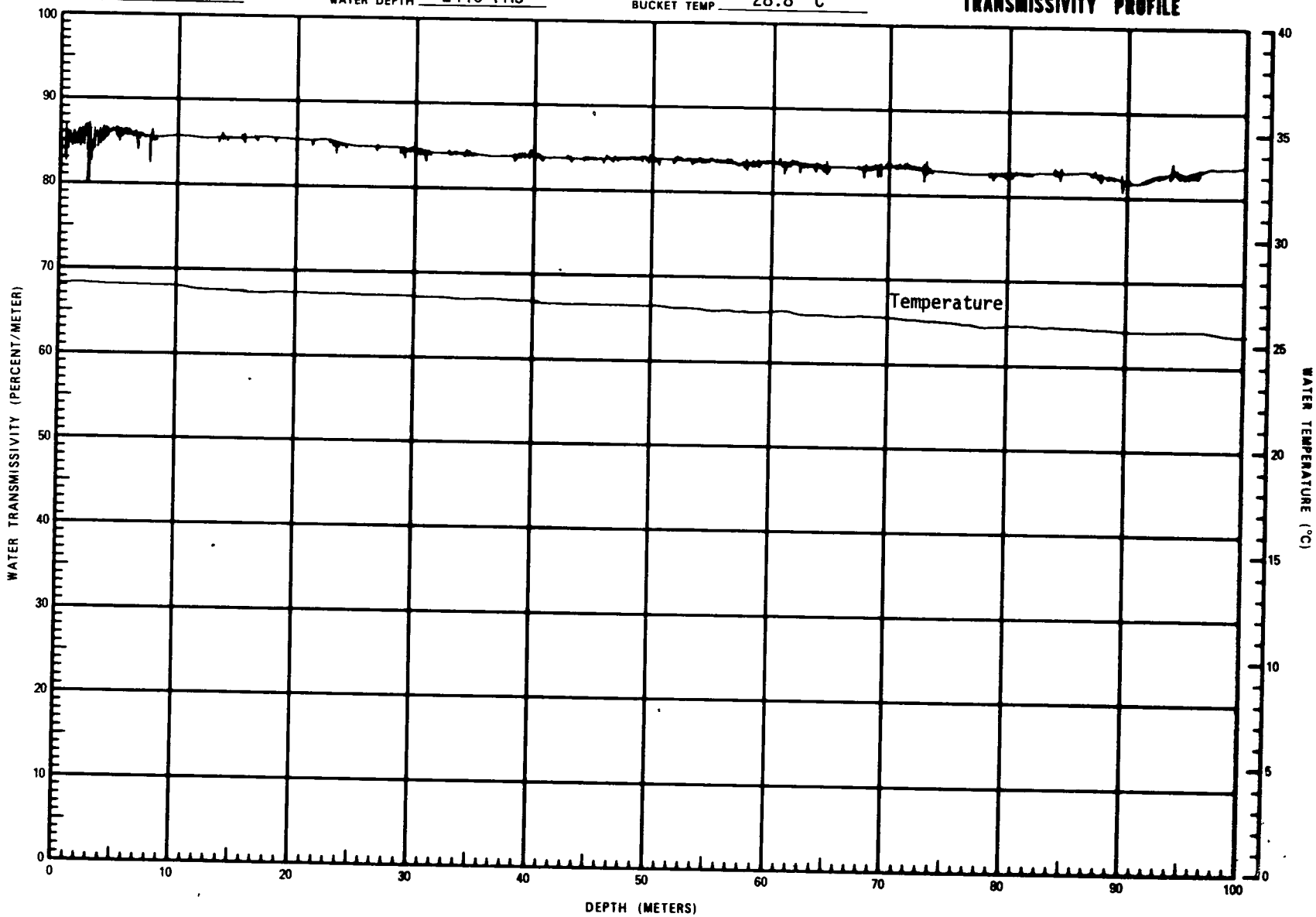
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DATE 5 May 1970
TIME 1640 L.A.T.
STATION SCOR 02

LAT 18°16.6' N
LONG 81°24' W
WATER DEPTH 2440 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 28.8° C

TRANSMISSIVITY PROFILE



T1 (3/72)

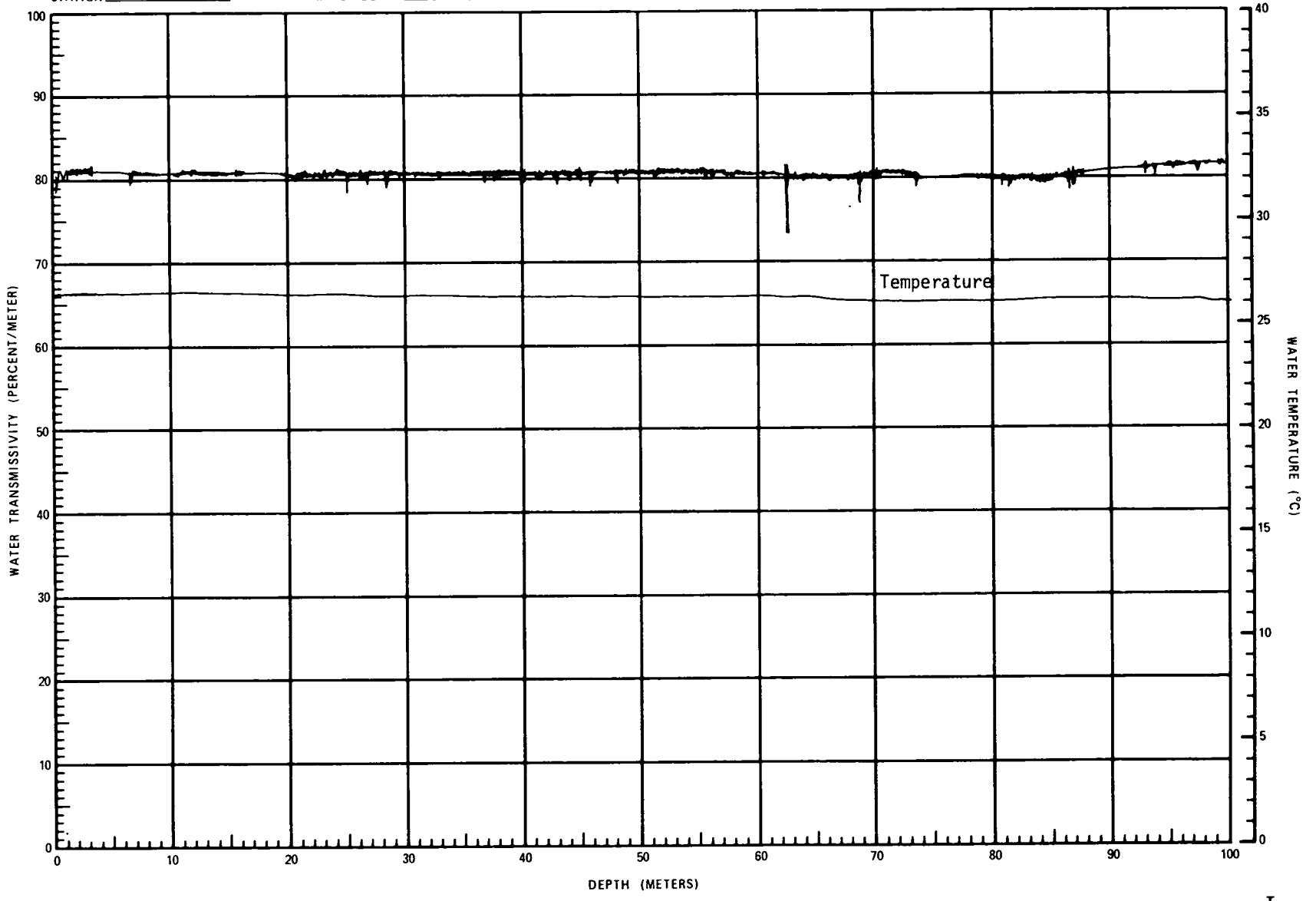
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 06 May 1970 LAT 16°22' N SPECTRAL FILTER $\bar{\lambda}$ = 581 nm

TIME 0900-0907 L.A.T. LONG 78°45' W

STATION SCOR 03 WATER DEPTH 735 FMS BUCKET TEMP 27.4° C

TRANSMISSIVITY PROFILE



T1 (3/72)

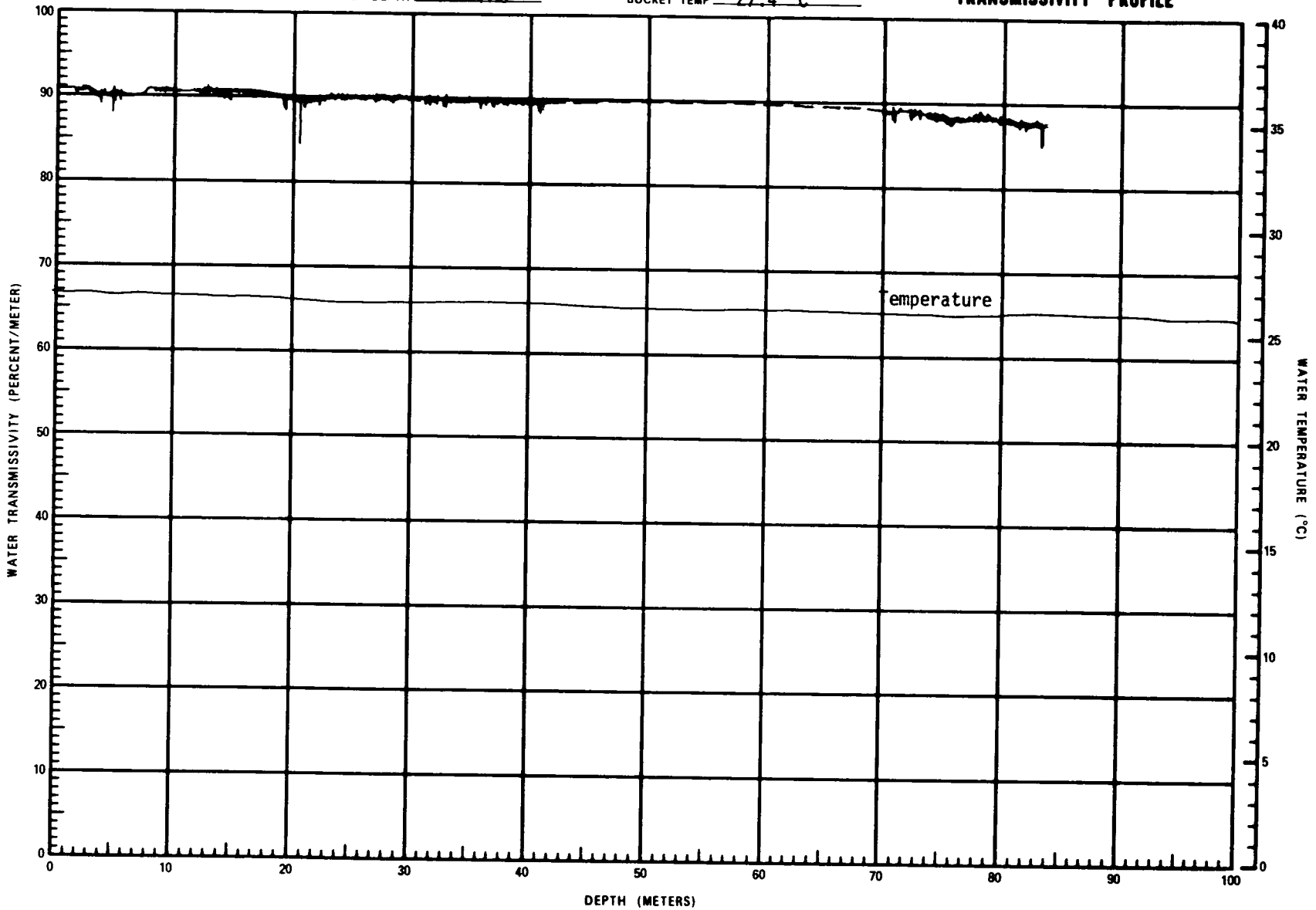
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 06 May 1970
TIME 0920 L.A.T.
STATION SCOR 03

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LONG 78°45' W
WATER DEPTH 735 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 27.4° C

TRANSMISSIVITY PROFILE



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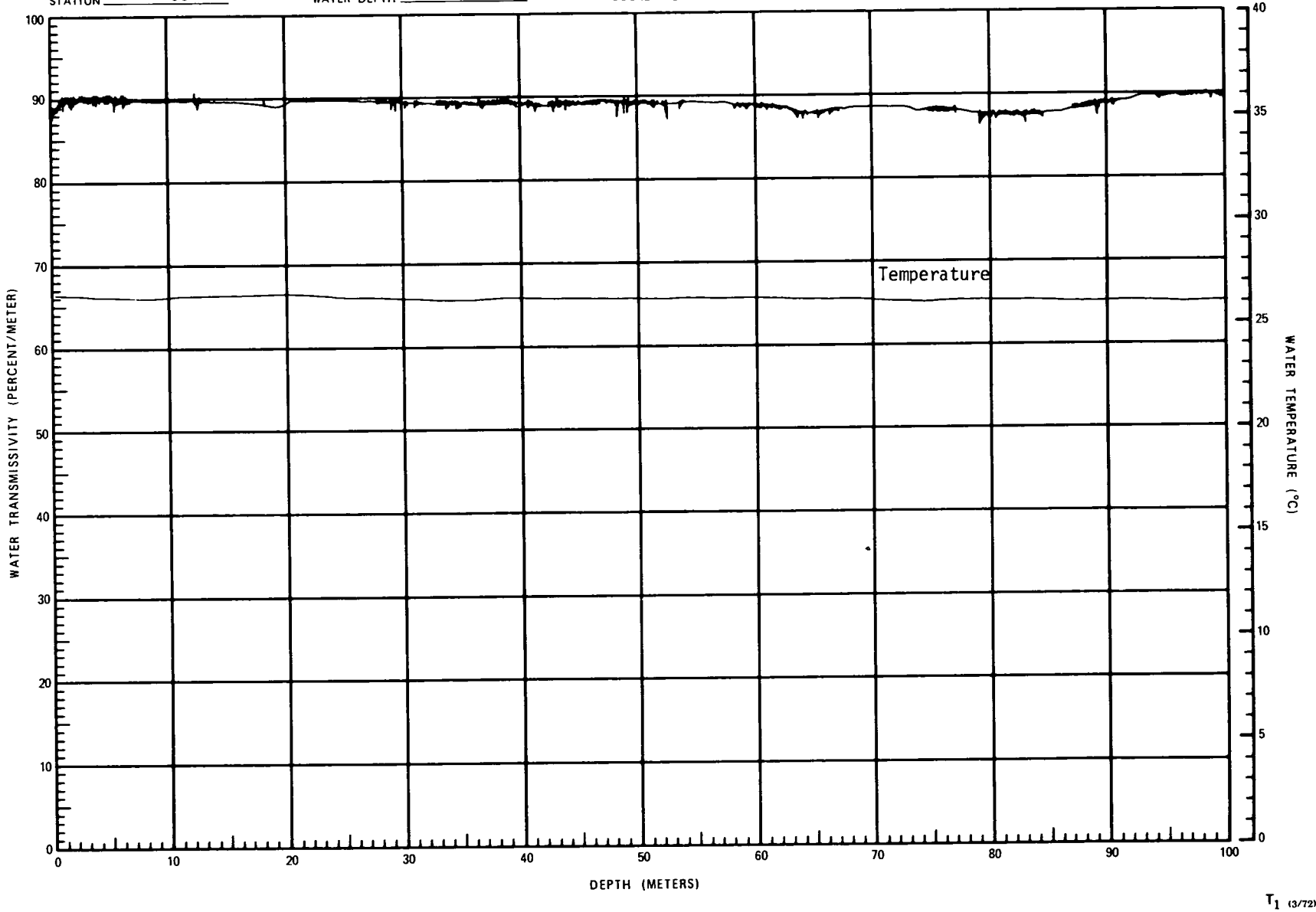
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 06 May 1970
TIME 0950-0958 L.A.T.
STATION SCOR 03

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LONG 78°45' W
WATER DEPTH 735 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 27.4° C

TRANSMISSIVITY PROFILE



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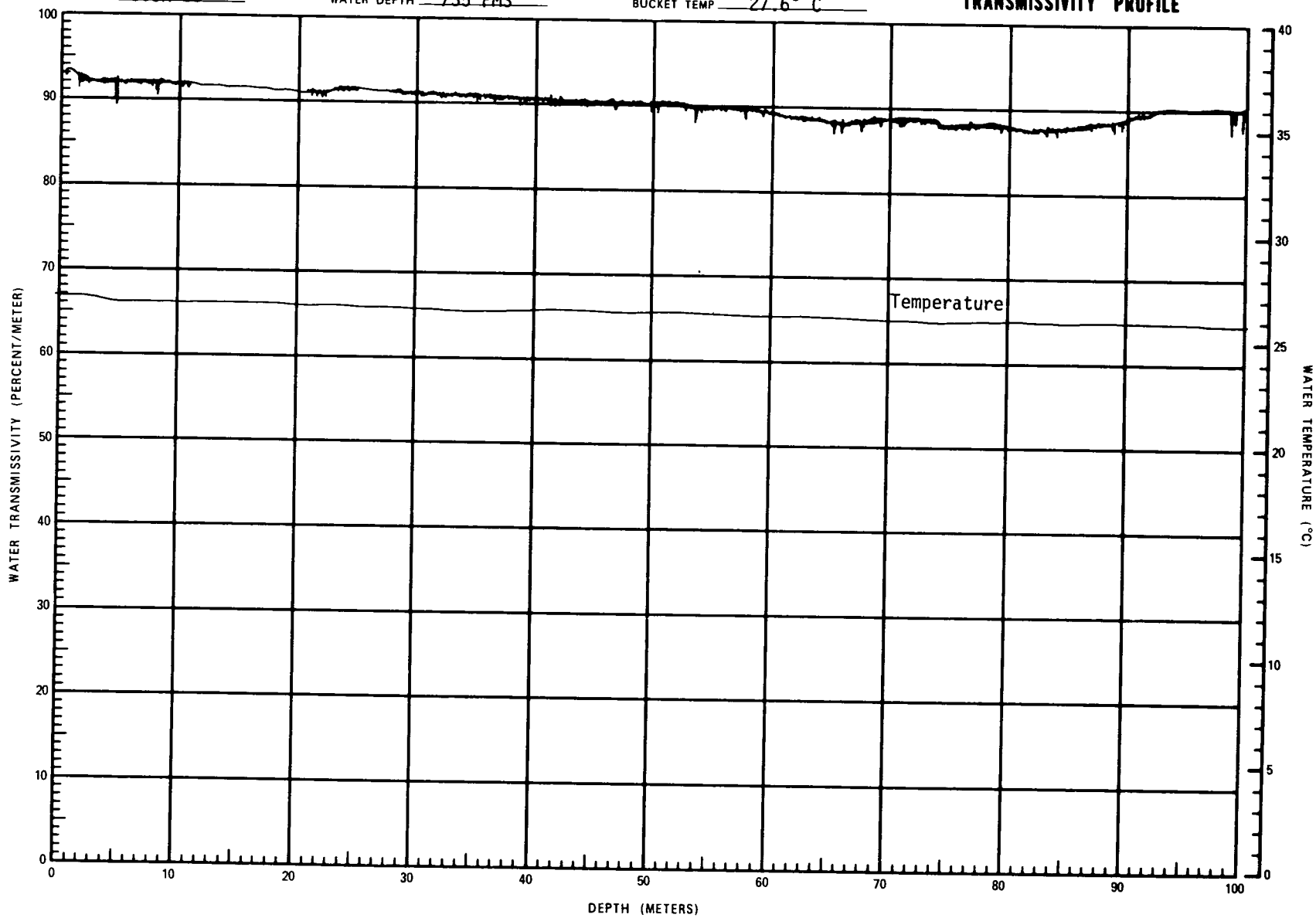
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 6 May 1970
TIME 1029-1034 L.A.T.
STATION SCOR 03

LAT 16°22' N
LONG 78°45' W
WATER DEPTH 735 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 27.6° C

TRANSMISSIVITY PROFILE



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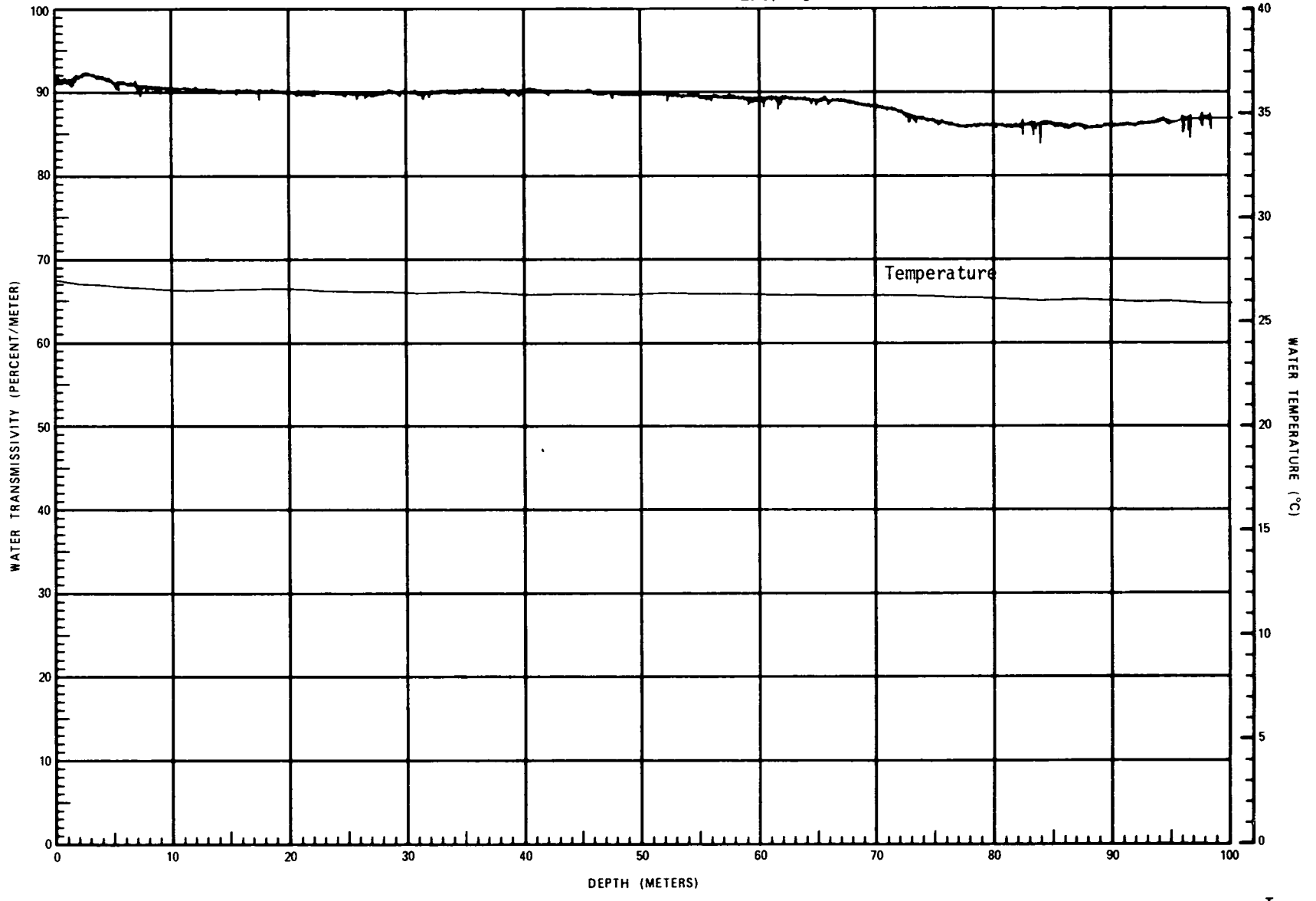
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 06 May 1970
TIME 1400 L.A.T.
STATION SCOR 03

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LONG $78^{o}45'$ W
WATER DEPTH 735 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 27.7^{o} C

TRANSMISSIVITY PROFILE



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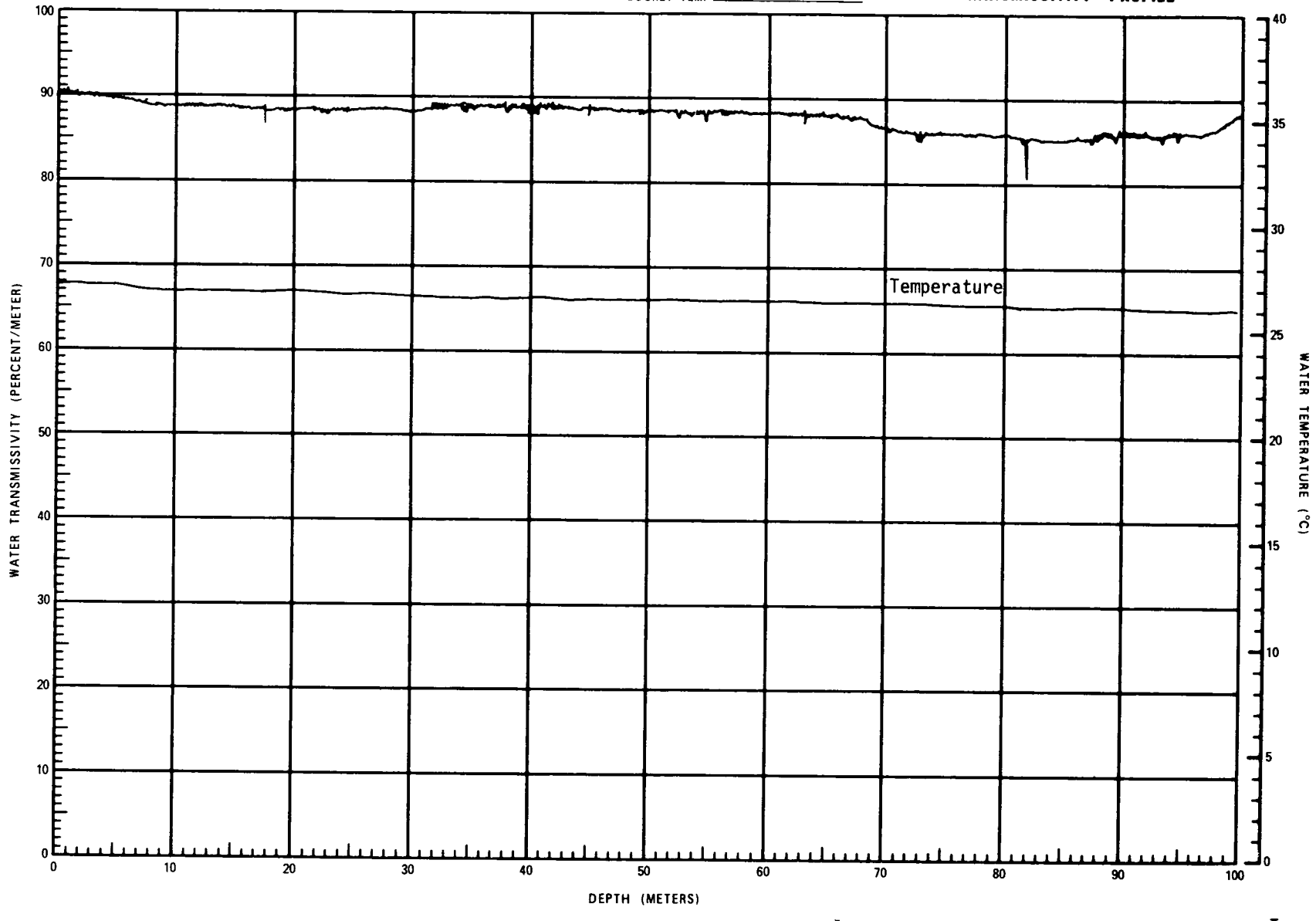
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DATE 6 May 1970
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LONG 78°45' W
WATER DEPTH 735 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 27.7° C

TRANSMISSIVITY PROFILE



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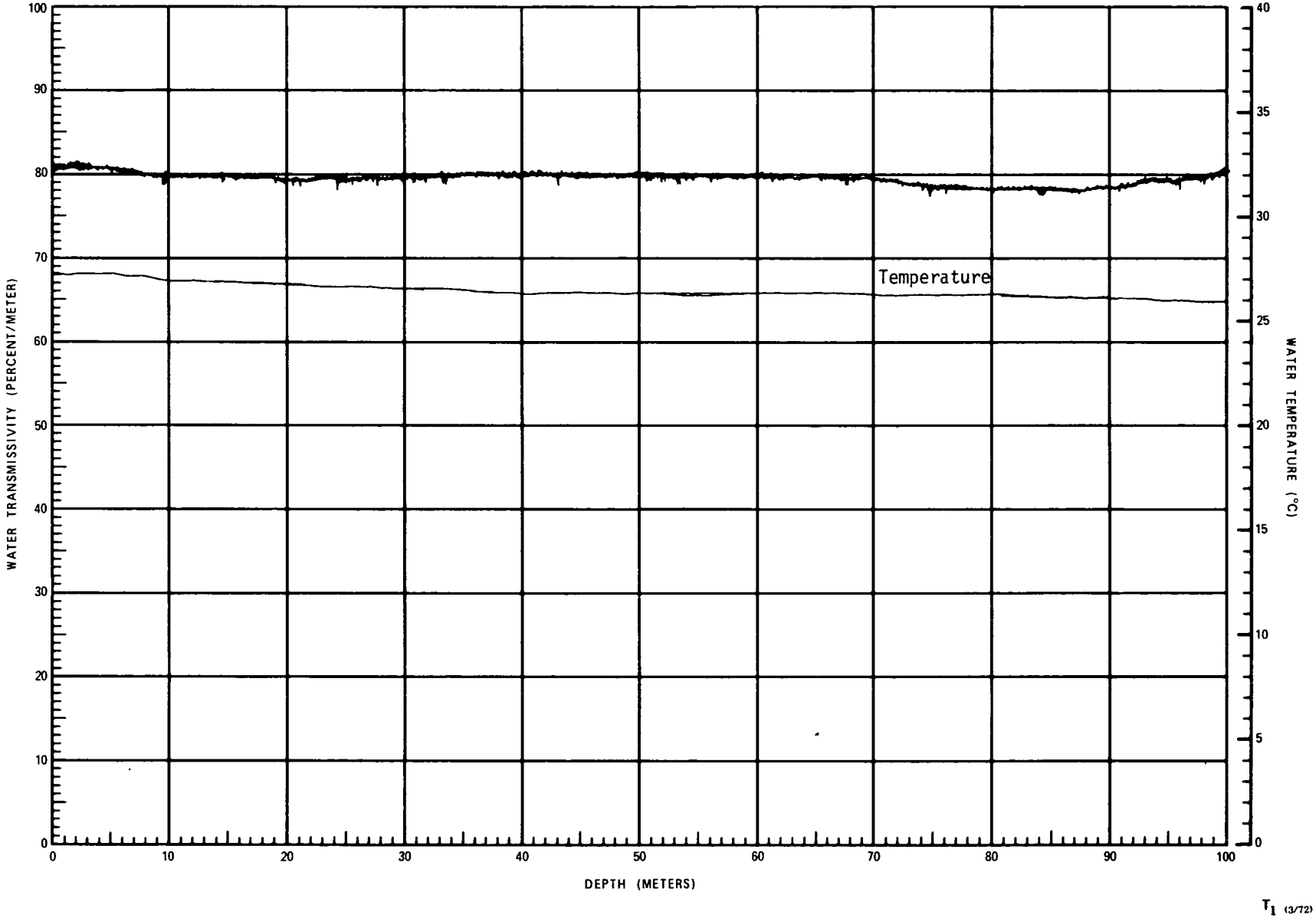
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DATE 06 May 1970 LAT 16°22' N

TIME 1520-1528 L.A.T. LONG 78°45' W SPECTRAL FILTER $\bar{\lambda}$ = 581 nm

STATION SCOR 03 WATER DEPTH 735 FMS BUCKET TEMP 27.7° C

TRANSMISSIVITY PROFILE



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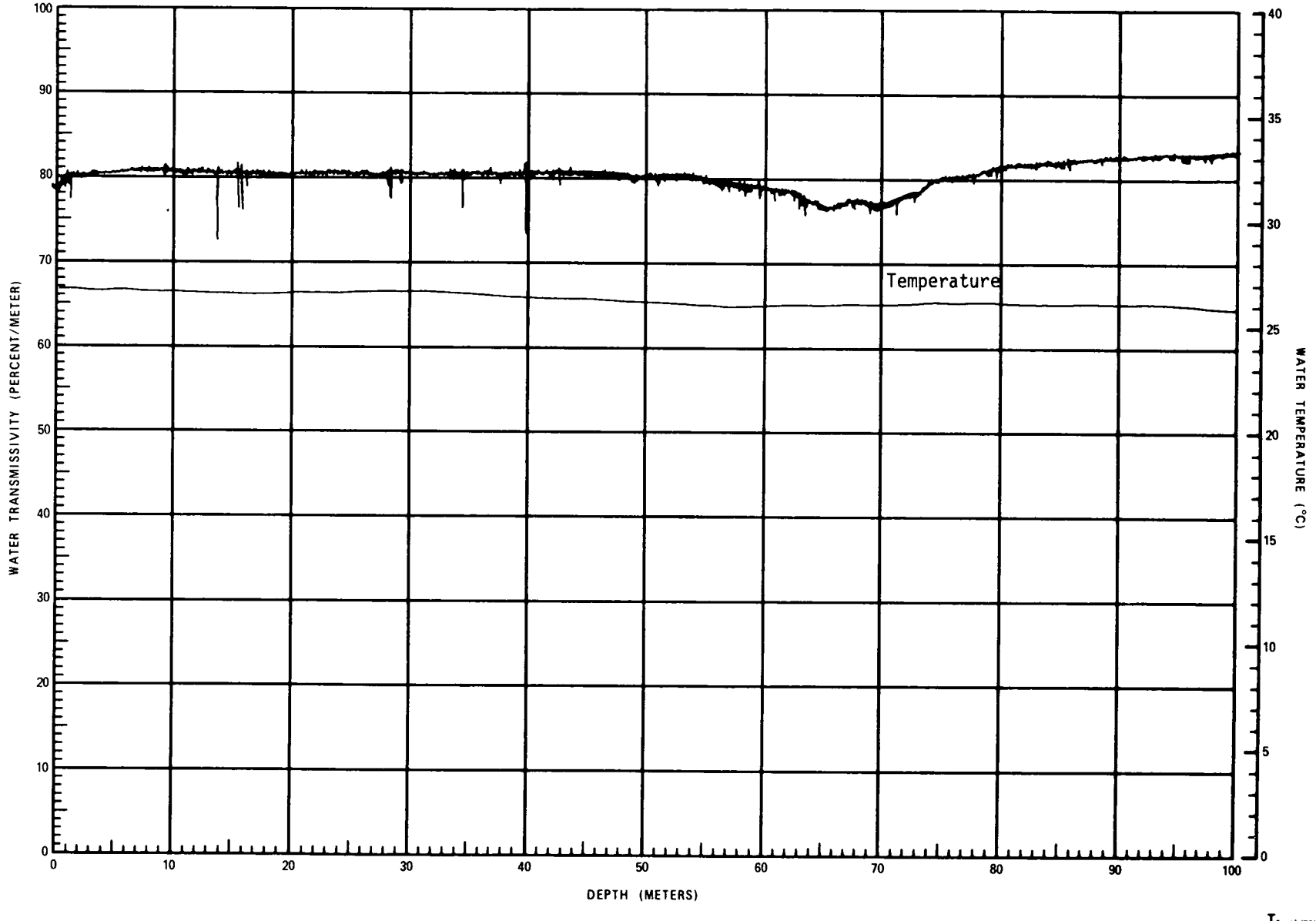
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 07 May 1970
TIME 0930-0948 L.A.T.
STATION SCOR 04

LAT $13^{o}10'$ N
LONG $78^{o}58'$ W
WATER DEPTH 1900 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 27.0^{o} C

TRANSMISSIVITY PROFILE



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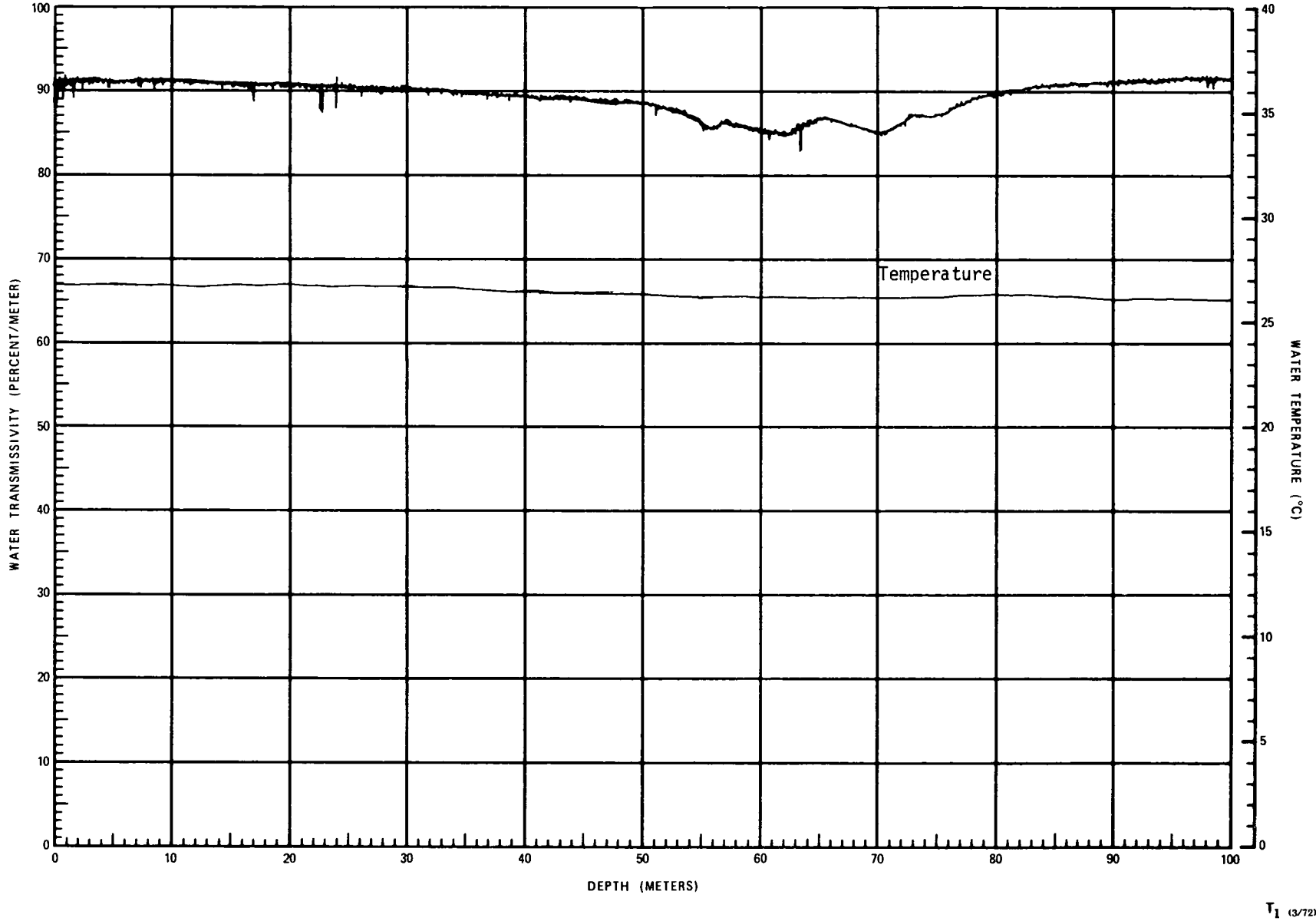
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DATE 07 May 1970 LAT 13°10' N

TIME 1000-1008 L.A.T. LONG 78°58' W SPECTRAL FILTER $\bar{\lambda}$ = 450 nm

STATION SCOR 04 WATER DEPTH 1900 FMS BUCKET TEMP 27.0° C

TRANSMISSIVITY PROFILE



T1 (3/72)

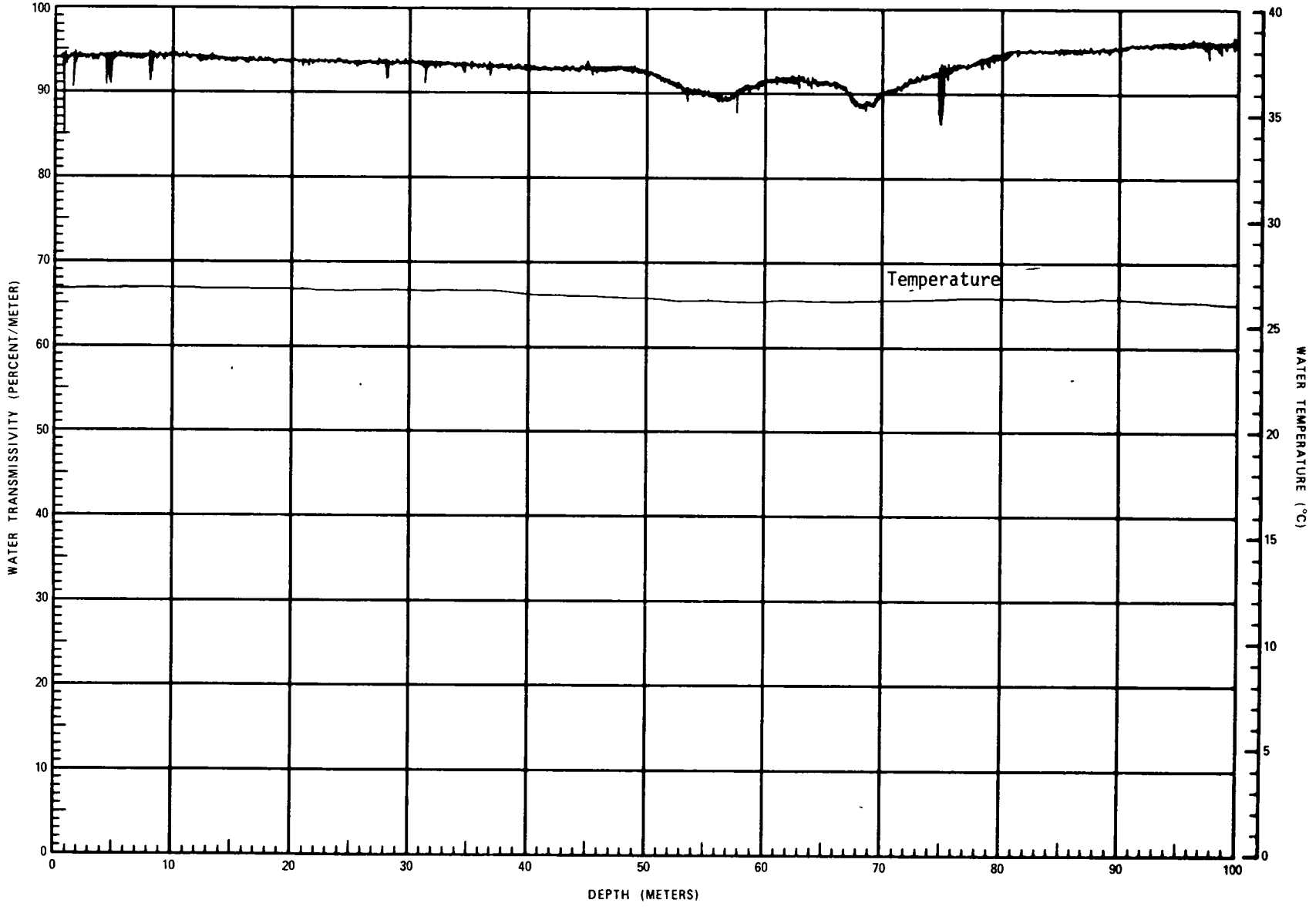
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DATE 07 May 1970
TIME 1025-1031 L.A.T.
STATION SCOR 04

LAT 13°10' N
LONG 78°58' W
WATER DEPTH 1900 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 27.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

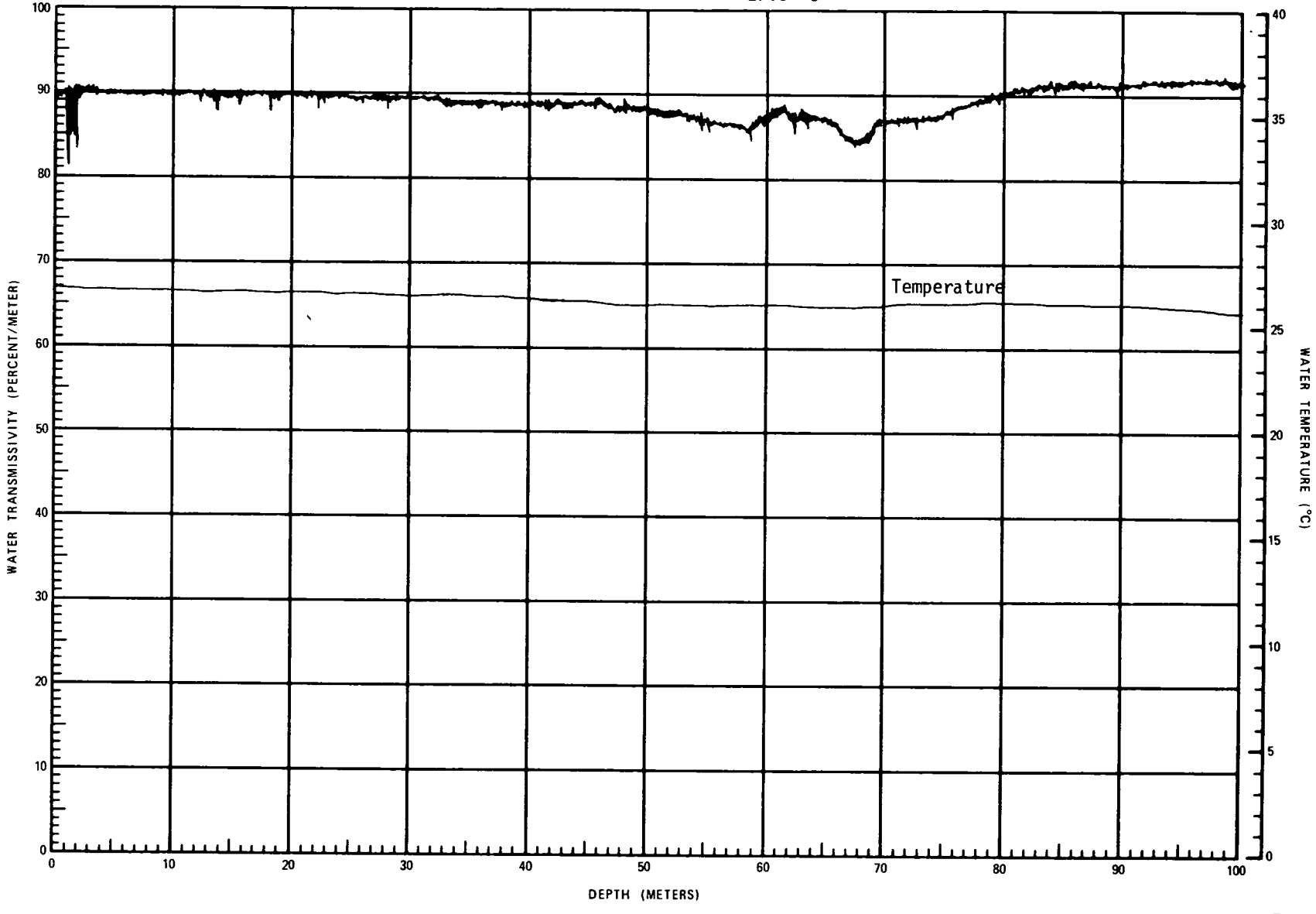
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DATE 7 May 1970
TIME 1040-1047 L.A.T.
STATION SCOR 04

LAT 13°10' N
LONG 78°58' W
WATER DEPTH 1900 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 27.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

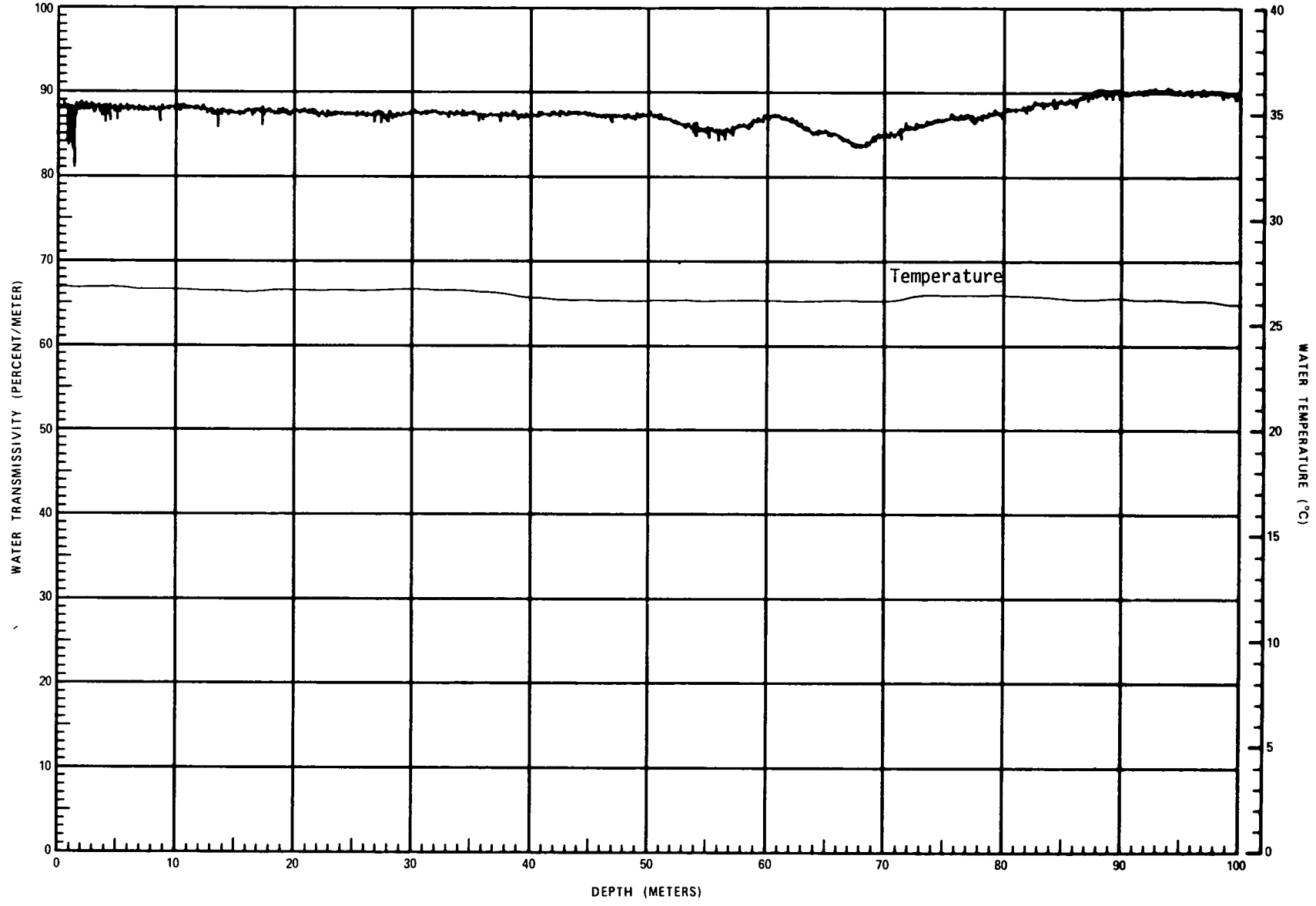
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 7 May 1970 LAT 13°10' N

TIME 1100-1108 L.A.T. LONG 78°58' W SPECTRAL FILTER $\bar{\lambda}$ = 535 nm

STATION SCOR 04 WATER DEPTH 1900 FMS BUCKET TEMP 27.0°C

TRANSMISSIVITY PROFILE



T1 (3/72)

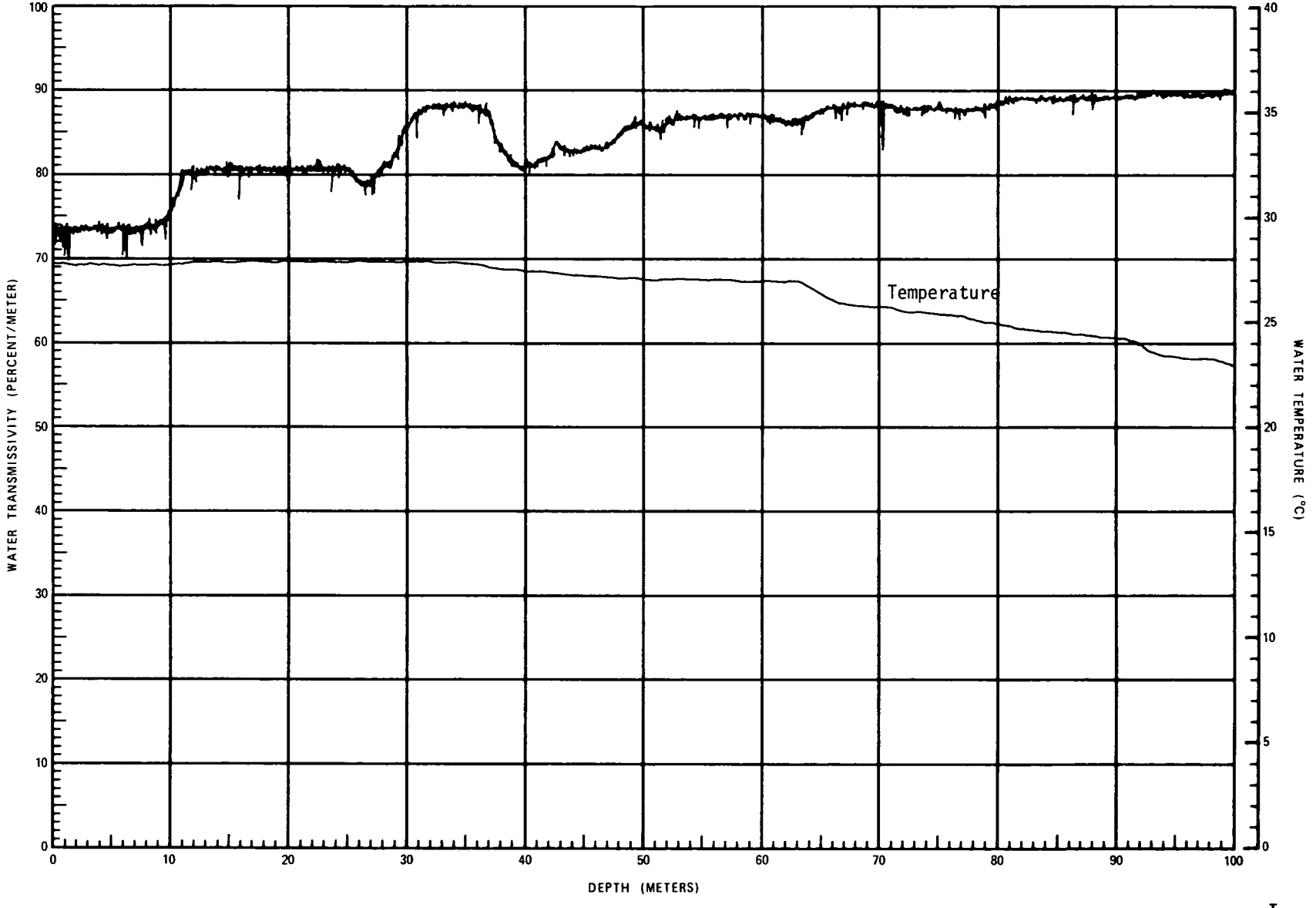
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 8 May 1970
TIME 0900 L.A.T.
STATION SCOR 05

LAT 9°51' N
LONG 79°41' W
WATER DEPTH 830 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 27.5° C

TRANSMISSIVITY PROFILE



T1 (3/72)

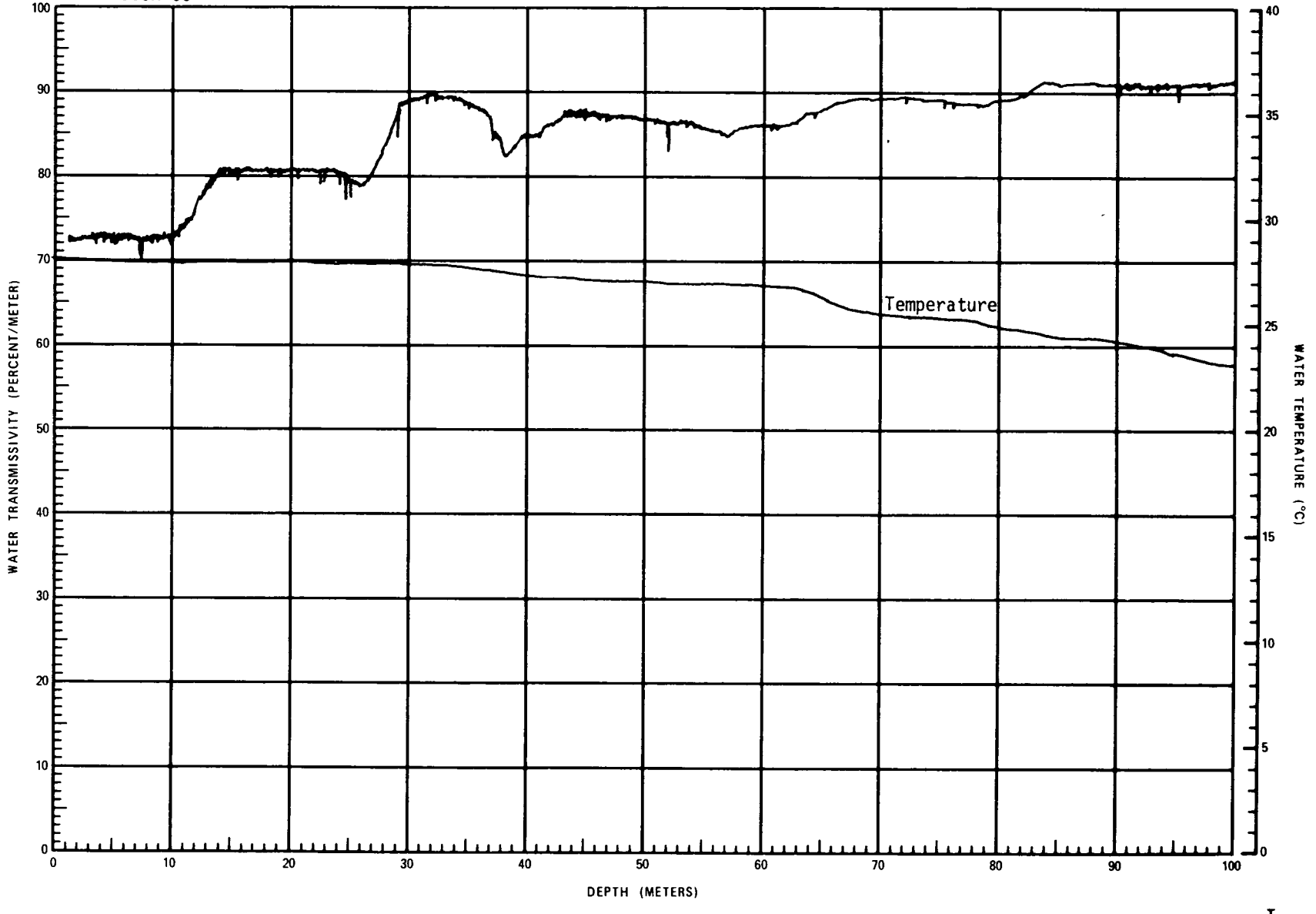
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DATE 8 May 1970
TIME 0930 L.A.T.
STATION SCOR 05

LAT 9°51' N
LONG 79°41' W
WATER DEPTH 830 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 27.5° C

TRANSMISSIVITY PROFILE



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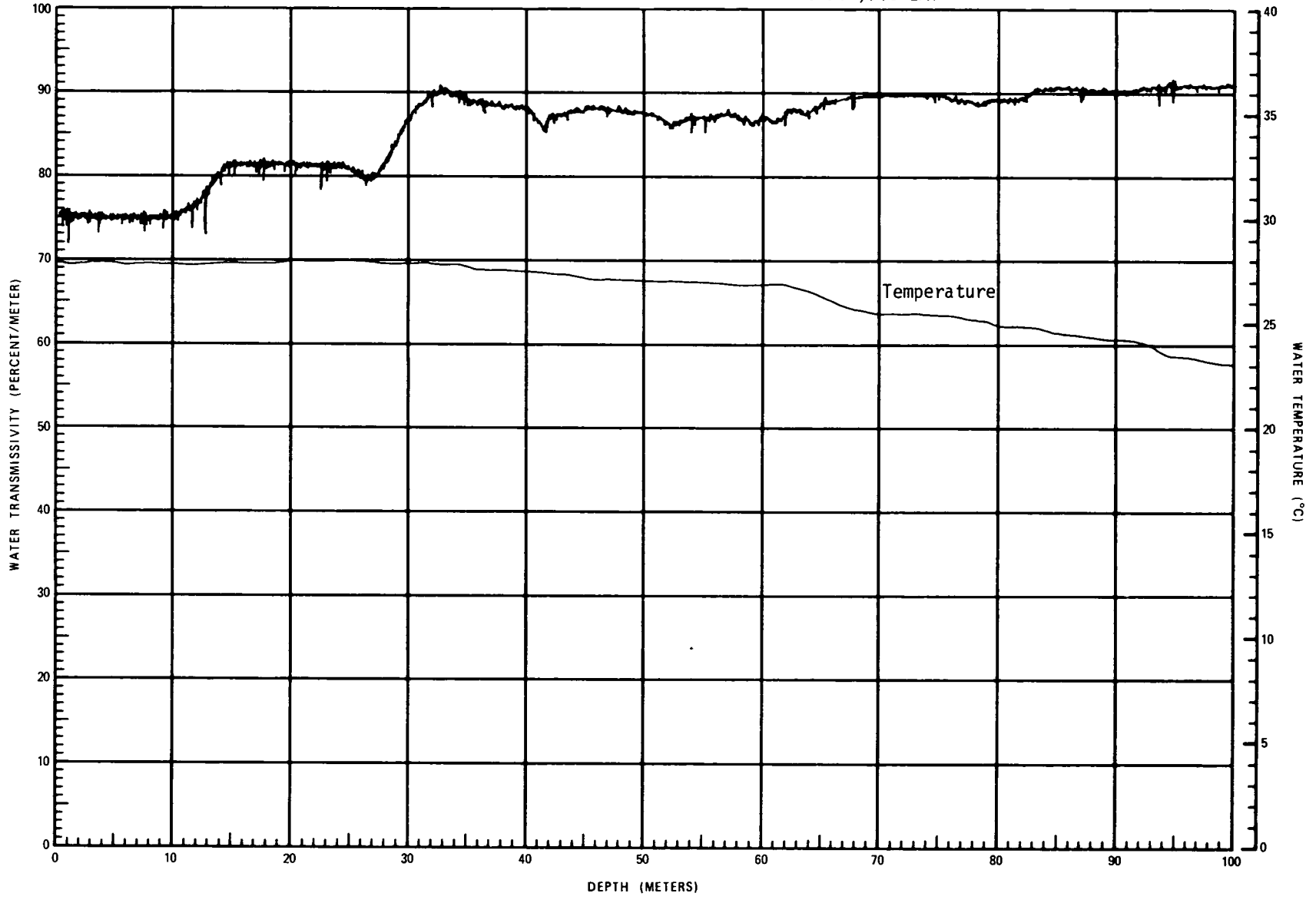
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WATER DEPTH 830 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 27.5° C at 0900 LAT

TRANSMISSIVITY PROFILE



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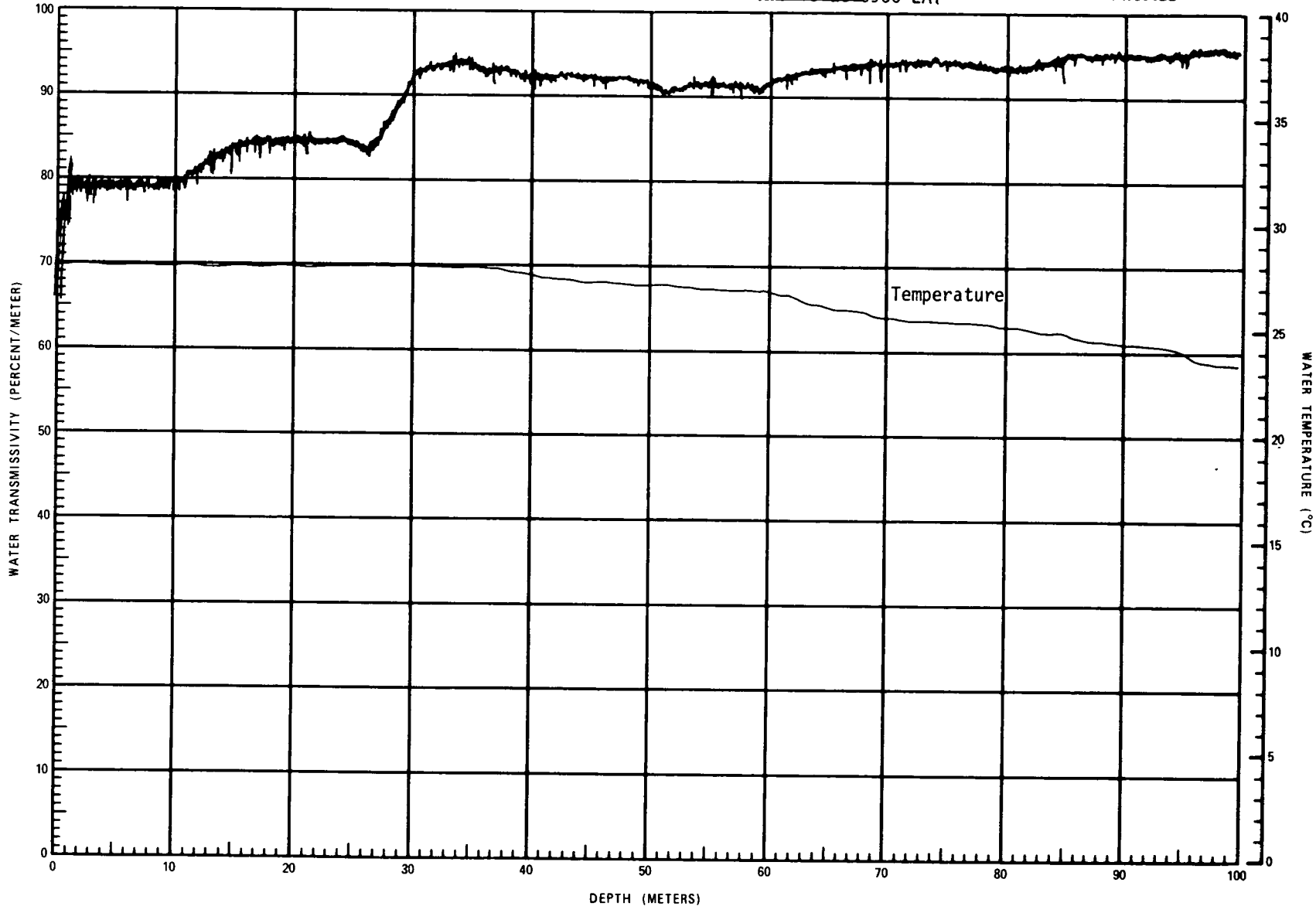
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WATER DEPTH 830 FMS

SPECTRAL FILTER 491 nm
BUCKET TEMP 27.5° C at 0900 LAT

TRANSMISSIVITY PROFILE



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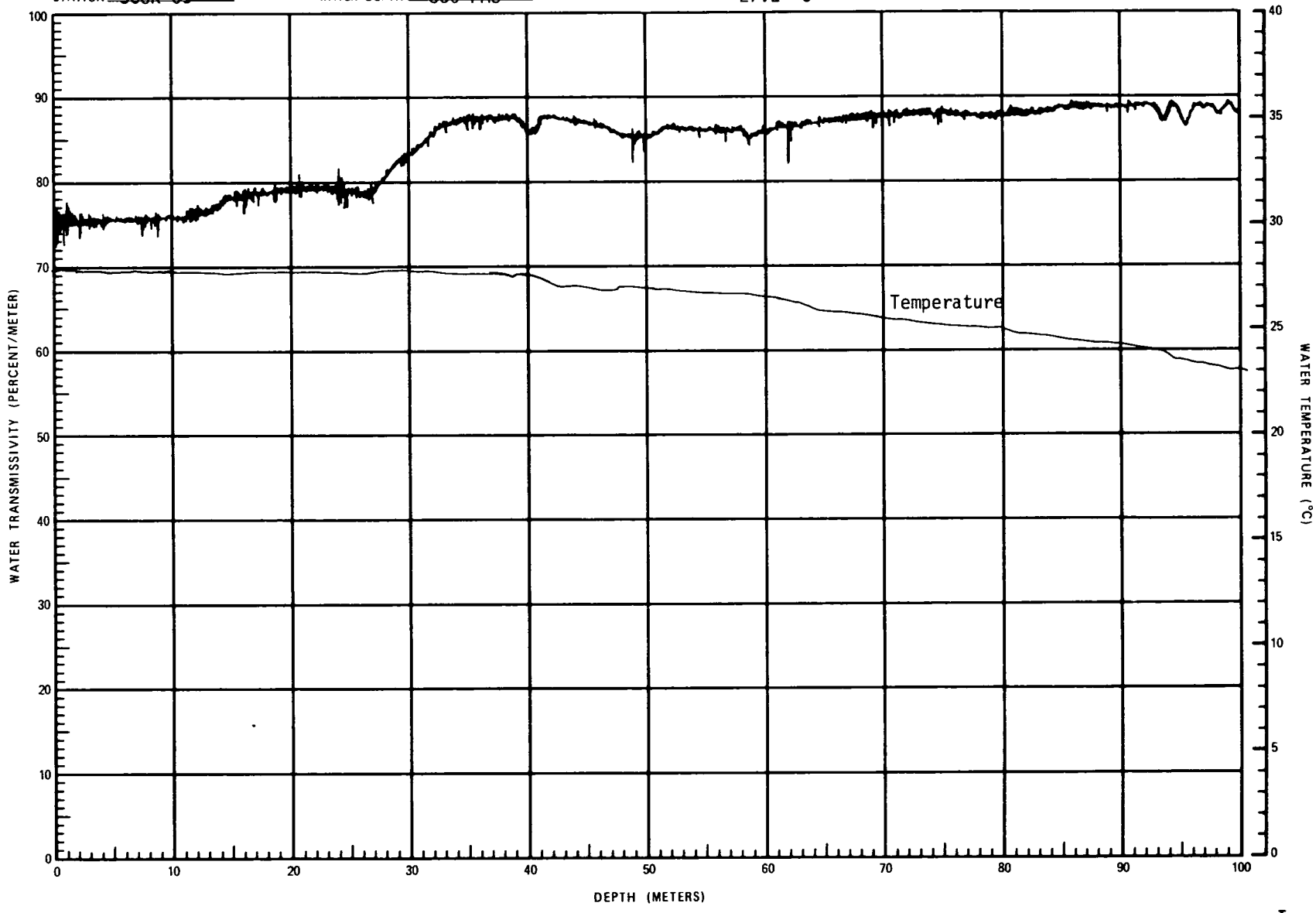
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DATE 08 May 1970
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STATION SCOR 05

LAT 9°51' N
LONG 79°41' W
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SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 27.2° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

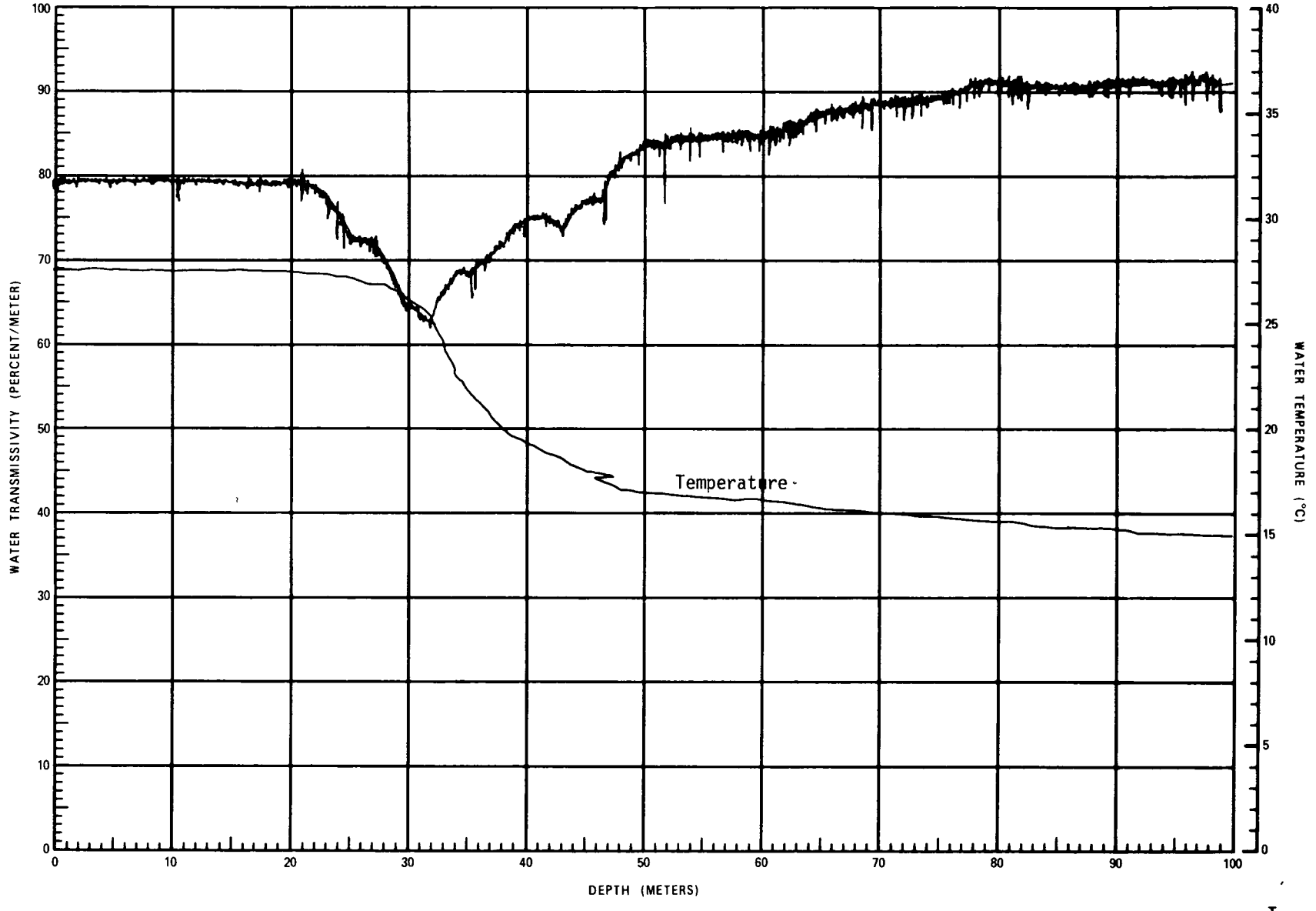
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DATE 09 May 1970
TIME 0950 L.A.T.
STATION SCOR 06

LAT 7°36' N
LONG 79°21' W
WATER DEPTH 240 FMS

SPECTRAL FILTER λ = 535 nm
BUCKET TEMP 27.4° C

TRANSMISSIVITY PROFILE



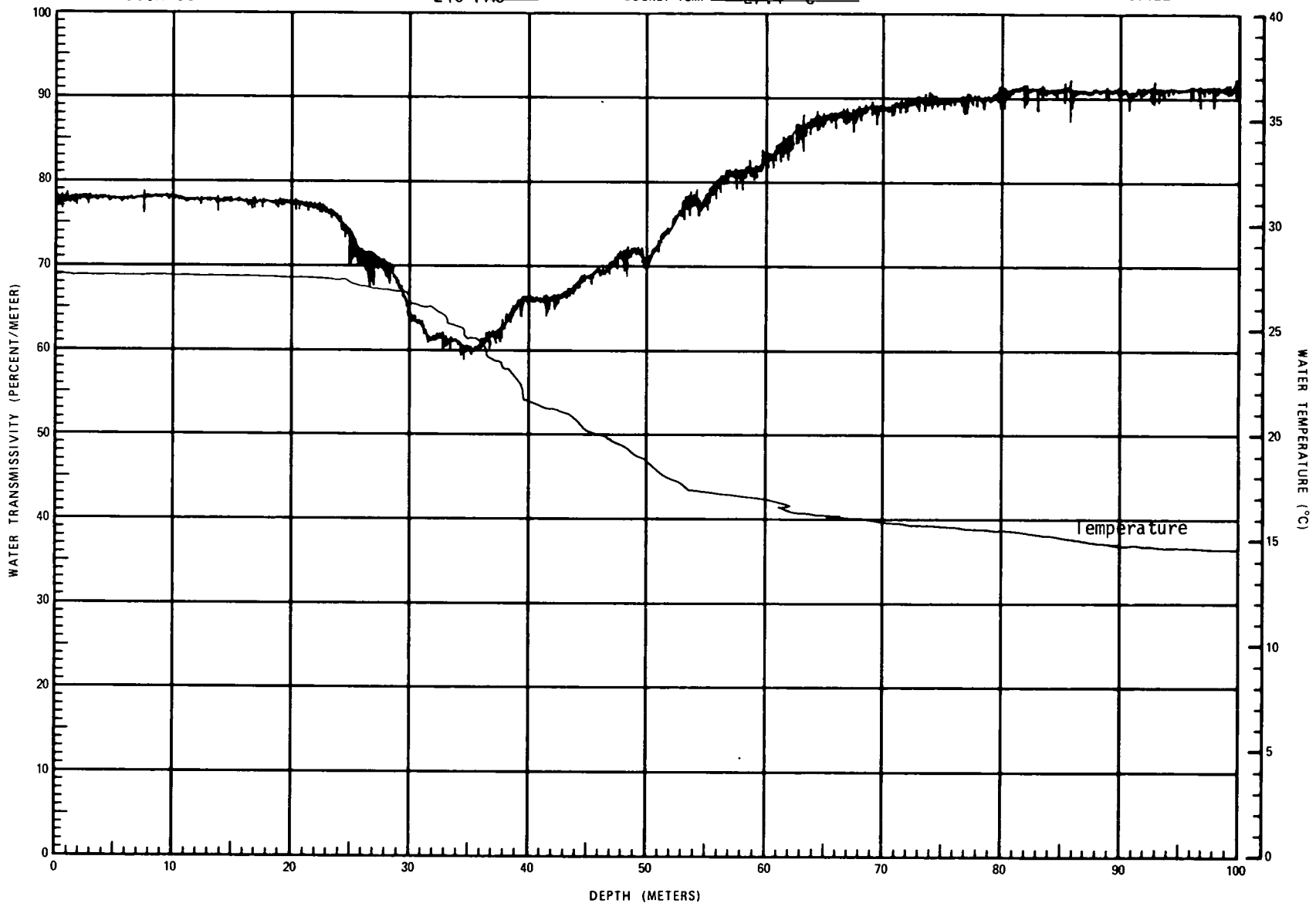
T1 (3/72)

VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 9 May 1970 LAT 7°36' N

TIME 1020 L.A.T. LONG 79°21' W SPECTRAL FILTER $\bar{\lambda}$ = 473 nm

STATION SCOR 06 WATER DEPTH 240 FMS BUCKET TEMP 27.4° C



T_1 (3/72)

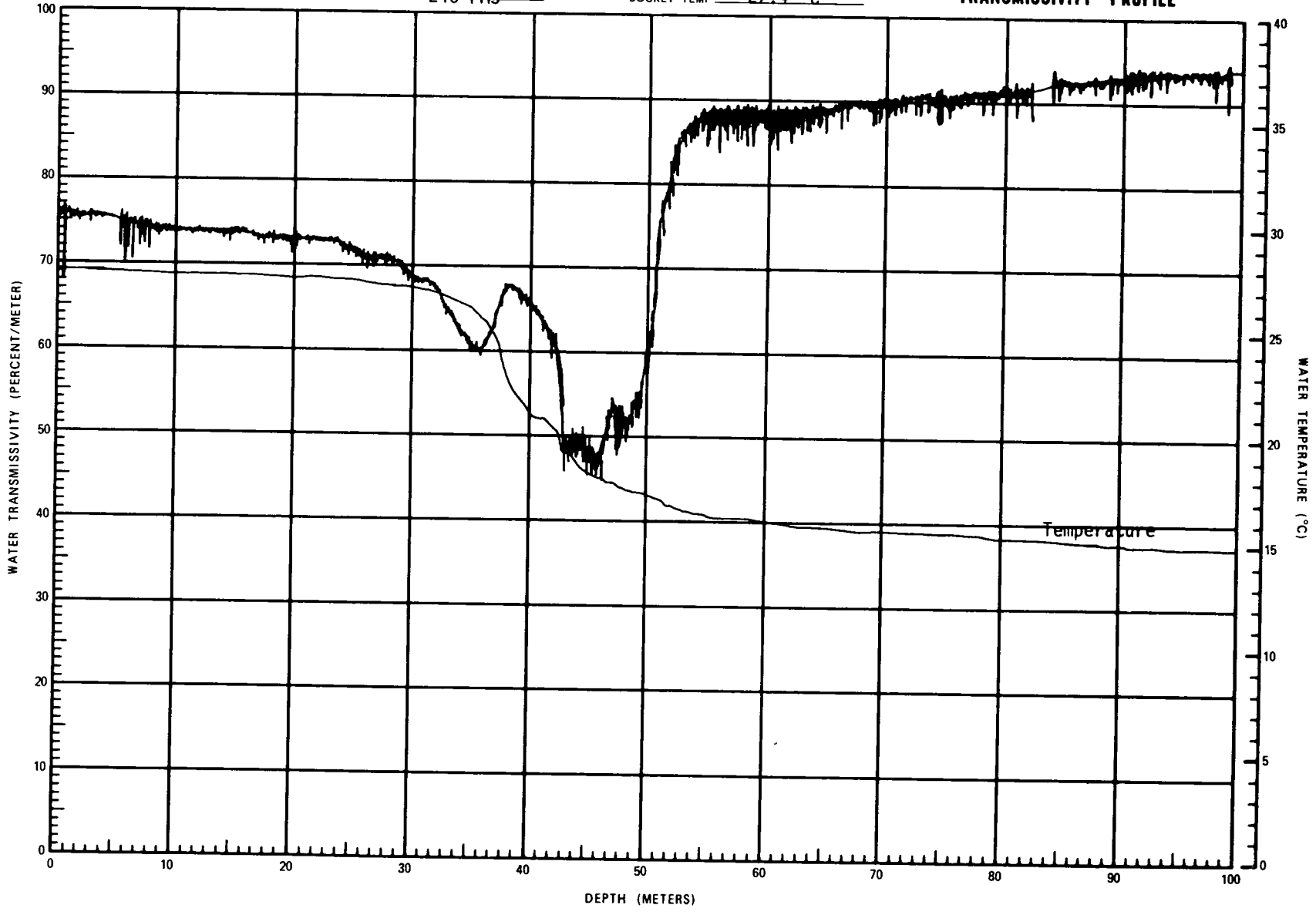
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DATE 09 May 1970
TIME 1345 L.A.T.
STATION SCOR 06

LAT 7° 36' N
LONG 79° 21' W
WATER DEPTH 240 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 27.4° C

TRANSMISSIVITY PROFILE



T1 (3/72)

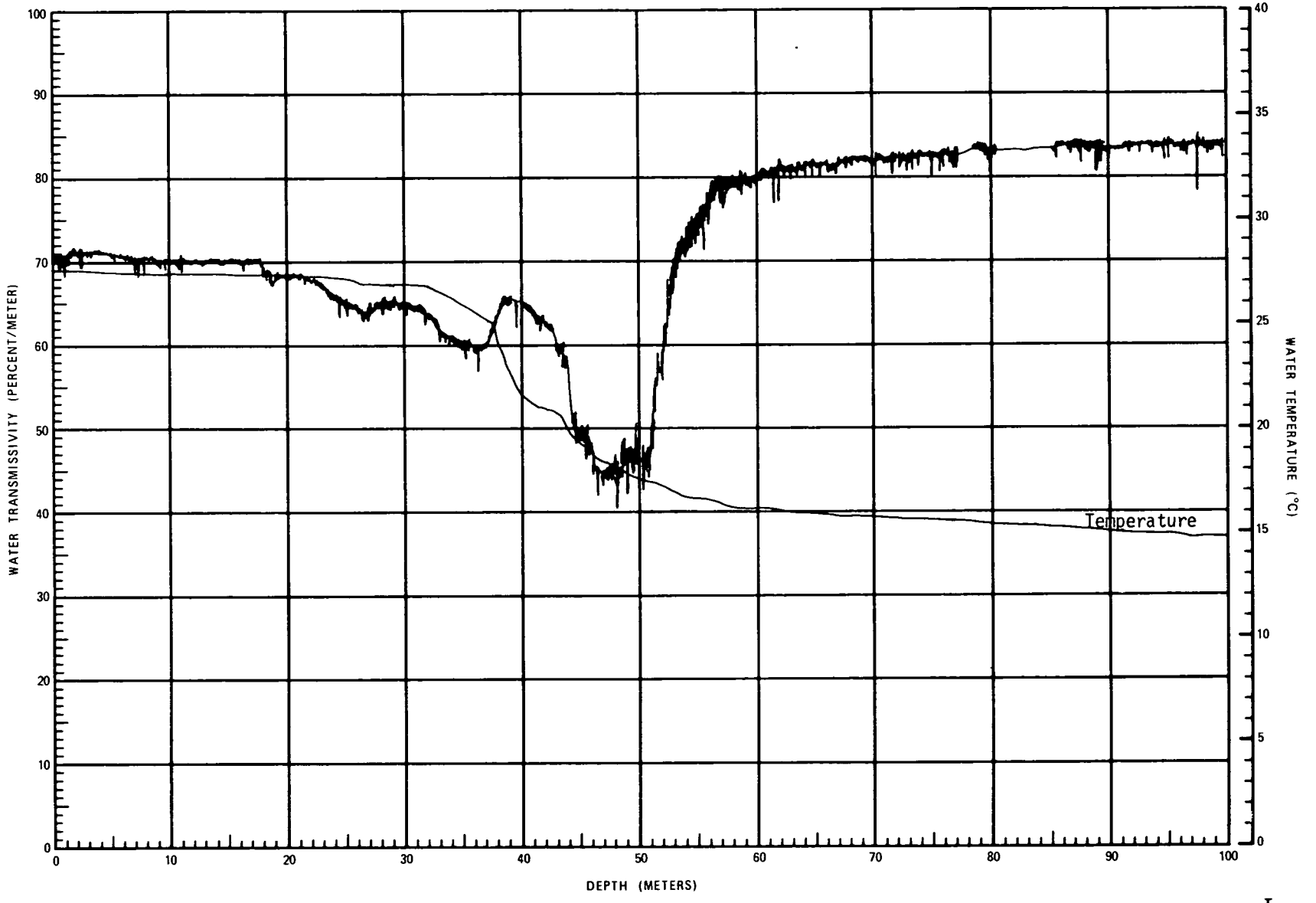
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DATE 09 May 1970
TIME 1410 L.A.T.
STATION SCOR 06

LAT 7°36' N
LONG 79°21' W
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SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 27.4° C

TRANSMISSIVITY PROFILE



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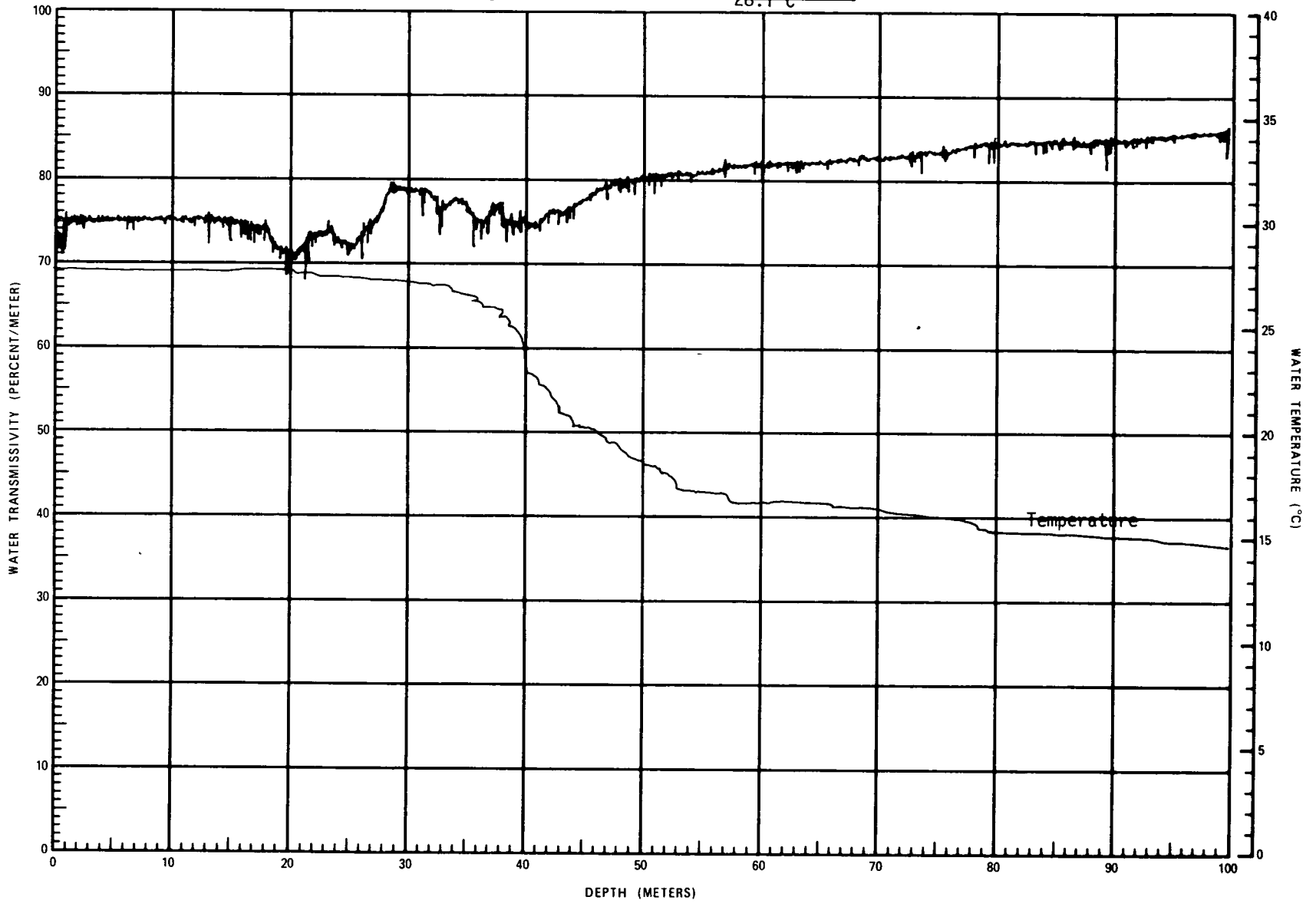
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 10 May 1970
TIME 1345 L.A.T.
STATION SCOR 07

LAT 4°48' N
LONG 81°46' W
WATER DEPTH 1200 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 28.1°C

TRANSMISSIVITY PROFILE



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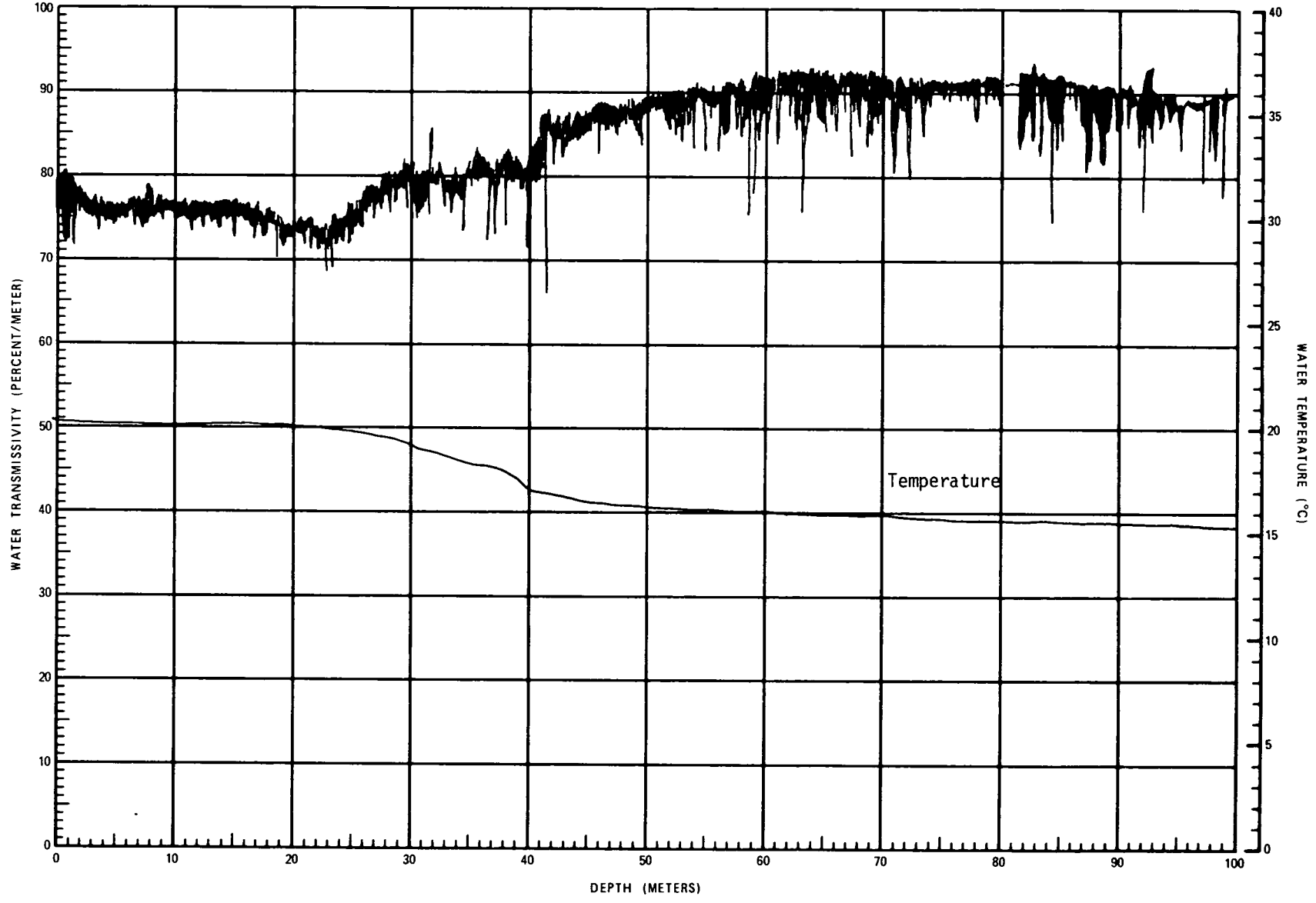
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DATE 12 May 1970
TIME 0920 L.A.T.
STATION SCOR 08

LAT 2°58' S
LONG 84°48' W
WATER DEPTH 1730 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 20.05° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

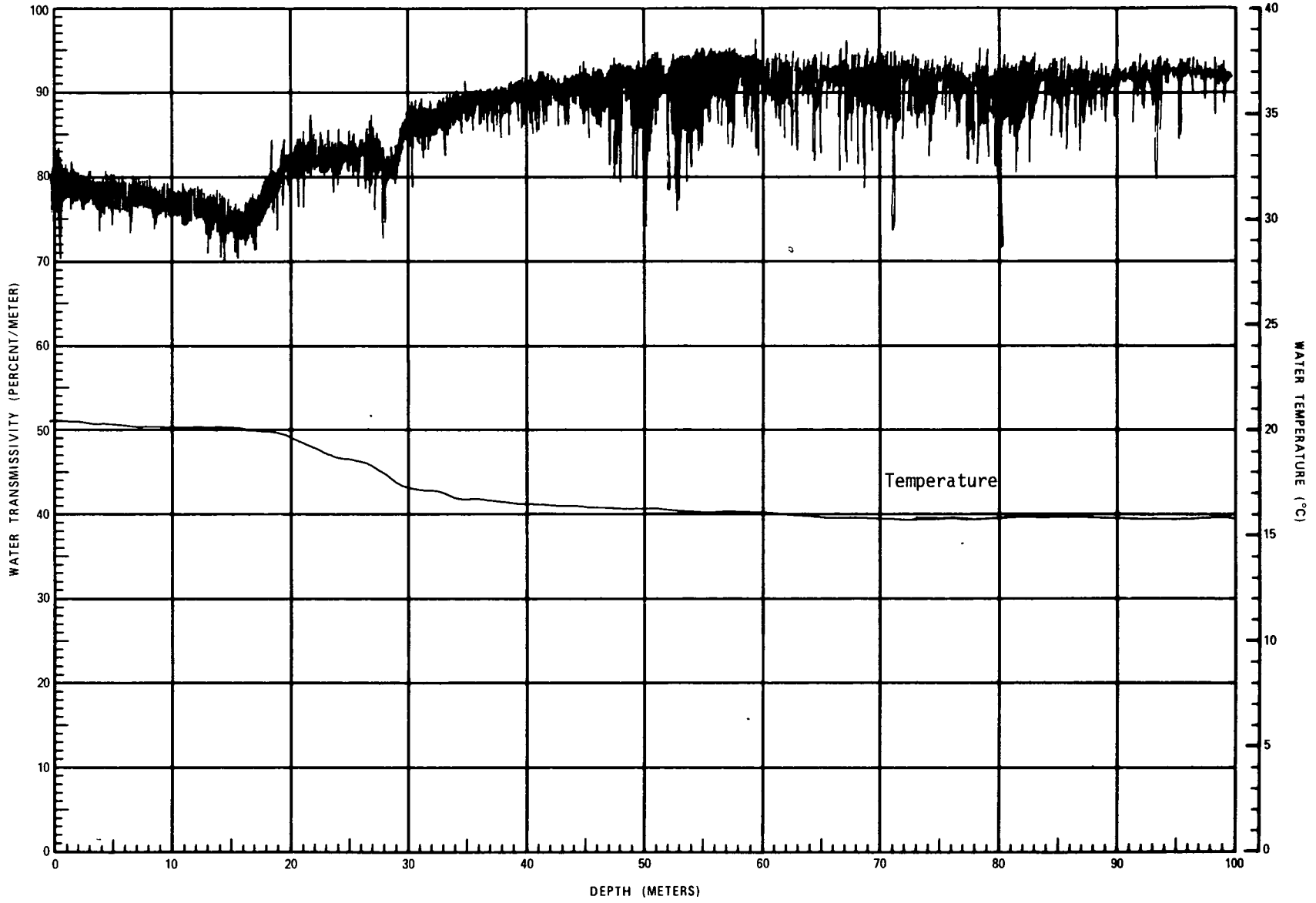
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 12 May 1970
TIME 0930-0940 L.A.T.
STATION SCOR 08

LAT 2°58' S
LONG 84°48' W
WATER DEPTH 1730 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 20.05° C

TRANSMISSIVITY PROFILE



T1 (3/72)

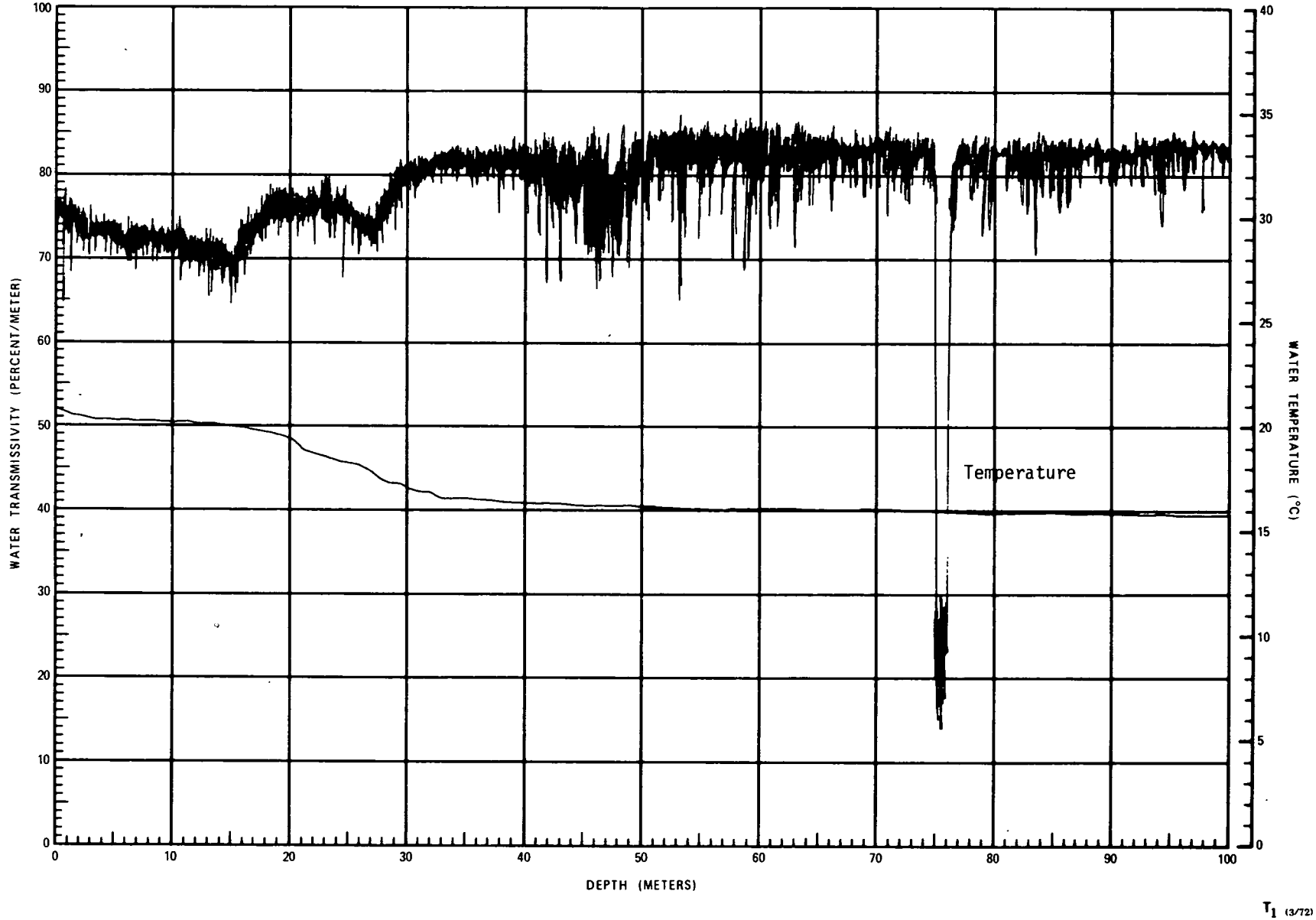
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 12 May 1970
TIME 1005 L.A.T.
STATION SCOR 08

LAT 2°58' S
LONG 84°48' W
WATER DEPTH 1730 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 20.05° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

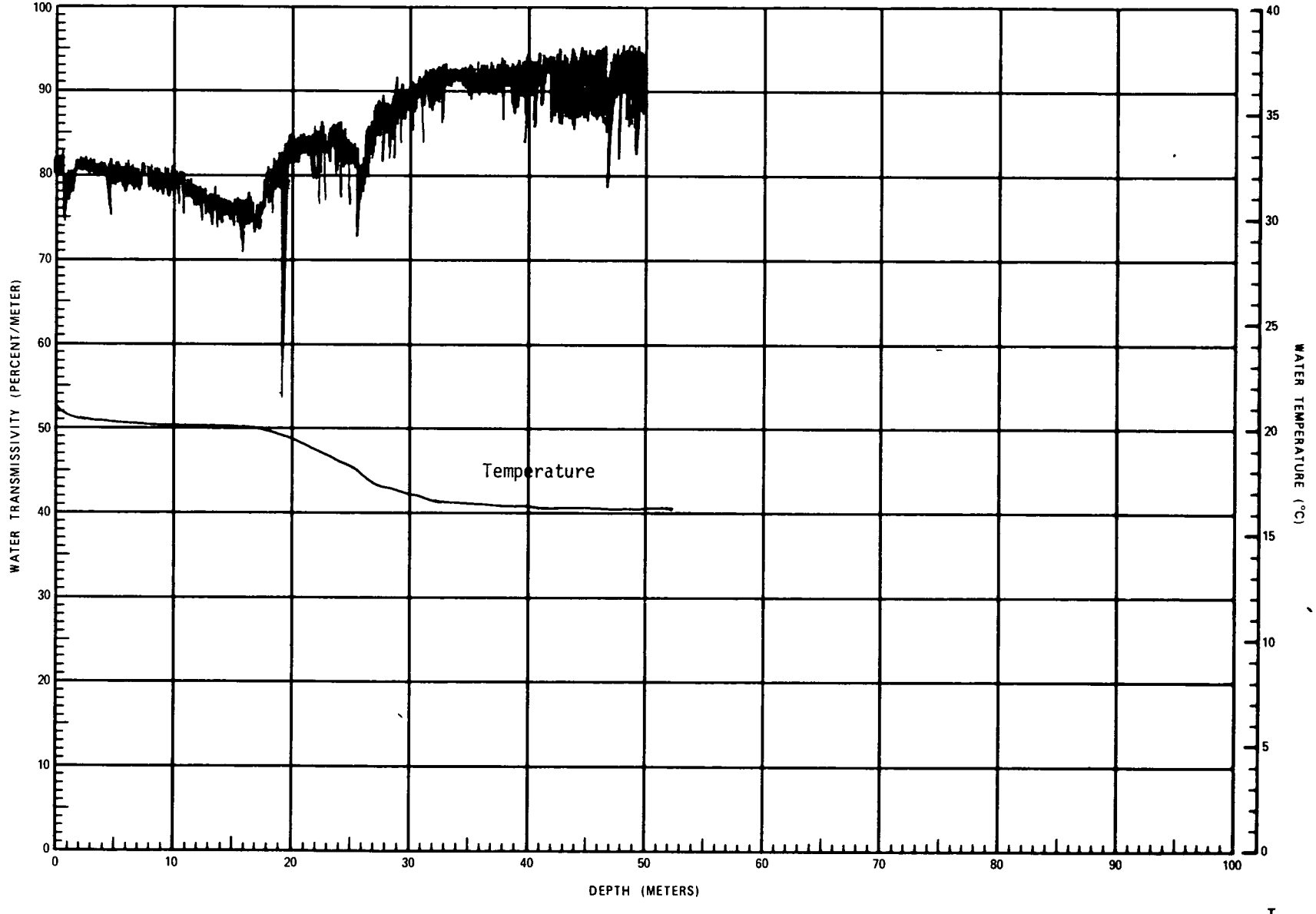
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 12 May 1970
TIME 1030 L.A.T.
STATION SCOR 08

LAT 2°58' S
LONG 84°48' W
WATER DEPTH 1730 FMS

SPECTRAL FILTER λ = 473 nm
BUCKET TEMP 20.07° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

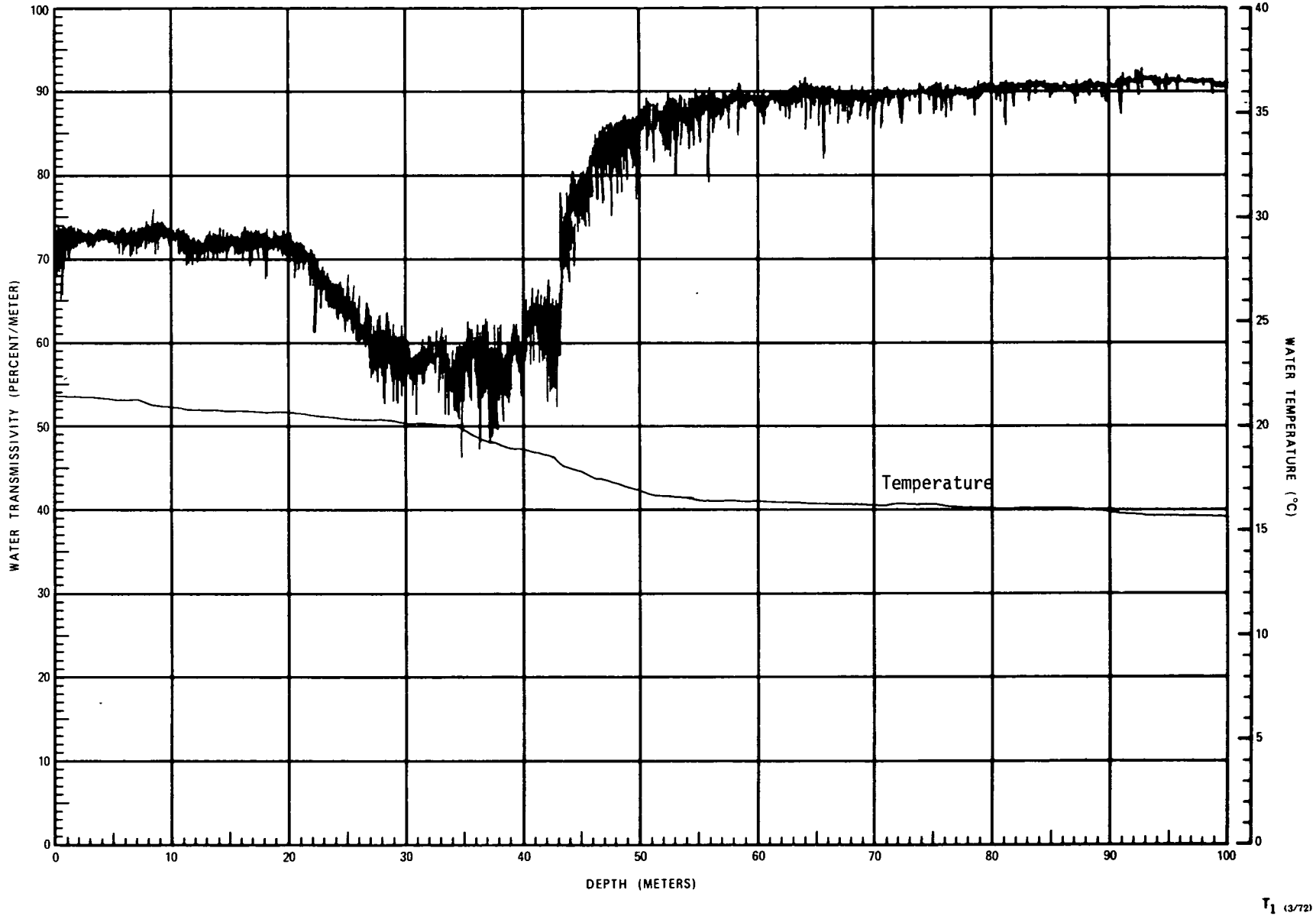
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 13 May 1970
TIME 1440-1457 L.A.T.
STATION SCOR 09

LAT 3°55' S
LONG 84°44' W
WATER DEPTH 1800 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 20.5° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

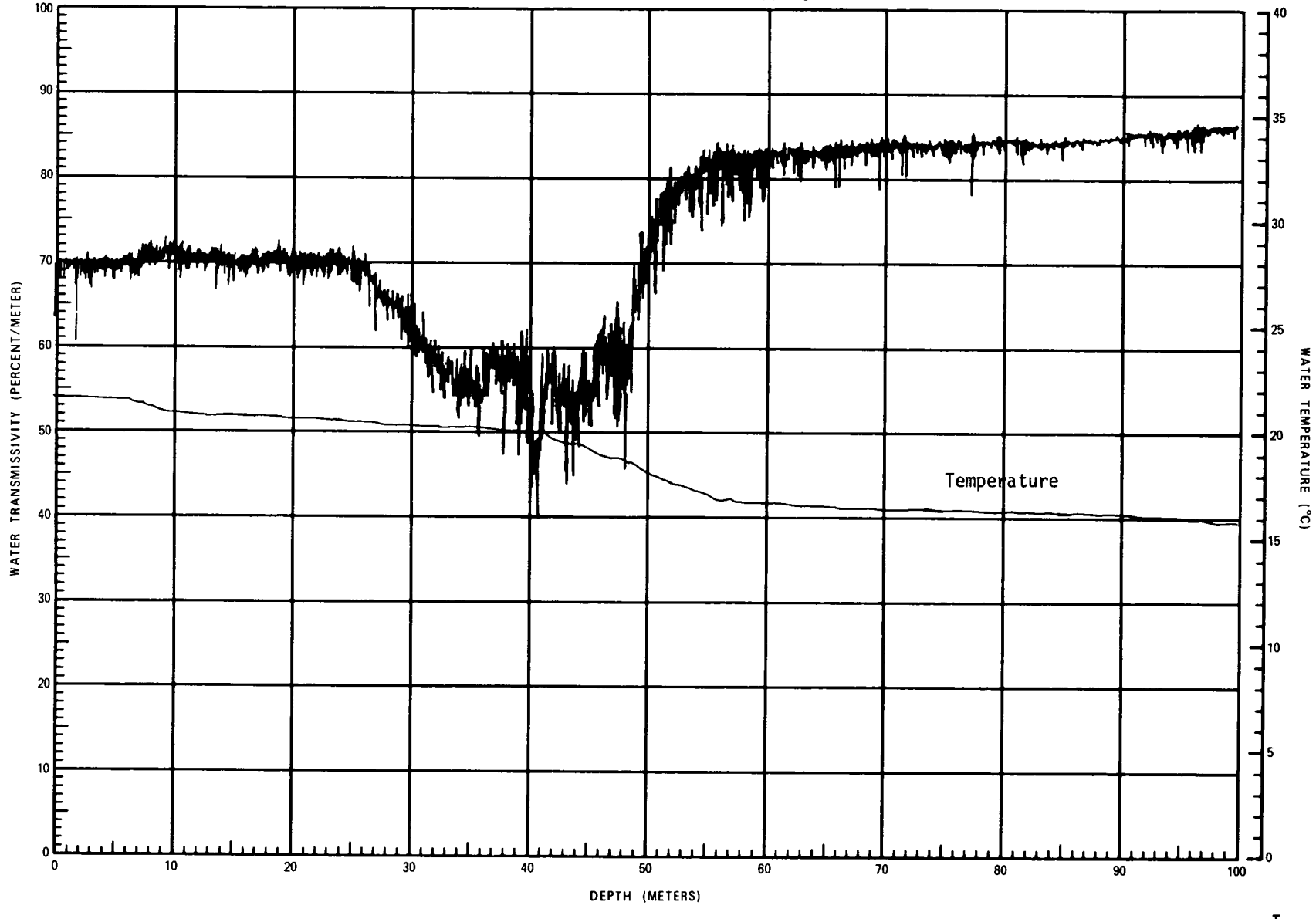
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 13 May 1970 LAT 3° 55' S

TIME 1510-1517 L.A.T. LONG 84° 44' W SPECTRAL FILTER λ = 581 nm

STATION SCOR 09 WATER DEPTH 1800 FMS BUCKET TEMP 20.5° C

TRANSMISSIVITY PROFILE

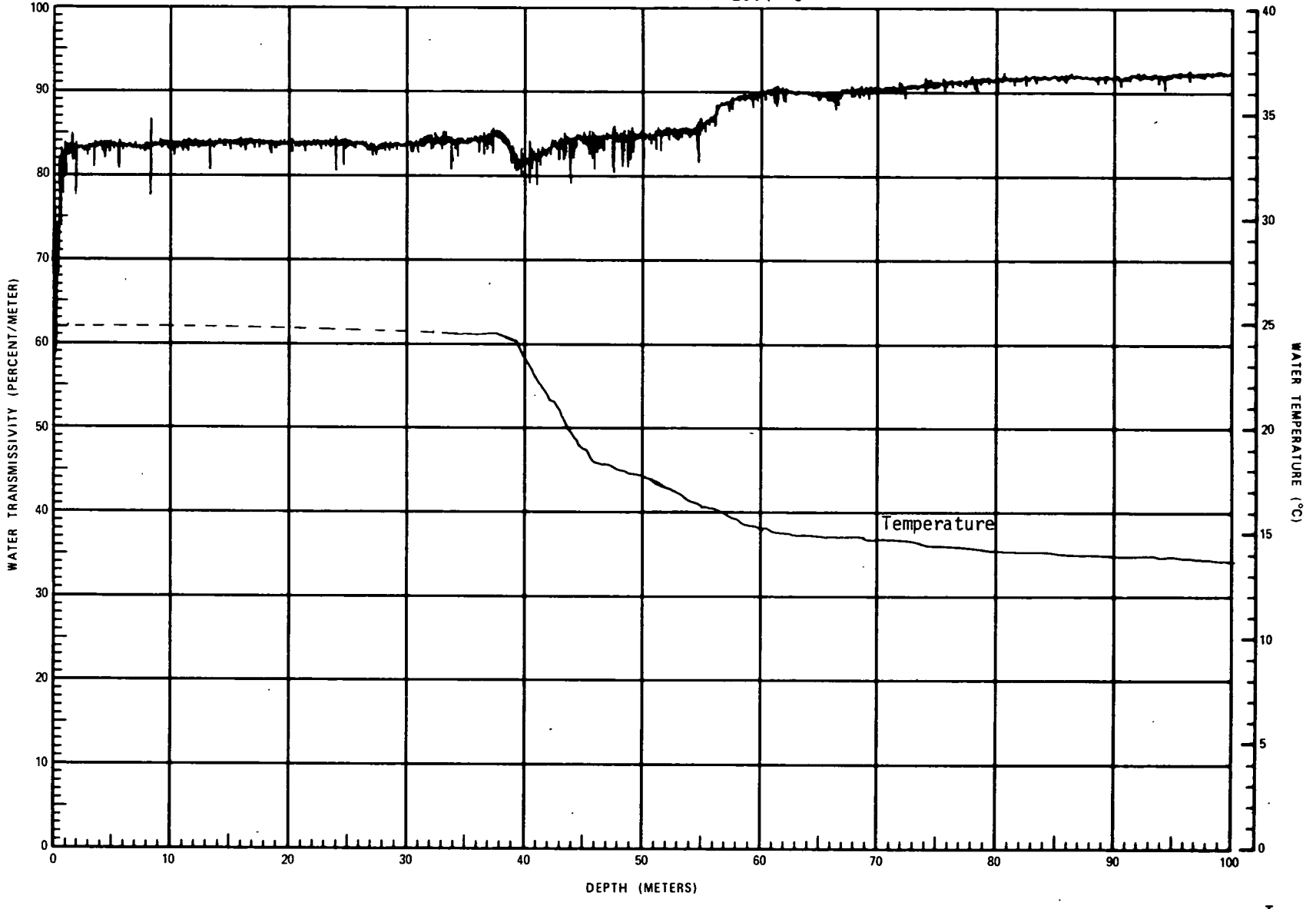


T1 (3/72)

VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 14 May 1970
TIME 1005 L.A.T.
STATION SCOR 10
LAT $5^{o}33'$ S
LONG $87^{o}38'$ W
WATER DEPTH 2100 FMS
SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 25.4^{o} C

TRANSMISSIVITY PROFILE



T_1 (3/72)

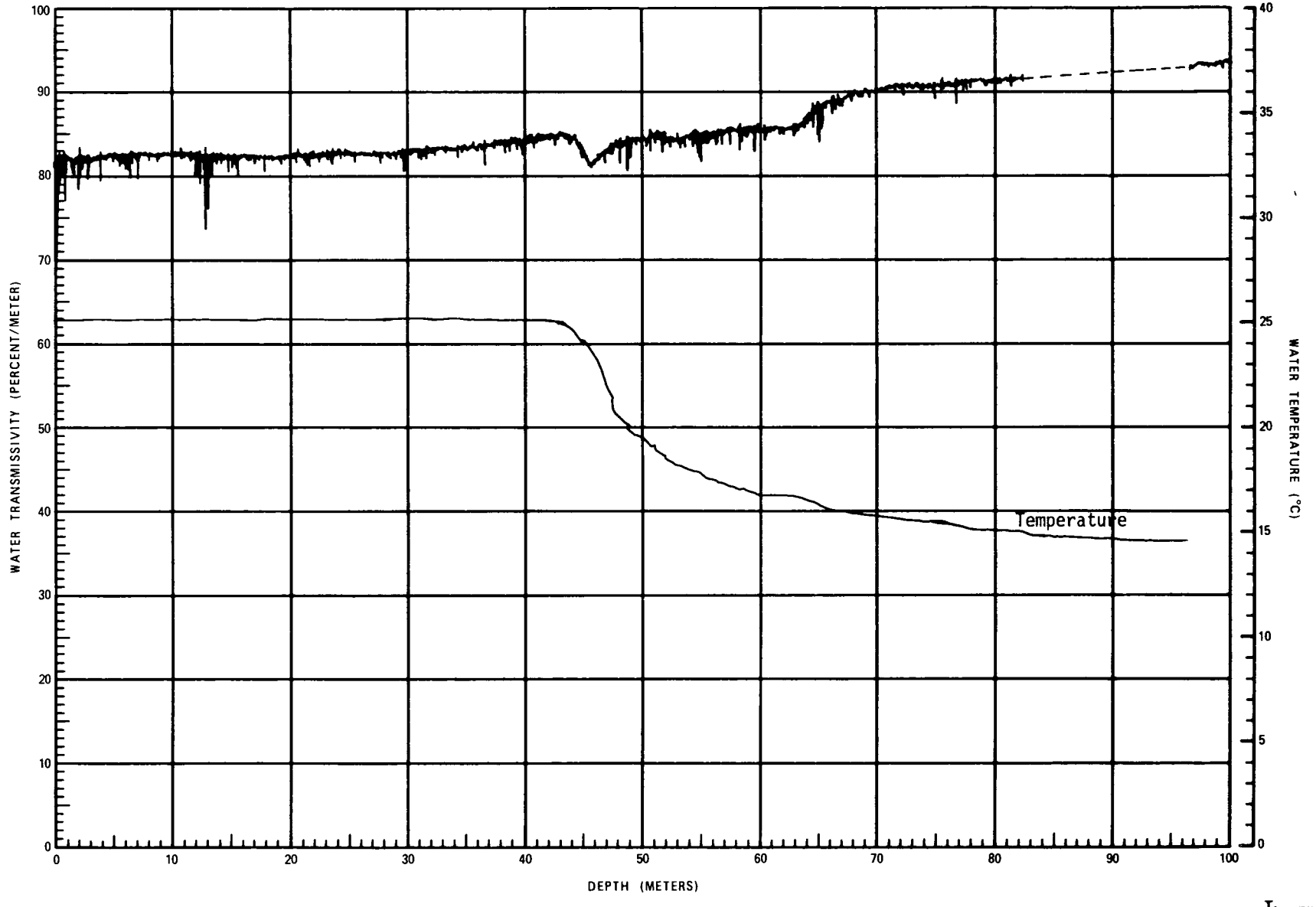
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 14 May 1970 LAT 5°33' S SPECTRAL FILTER $\bar{\lambda}$ = 491 nm

TIME 1357 L.A.T. LONG 87°38' W BUCKET TEMP 25.4° C

STATION SCOR 10 WATER DEPTH 2100 FMS

TRANSMISSIVITY PROFILE



T1 (3/72)

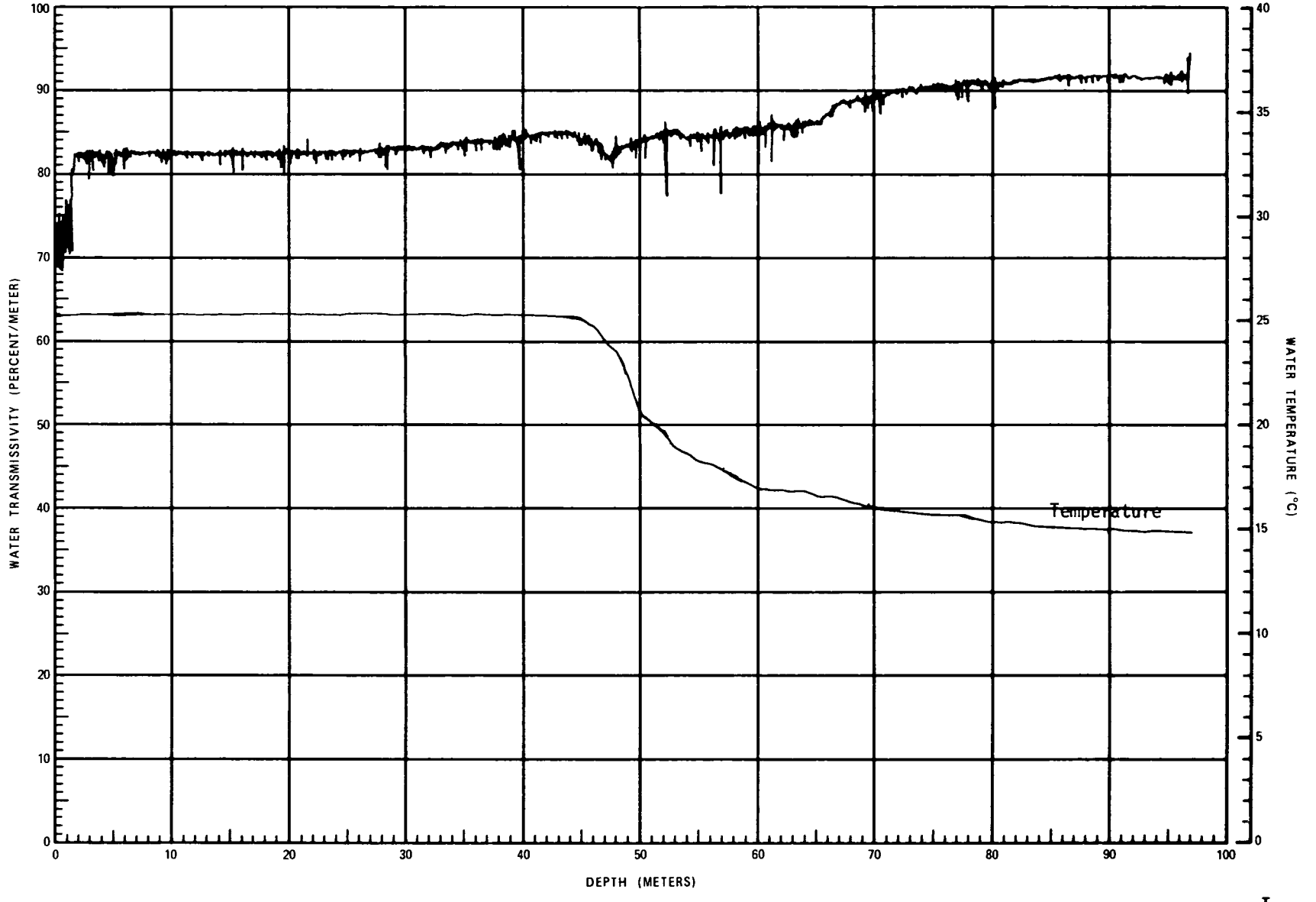
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 14 May 1970
TIME 1430 L.A.T.
STATION SCOR 10

LAT 5°33' S
LONG 87°38' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER λ = 473 nm
BUCKET TEMP 25.4° C

TRANSMISSIVITY PROFILE



T1 (3/72)

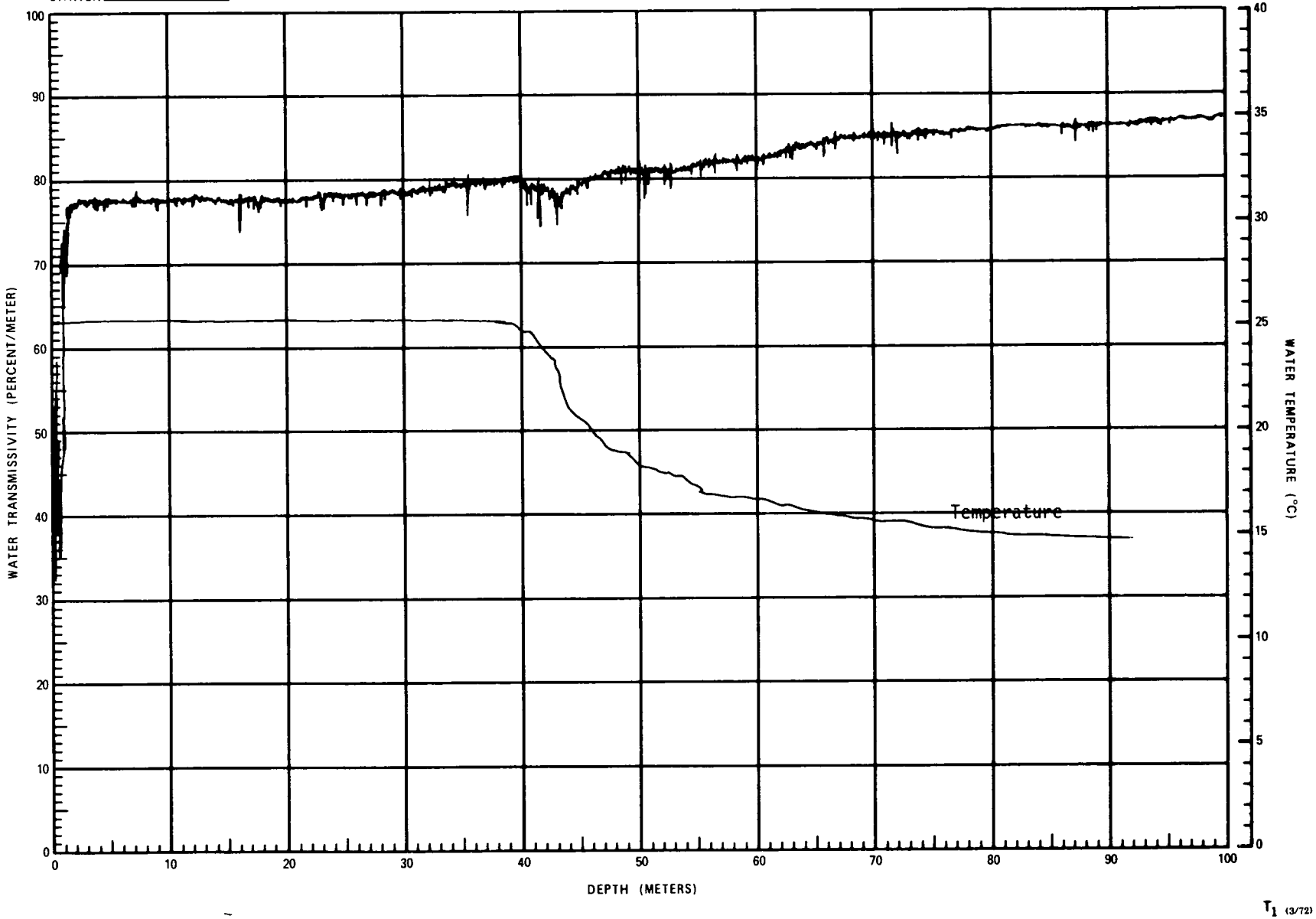
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 14 May 1970
TIME 1450 L.A.T.
STATION SCOR 10

LAT 5°33' S
LONG 87°38' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER λ = 581 nm
BUCKET TEMP 25.4° C

TRANSMISSIVITY PROFILE



T1 (3/72)

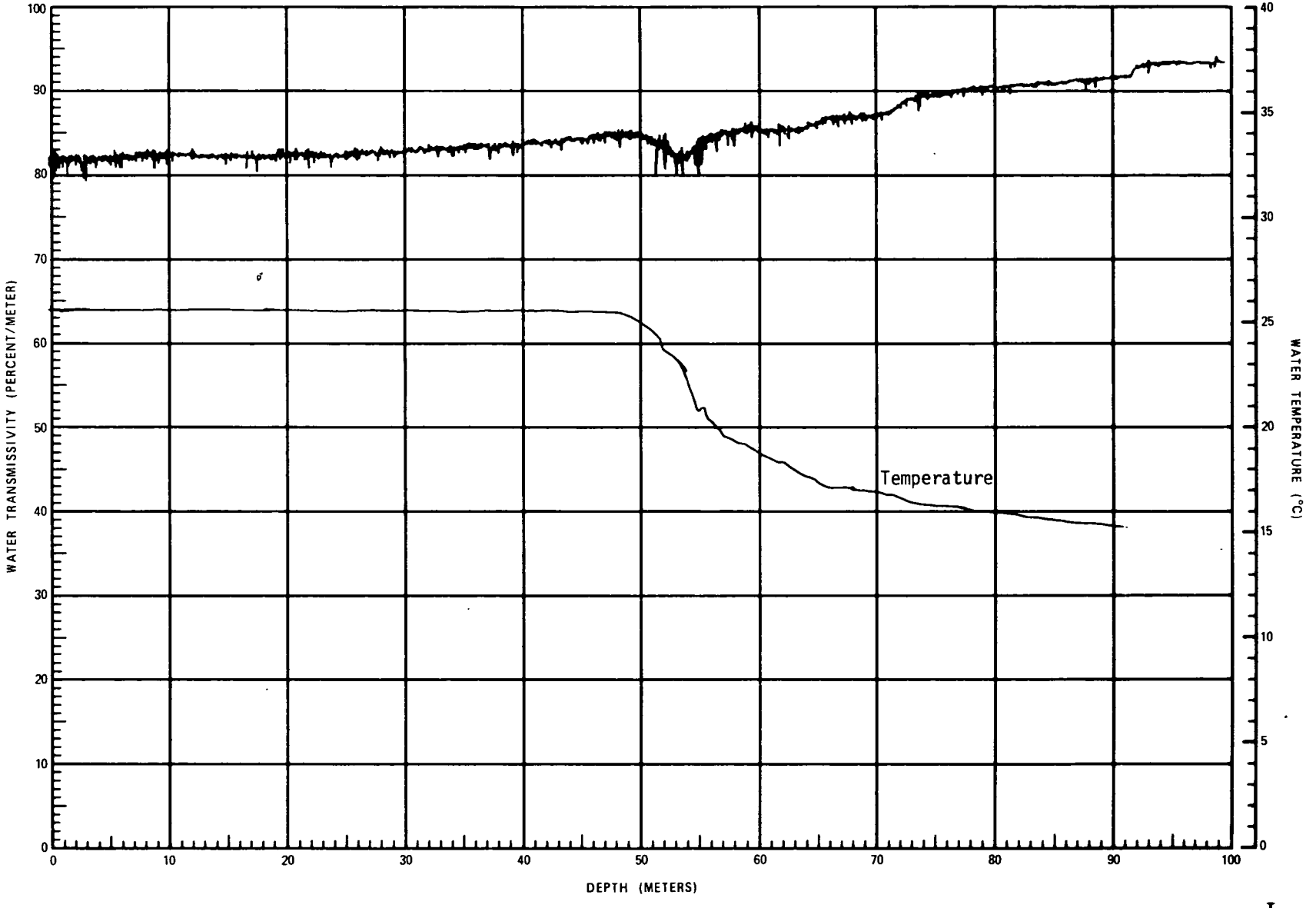
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 14 May 1970
TIME 1510 L.A.T.
STATION SCOR 10

LAT 5°33' S
LONG 87°38' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER λ = 535 nm
BUCKET TEMP 25.4° C

TRANSMISSIVITY PROFILE



T1 (3/72)

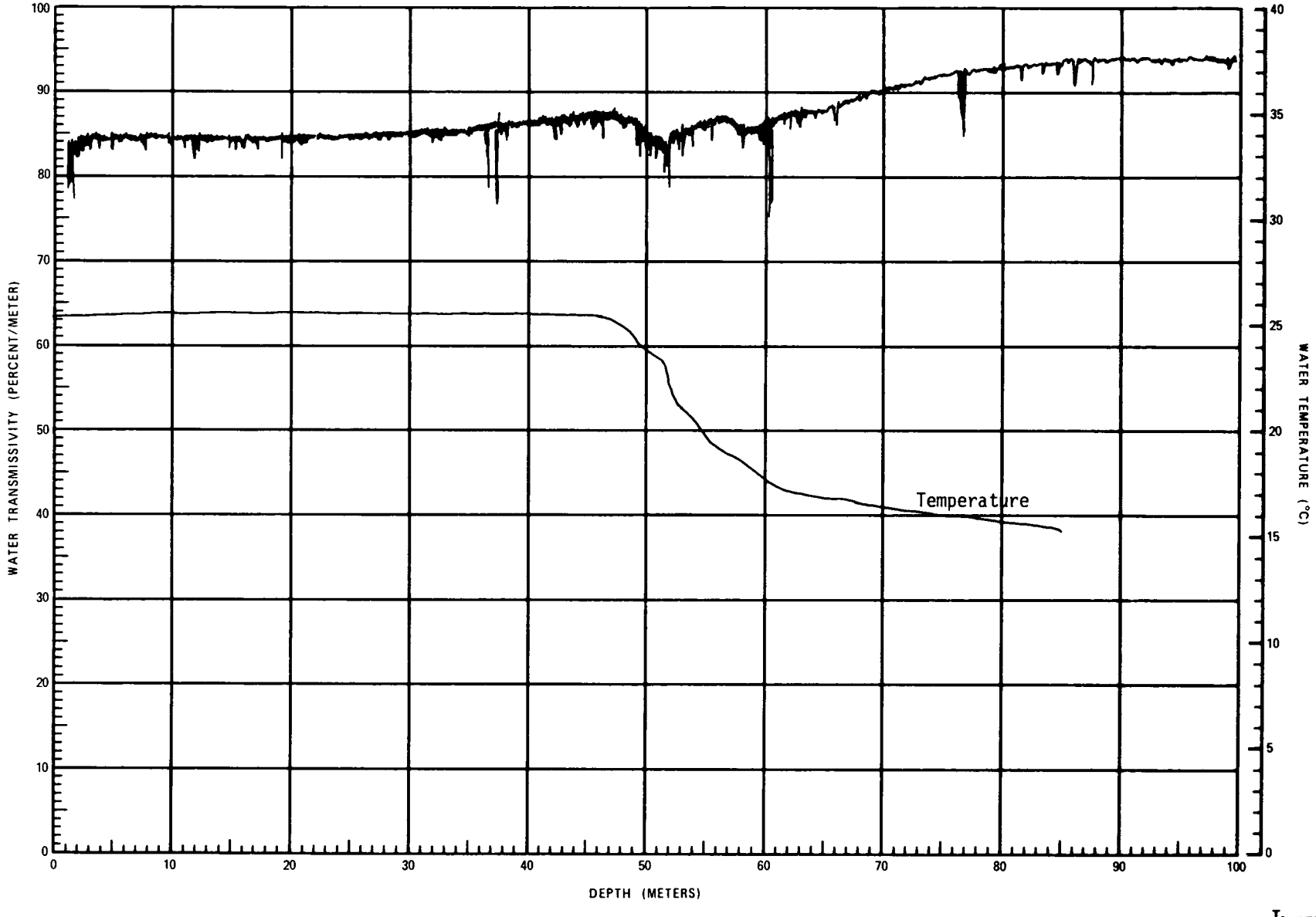
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 14 May 1970 LAT 5°33' S SPECTRAL FILTER $\bar{\lambda}$ = 450 nm

TIME 1530 L.A.T. LONG 87°38' W BUCKET TEMP 25.4° C

STATION SCOR 10 WATER DEPTH 2100 FMS

TRANSMISSIVITY PROFILE



T_1 (3/72)

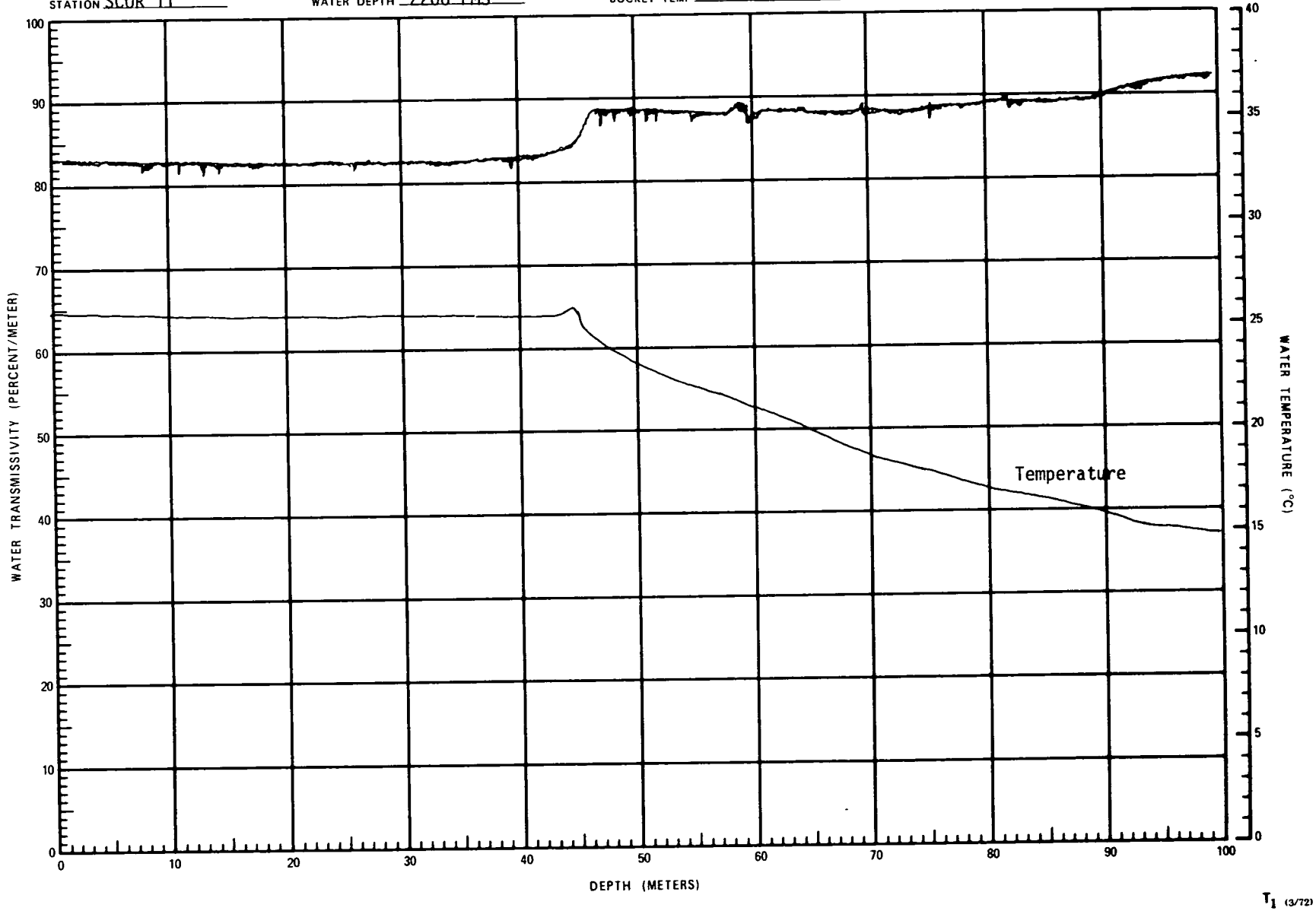
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 15 May 1970
TIME 1130 L.A.T.
STATION SCOR 11

LAT 7°55' S
LONG 90°15' W
WATER DEPTH 2200 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 25.4° C

TRANSMISSIVITY PROFILE



T1 (3/72)

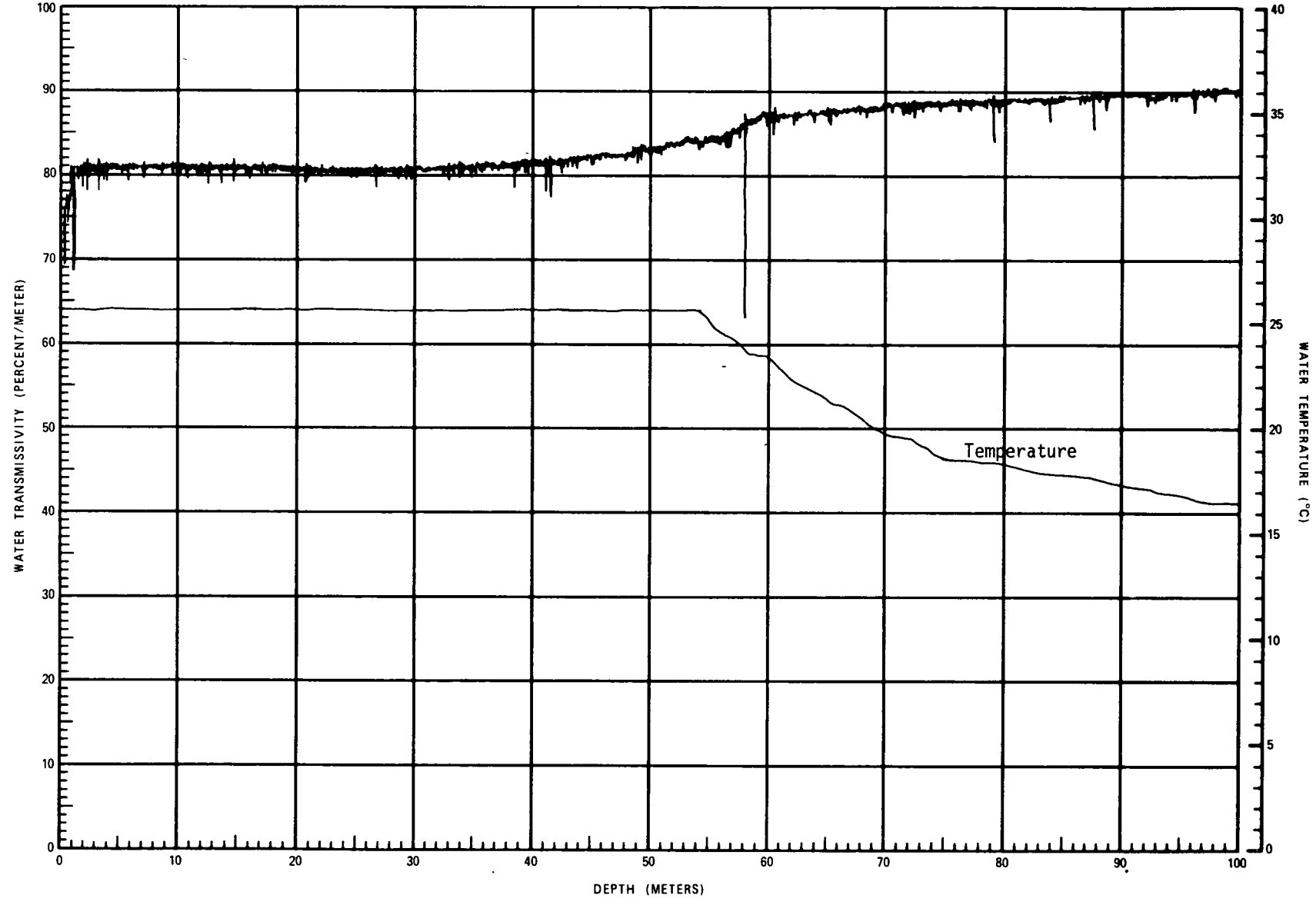
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 15 May 1970
TIME 1640 L.A.T.
STATION SCOR 11

LAT 7°55' S
LONG 90°15' W
WATER DEPTH 2200 FMS

SPECTRAL FILTER λ = 450 nm
BUCKET TEMP 25.5° C

TRANSMISSIVITY PROFILE



T1 (3/72)

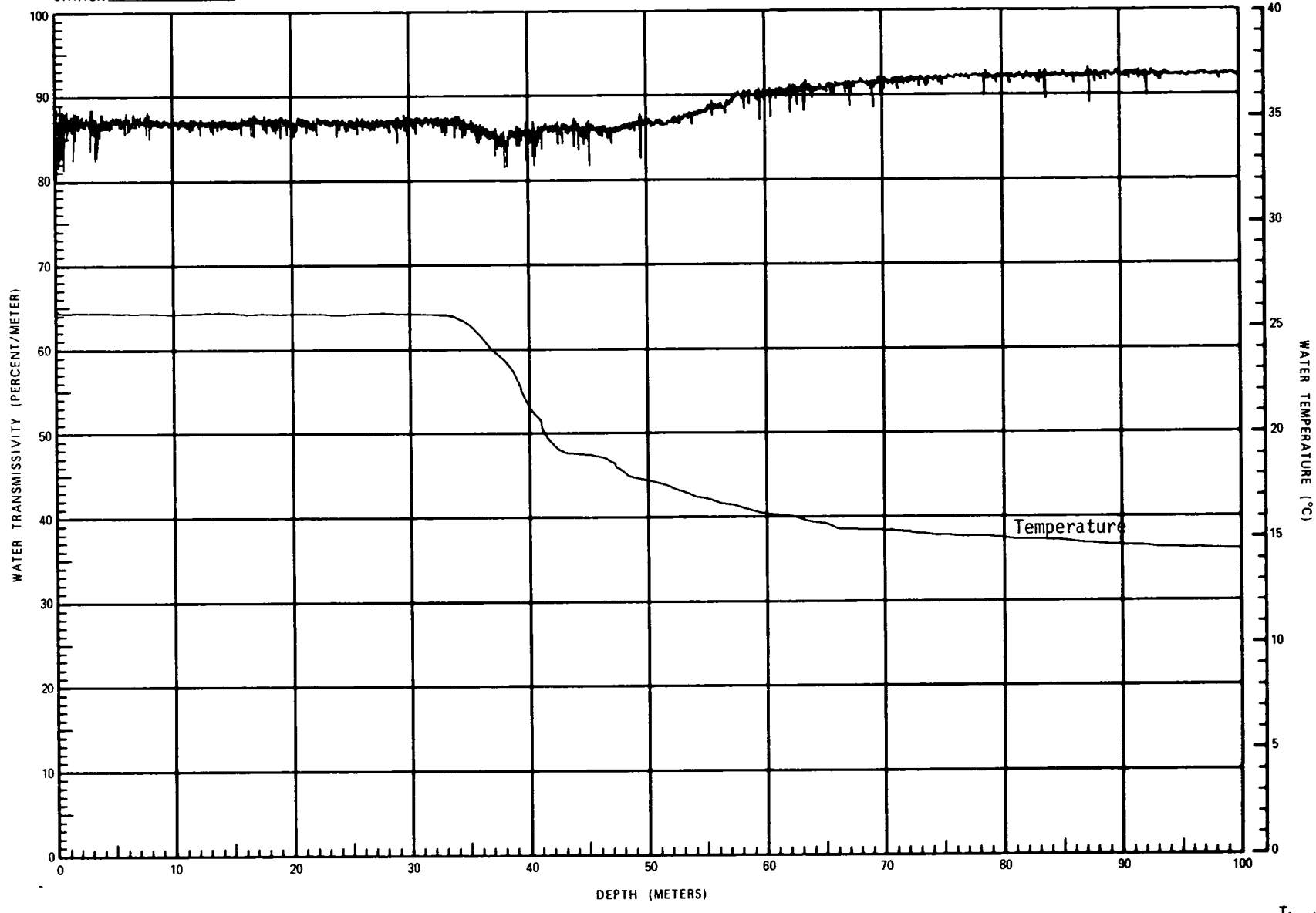
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 16 May 1970
TIME 1055-1100 L.A.T.
STATION SCOR 12

LAT 5°32' S
LONG 87°53' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER λ = 450 nm
BUCKET TEMP 25.6° C

TRANSMISSIVITY PROFILE



T1 (3/72)

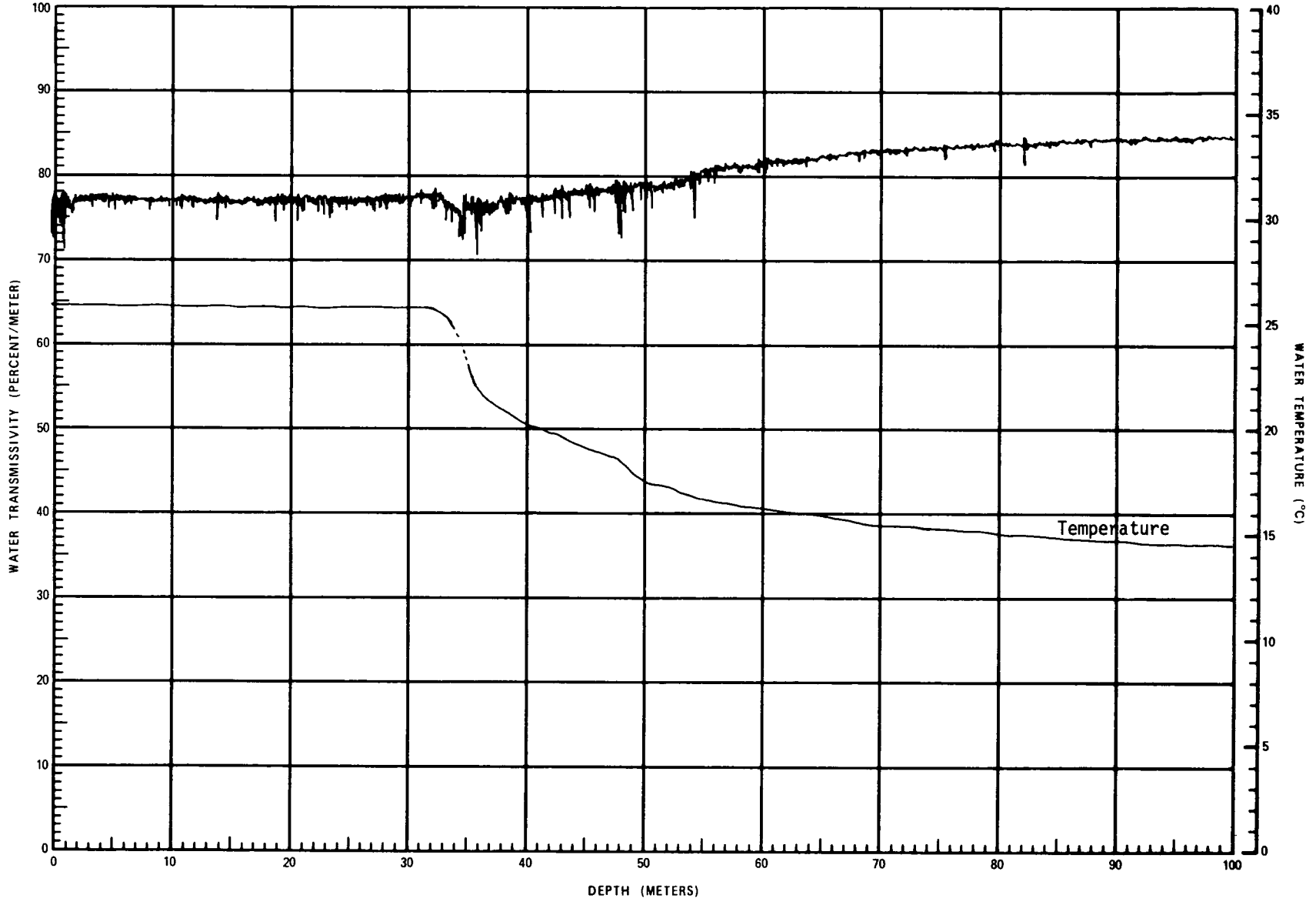
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 16 May 1970
TIME 1330 L.A.T.
STATION SCOR 12

LAT 5°32' S
LONG 87°53' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER λ = 581 nm
BUCKET TEMP 25.5° C

TRANSMISSIVITY PROFILE



T1 (3/72)

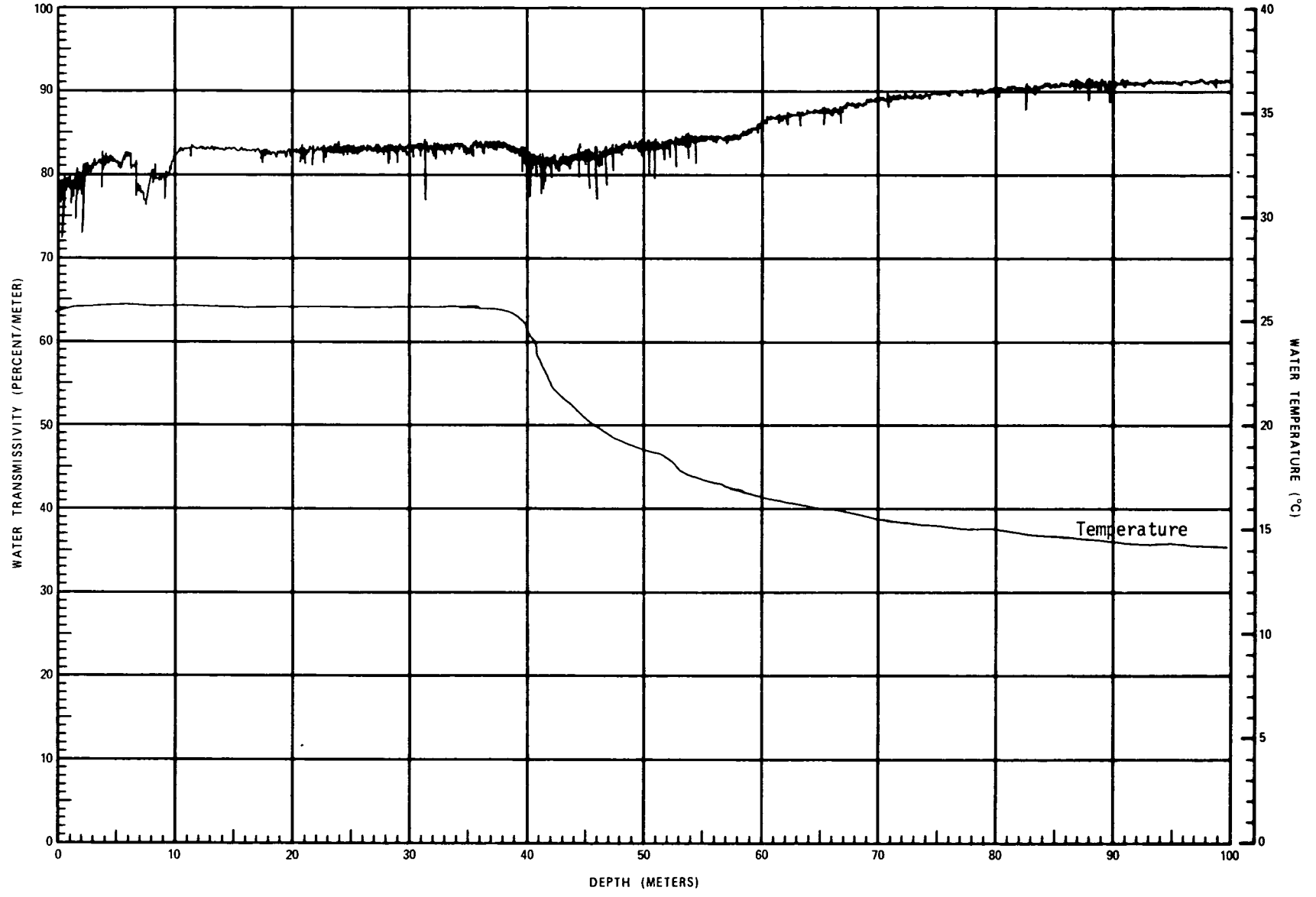
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 16 May 1970
TIME 1350-1355 L.A.T.
STATION SCOR 12

LAT $5^{o}32'$ S
LONG 87^{o} 53' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 25.5^{o} C

TRANSMISSIVITY PROFILE

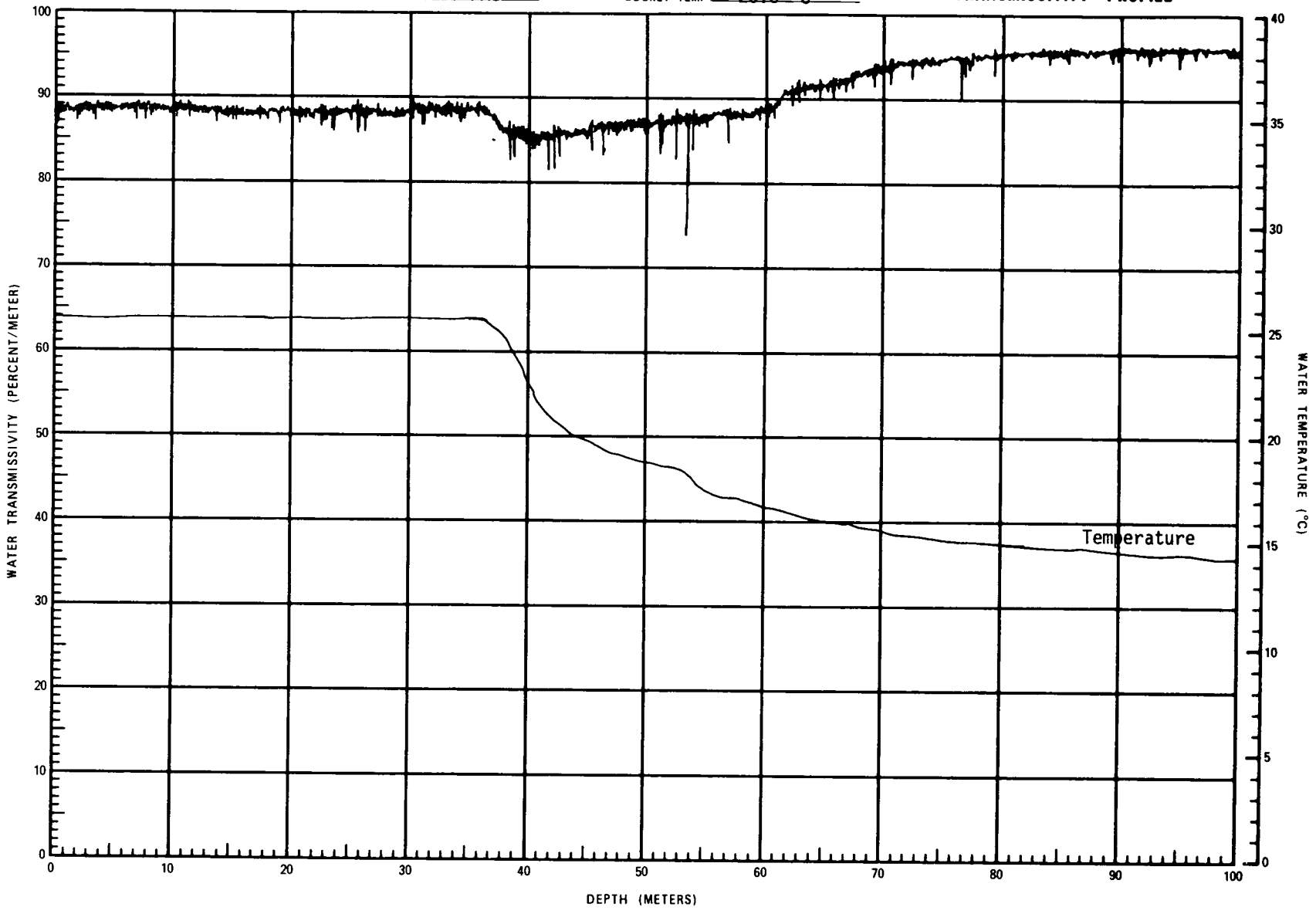


T_1 (3/72)

VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 16 May 1970
TIME 1408-1413 L.A.T.
STATION SCOR 12
LAT 5°32' S
LONG 87°53' W
WATER DEPTH 2100 FMS
SPECTRAL FILTER 473 nm
BUCKET TEMP 25.6° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

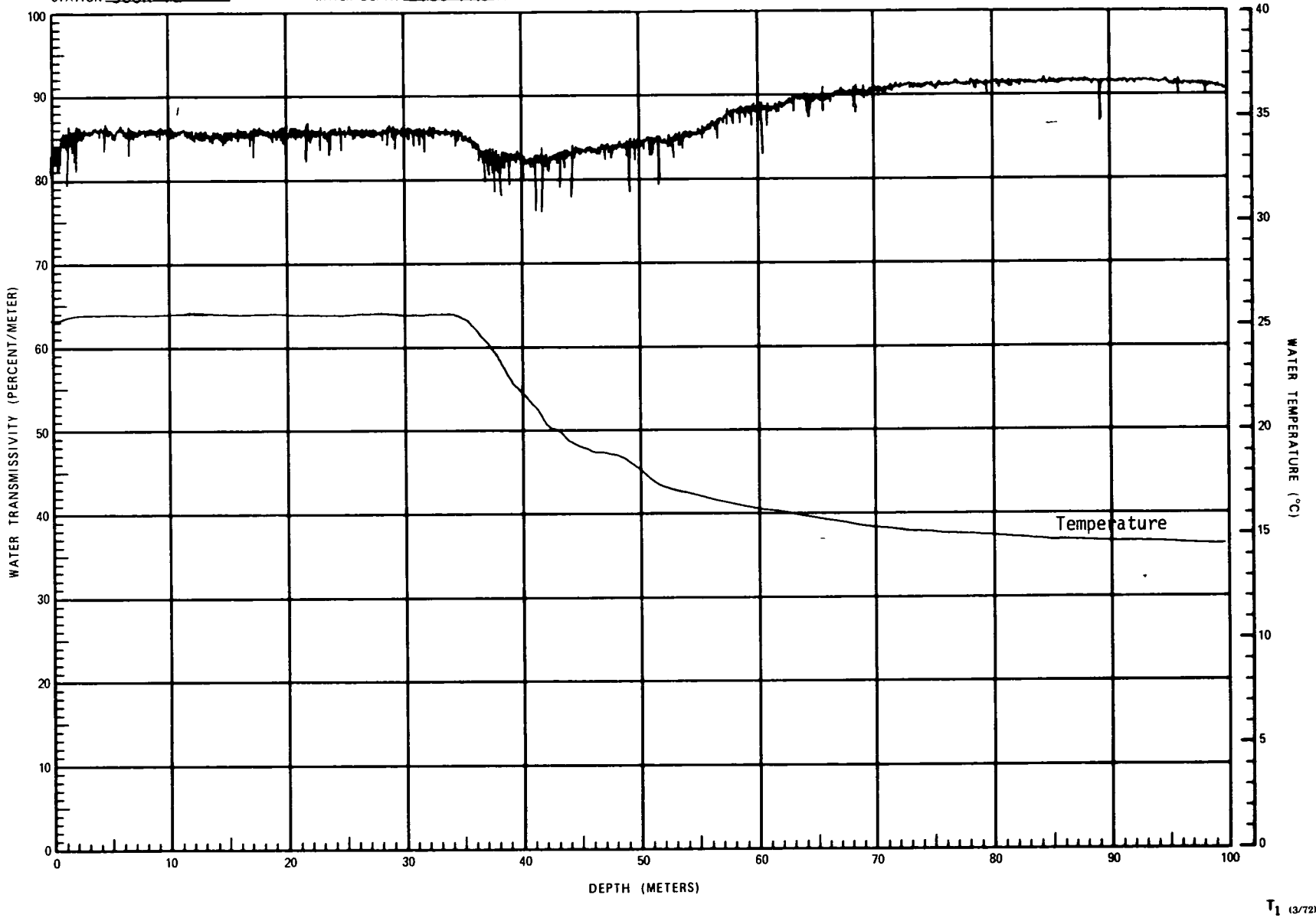
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 16 May 1970
TIME 1425 L.A.T.
STATION SCOR 12

LAT 5° 32' S
LONG 87° 53' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 25.6° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

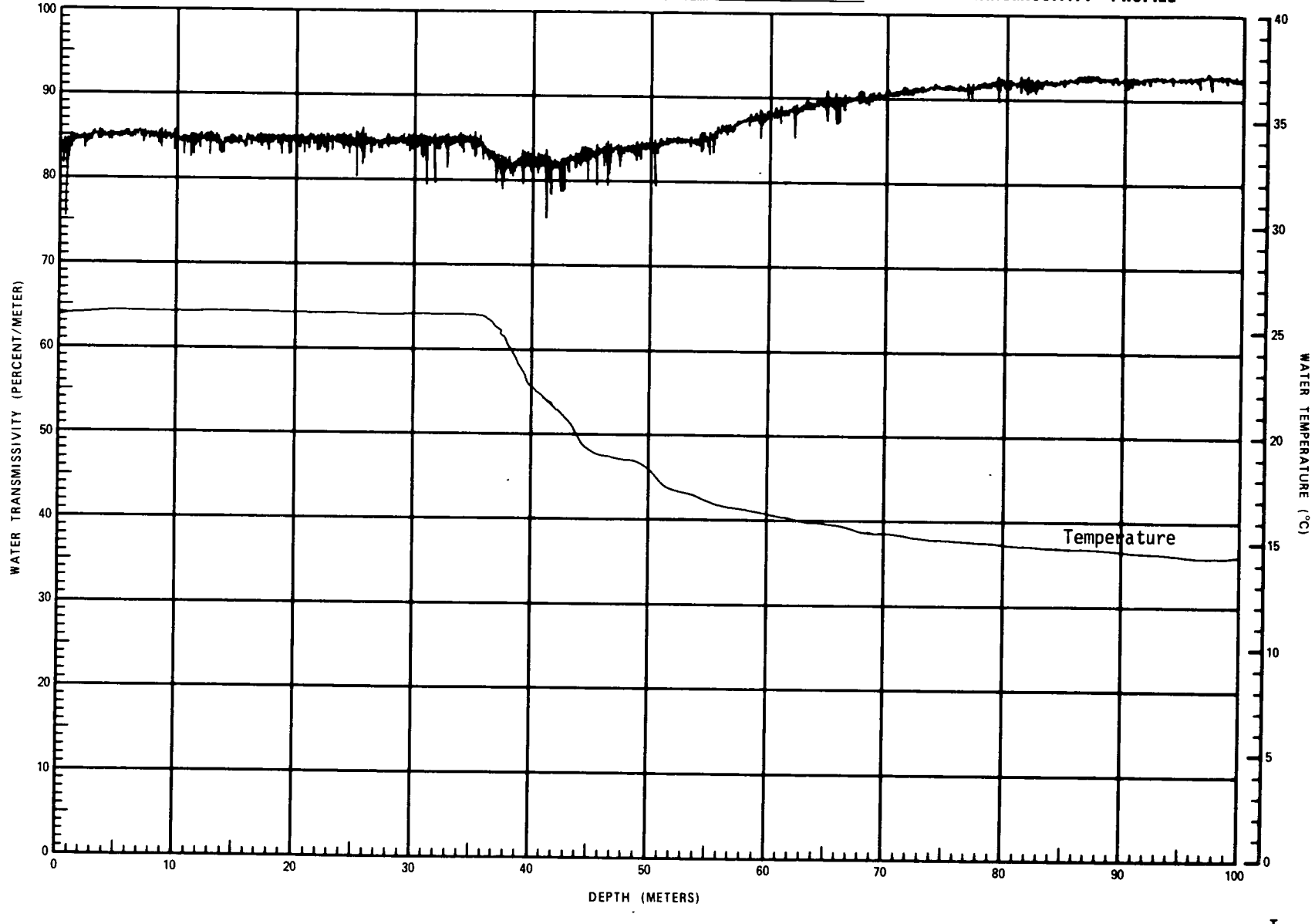
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 16 May 1970
TIME 1444-1448 L.A.T.
STATION SCOR 12

LAT 5°32' S
LONG 87°53' W
WATER DEPTH 2100 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 25.6° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

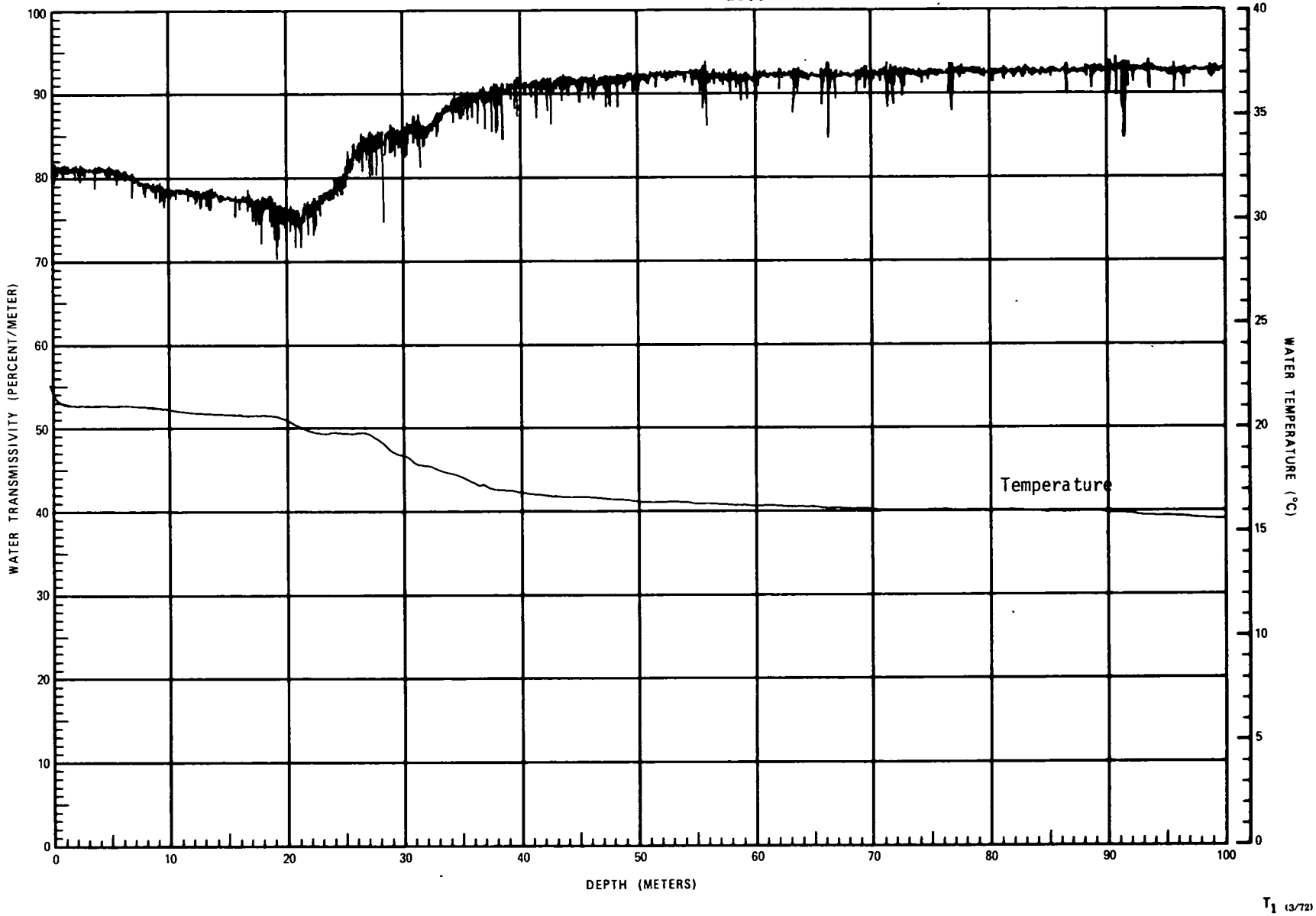
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 1030 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 20.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

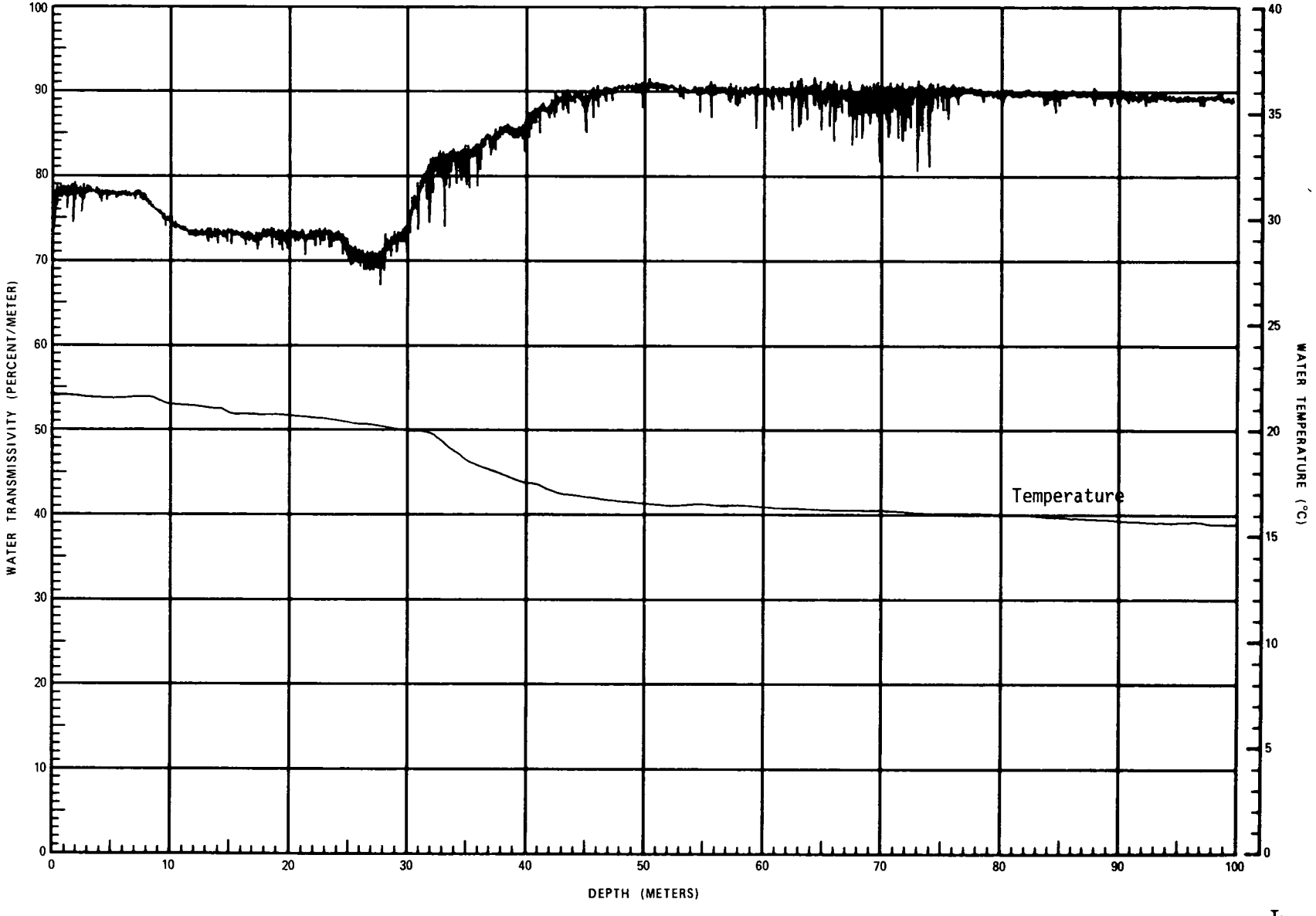
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 1418 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 21.0° C

TRANSMISSIVITY PROFILE



T1 (3/72)

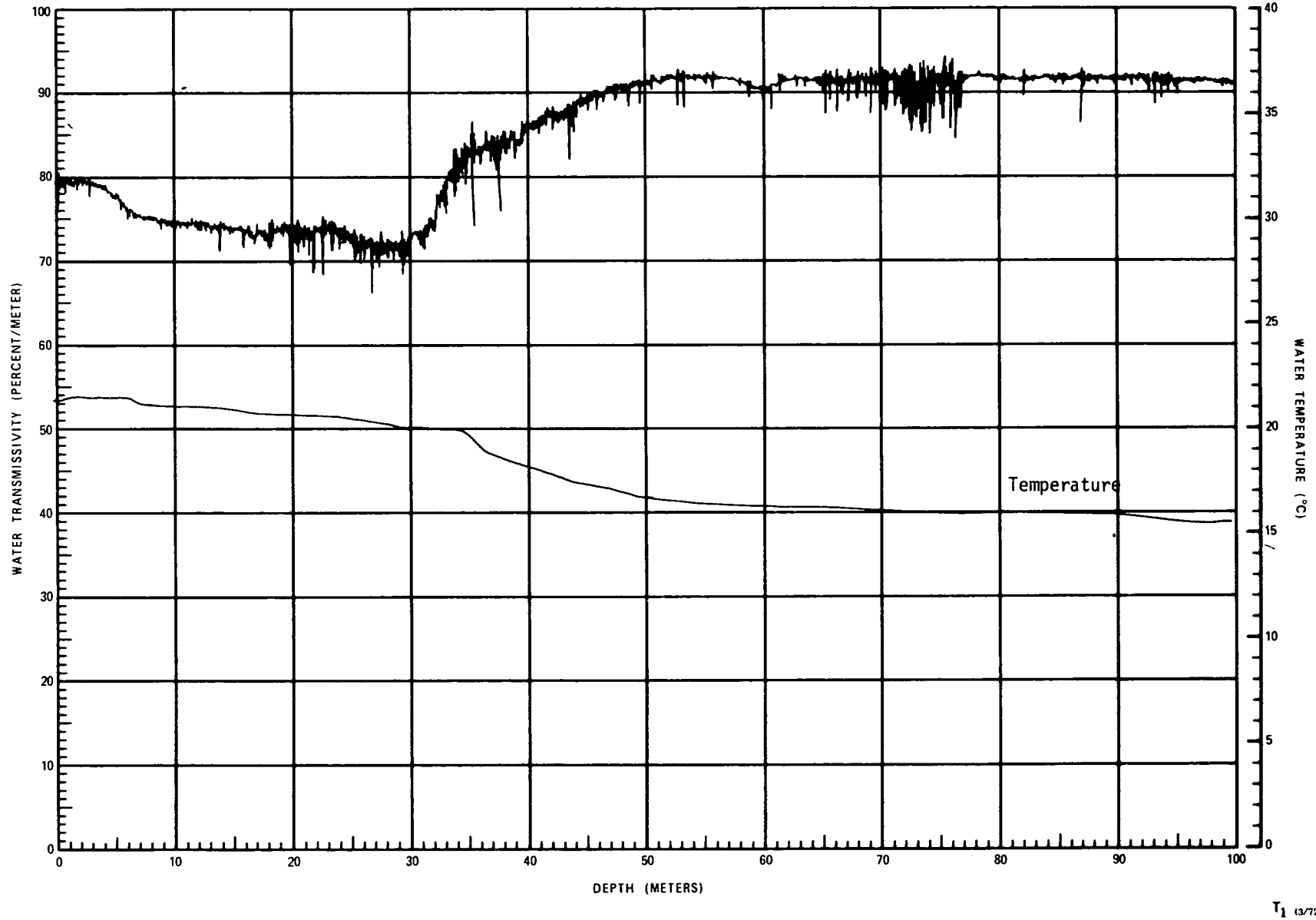
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 1444 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 21.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

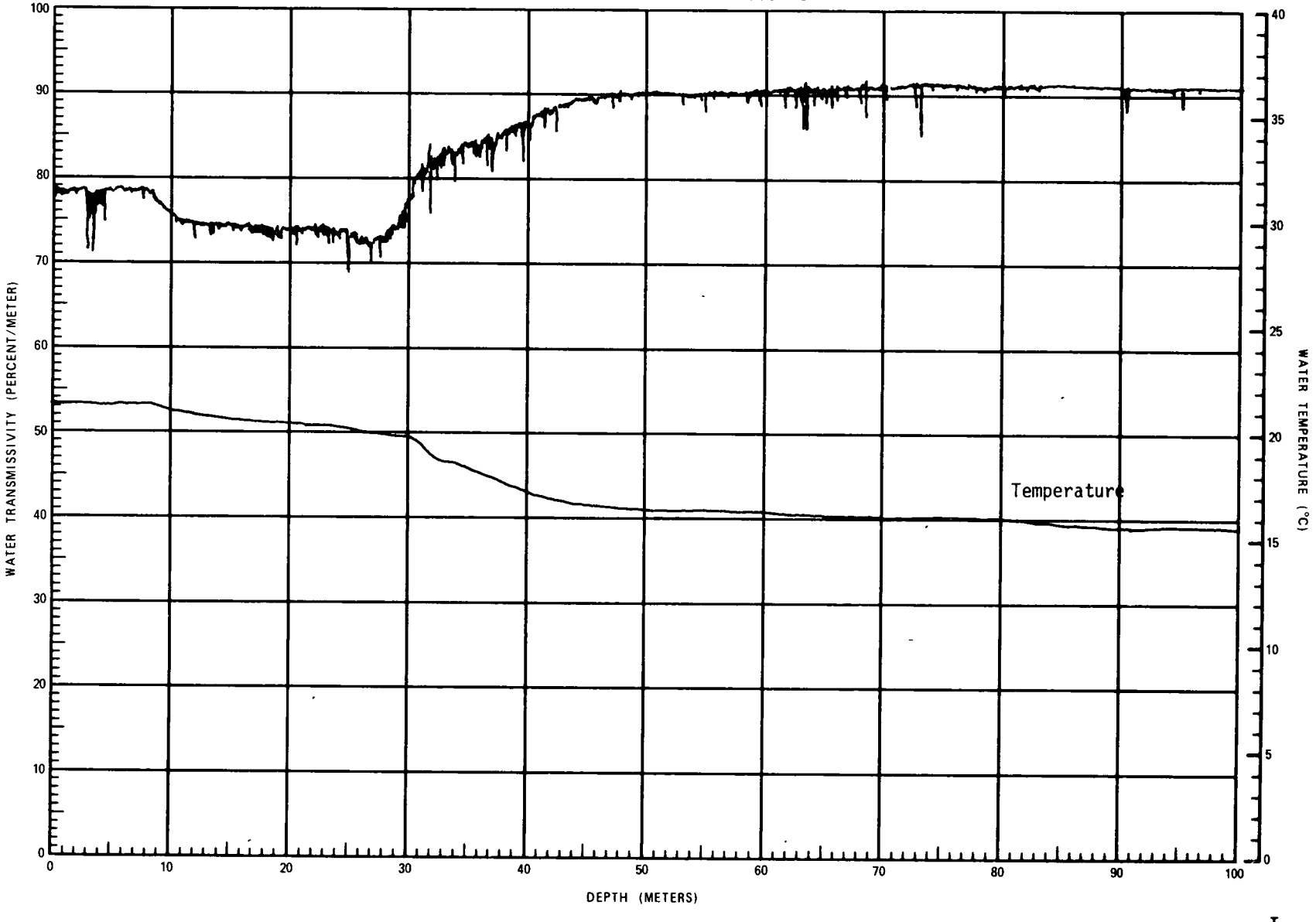
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970 LAT 3°4' S

TIME 14:57 L.A.T. LONG 85°25' W SPECTRAL FILTER $\bar{\lambda}$ = 535 nm

STATION SCOR 13 WATER DEPTH 1740 FMS BUCKET TEMP 21.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

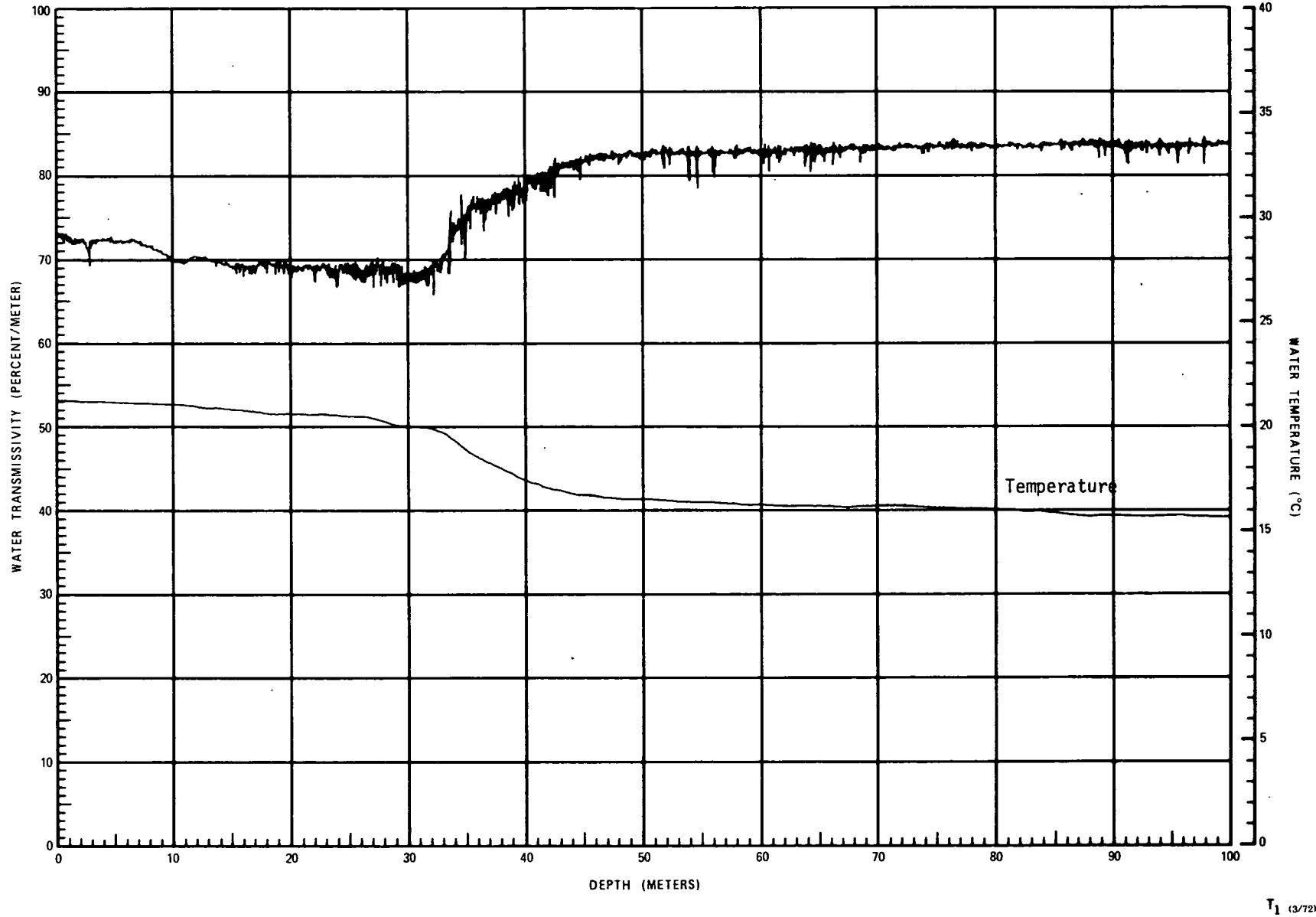
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 1515 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 21.0° C

TRANSMISSIVITY PROFILE



T1 (3/72)

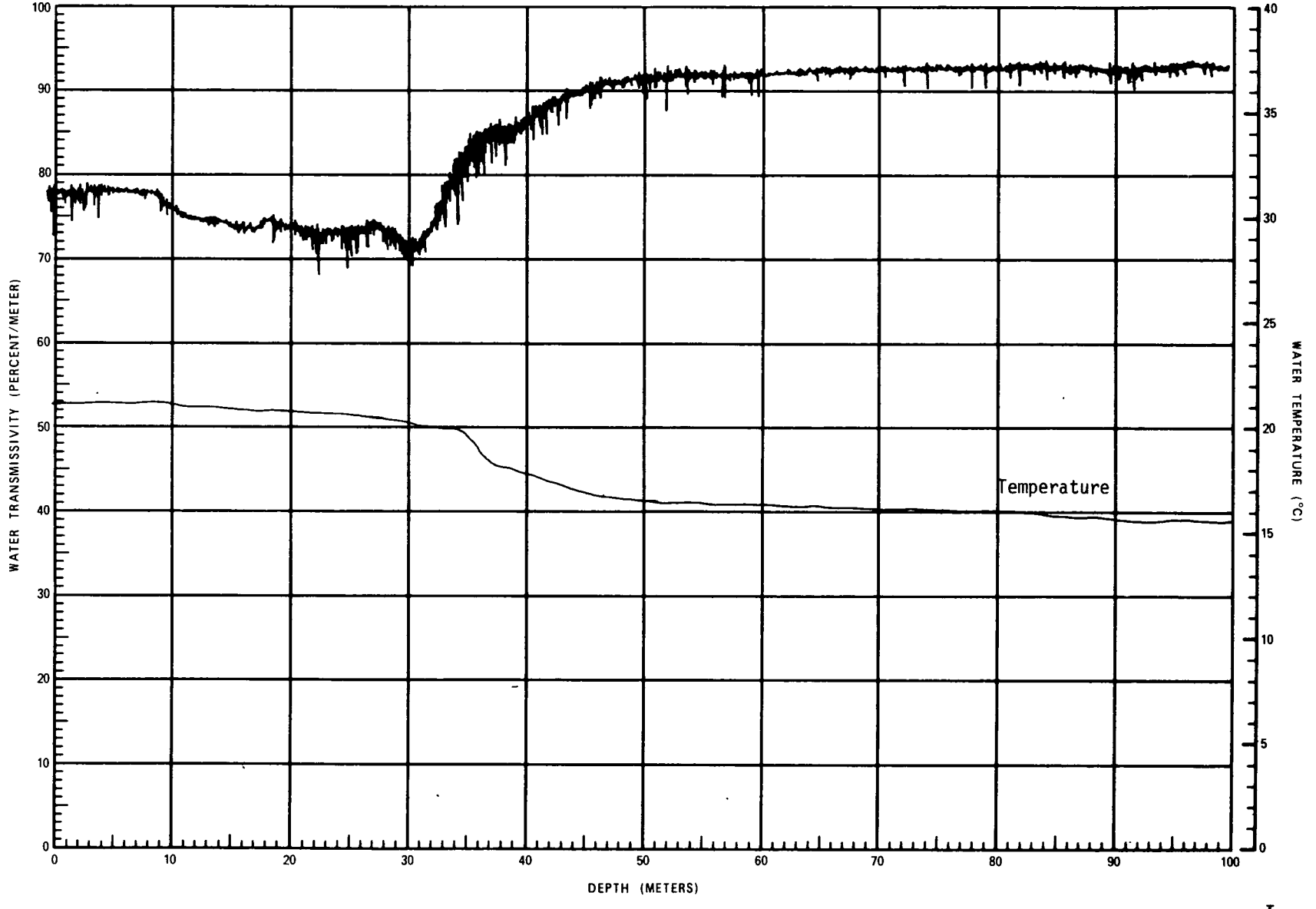
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 1625 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 21.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

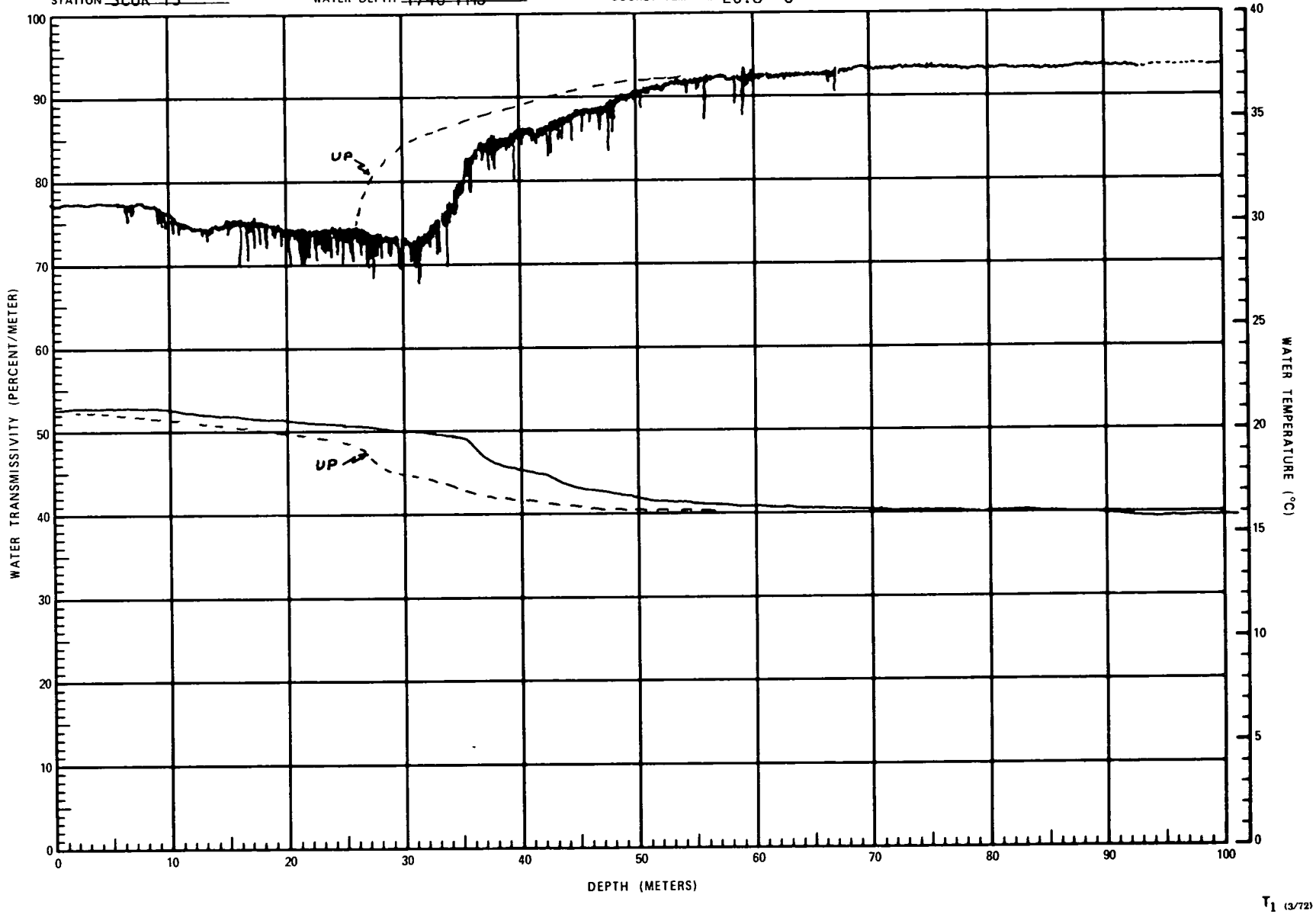
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 19:15 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 20.8° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

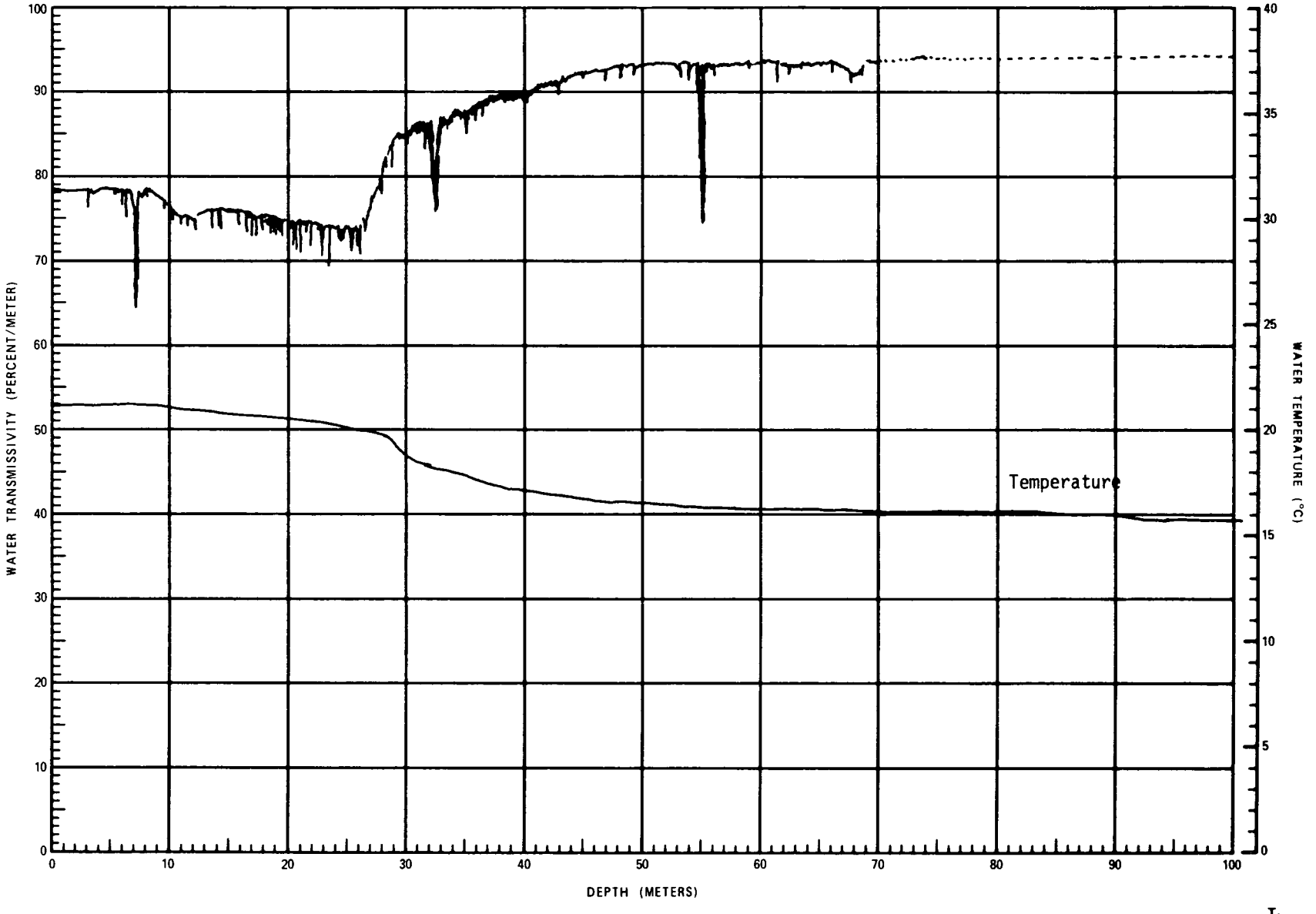
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 17 May 1970
TIME 19:20 L.A.T.
STATION SCOR 13

LAT 3°4' S
LONG 85°25' W
WATER DEPTH 1740 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 20.8° C

TRANSMISSIVITY PROFILE



T1 (3/72)

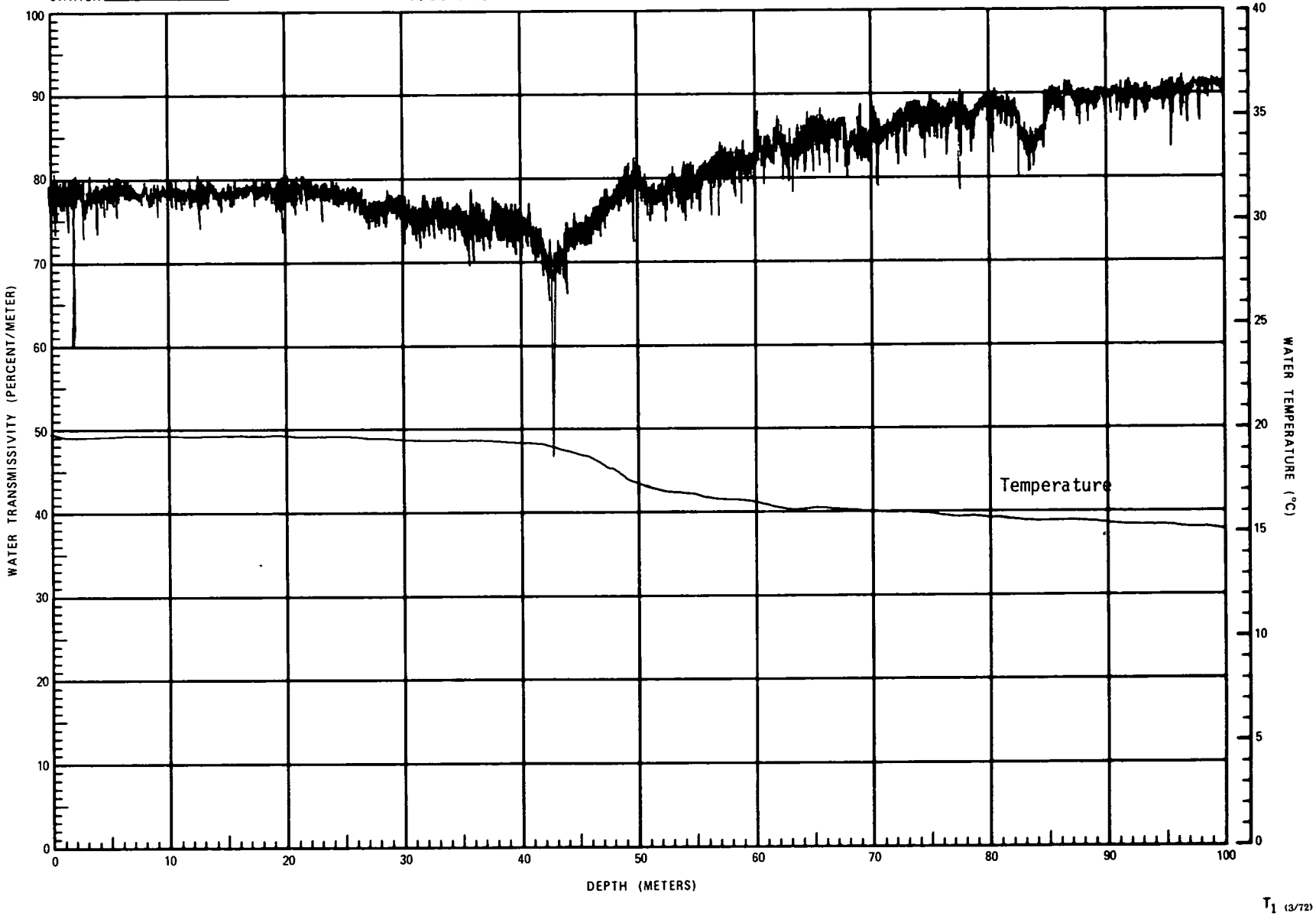
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 18 May 1970 LAT 2°57' S

TIME 1010 L.A.T. LONG 84°55' W SPECTRAL FILTER $\bar{\lambda}$ = 491 nm

STATION SCOR 14 WATER DEPTH 1730 FMS BUCKET TEMP 19.9° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

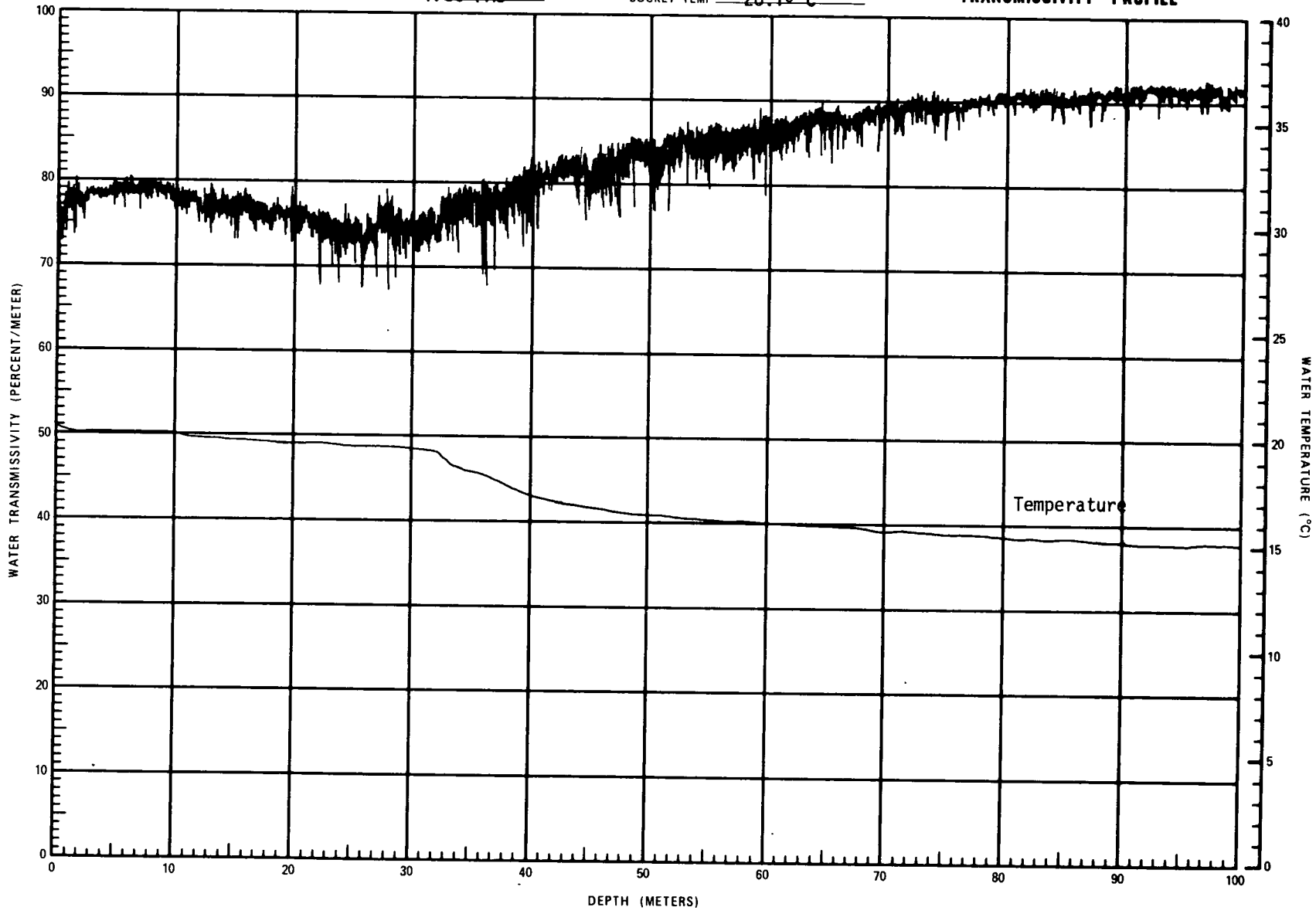
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 18 May 1970
TIME 1320 L.A.T.
STATION SCOR 14

LAT 2°51' S
LONG 84°55' W
WATER DEPTH 1730 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 20.10 C

TRANSMISSIVITY PROFILE



T1 (3/72)

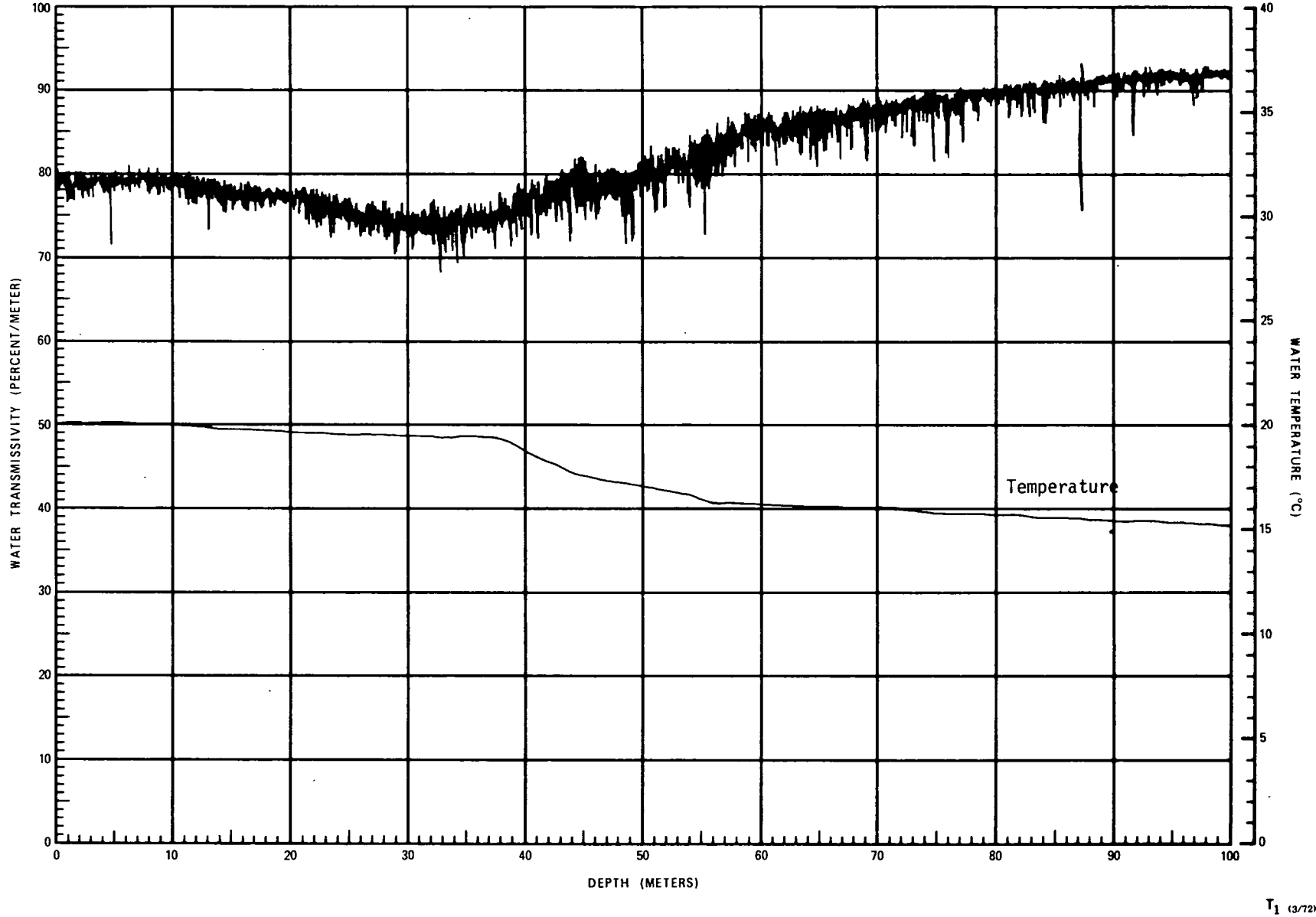
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 18 May 1970
TIME 1607 L.A.T.
STATION SCOR 14

LAT 2°57' S
LONG 84°55' W
WATER DEPTH 1730 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 20.0° C

TRANSMISSIVITY PROFILE



T1 (3/72)

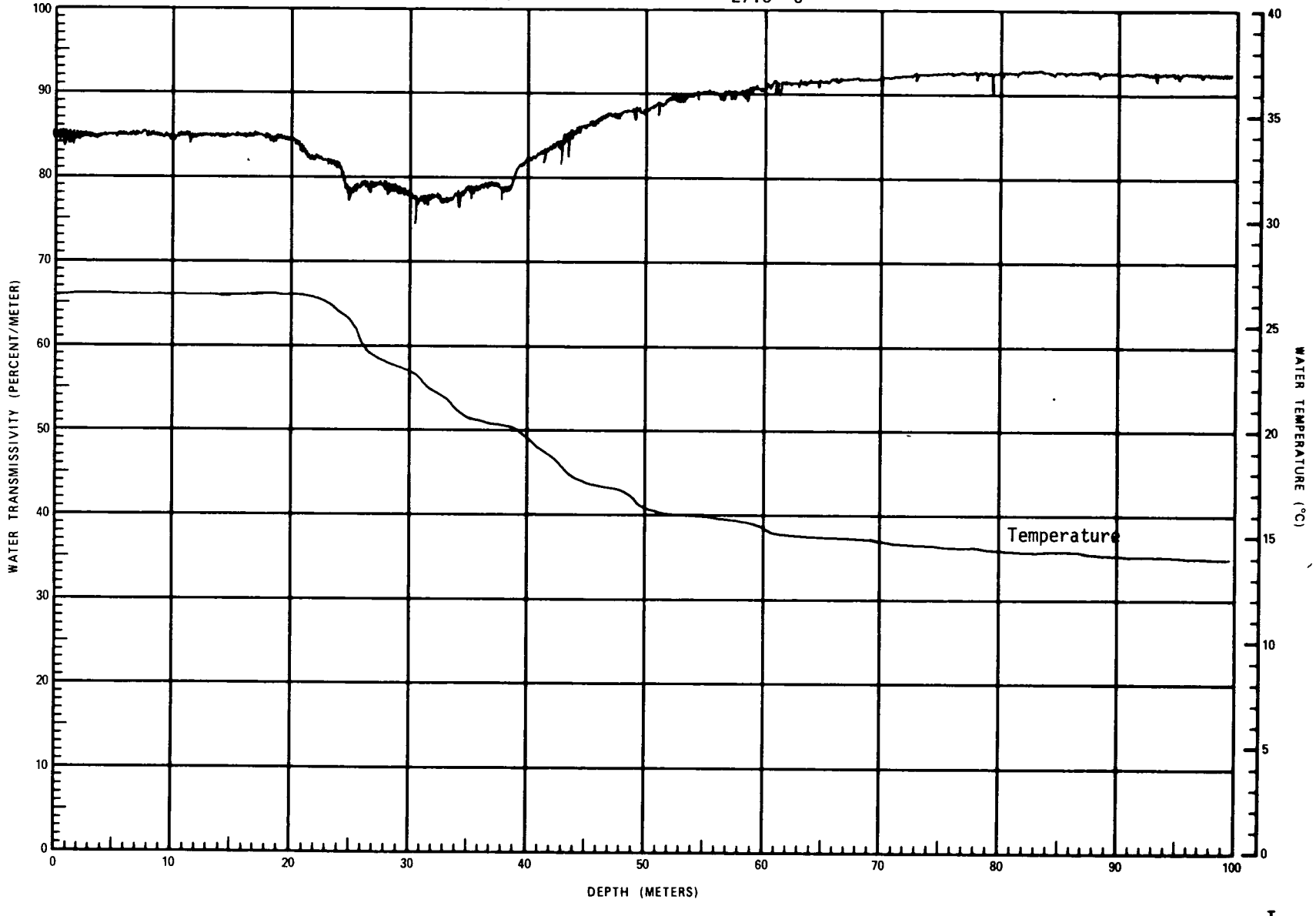
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 20 May 1972
TIME 1015 L.A.T.
STATION SCOR 15

LAT 4°33' N
LONG 82°56' W
WATER DEPTH 1650 FMS

SPECTRAL FILTER λ= 491 nm
BUCKET TEMP 27.3° C

TRANSMISSIVITY PROFILE



T1 (3/72)

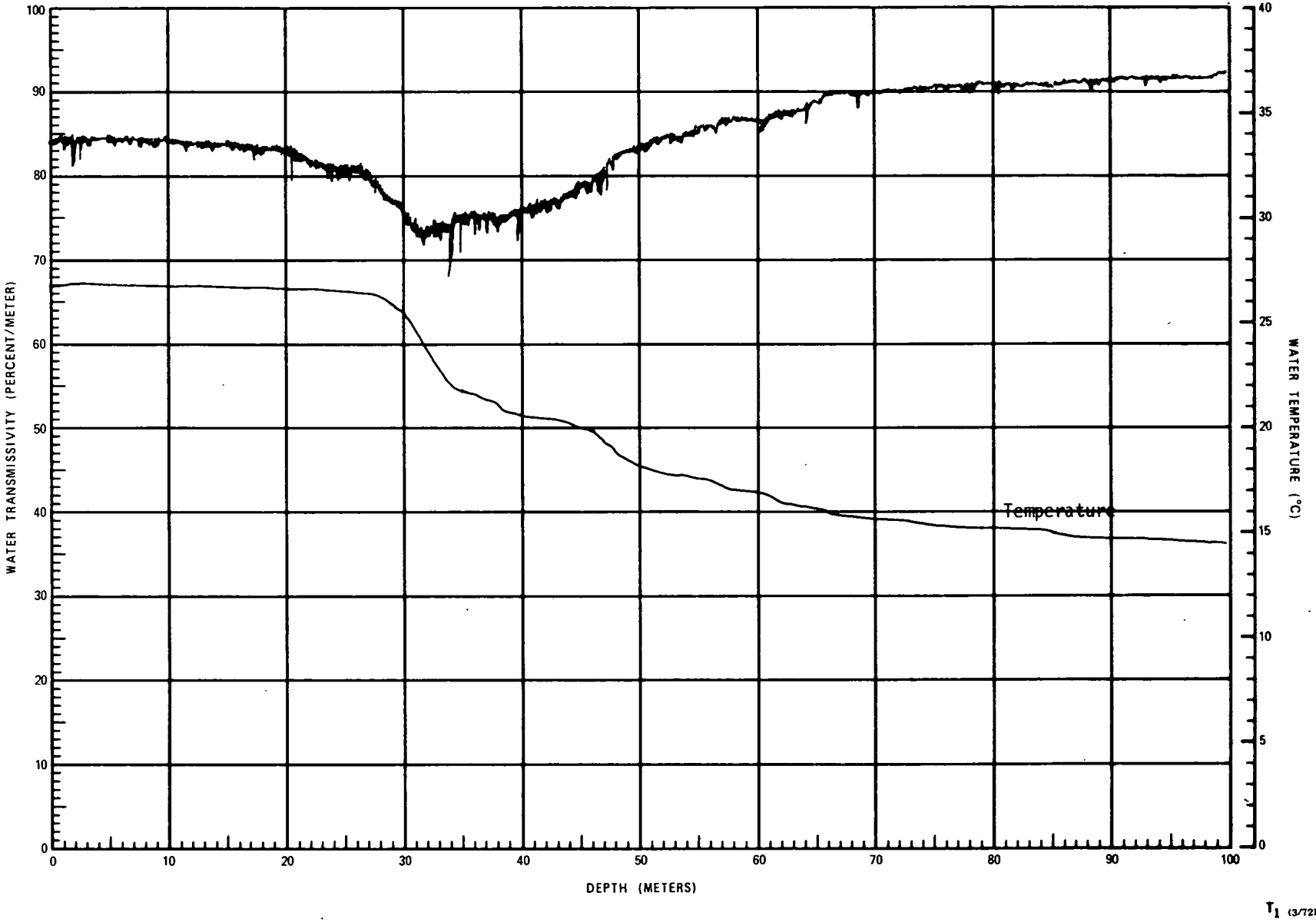
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 20 May 1970
TIME 1400 L.A.T.
STATION SCOR 15

LAT 4°33' N
LONG 82°56' W
WATER DEPTH 1650 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 27.3° C

TRANSMISSIVITY PROFILE



T1 (3/72)

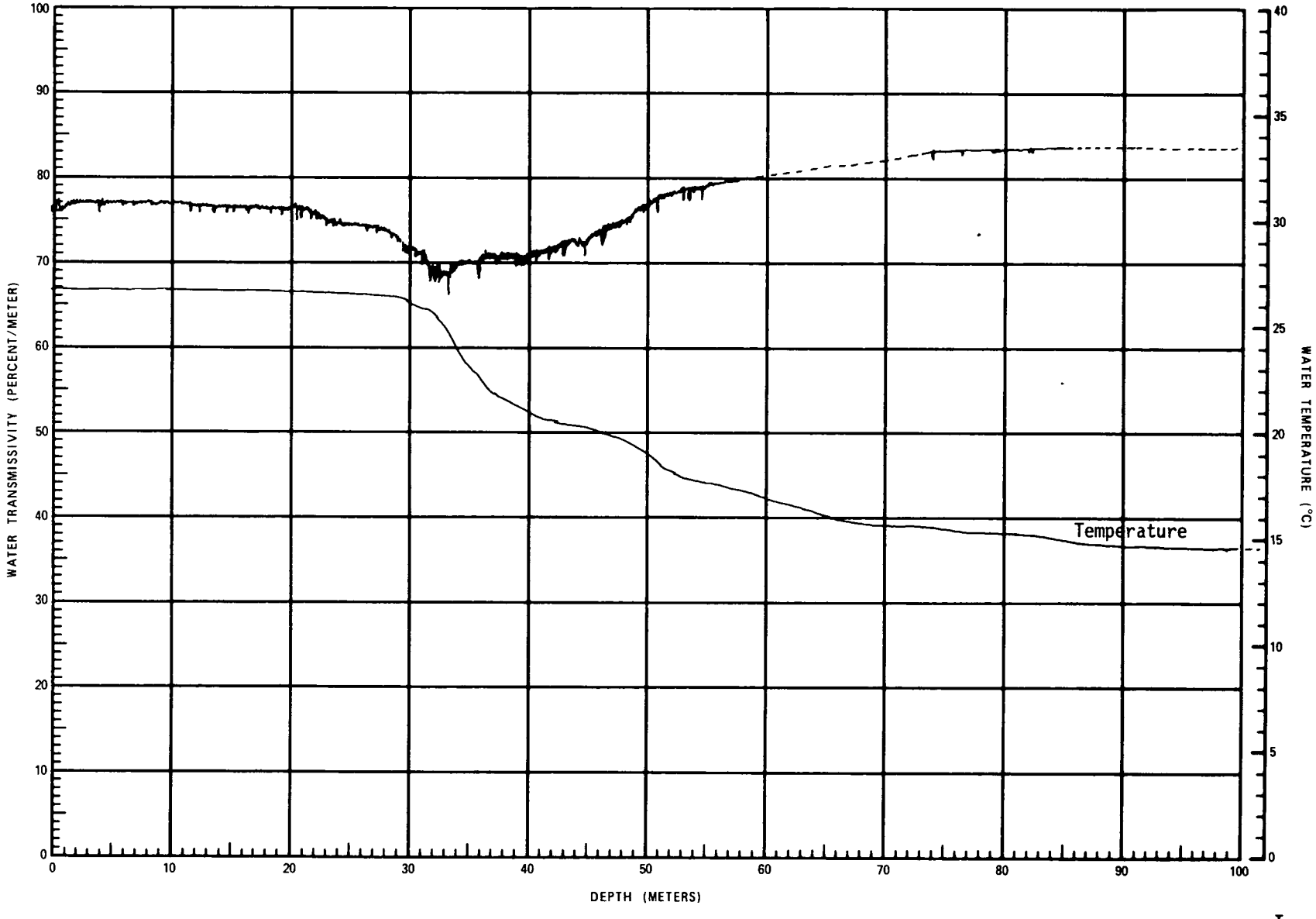
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 20 May 1970
TIME 1420 L.A.T.
STATION SCOR 15

LAT 4°33' N
LONG 82°56' W
WATER DEPTH 1650 FMS

SPECTRAL FILTER λ = 581 nm
BUCKET TEMP 27.3° C

TRANSMISSIVITY PROFILE



T1 (3/72)

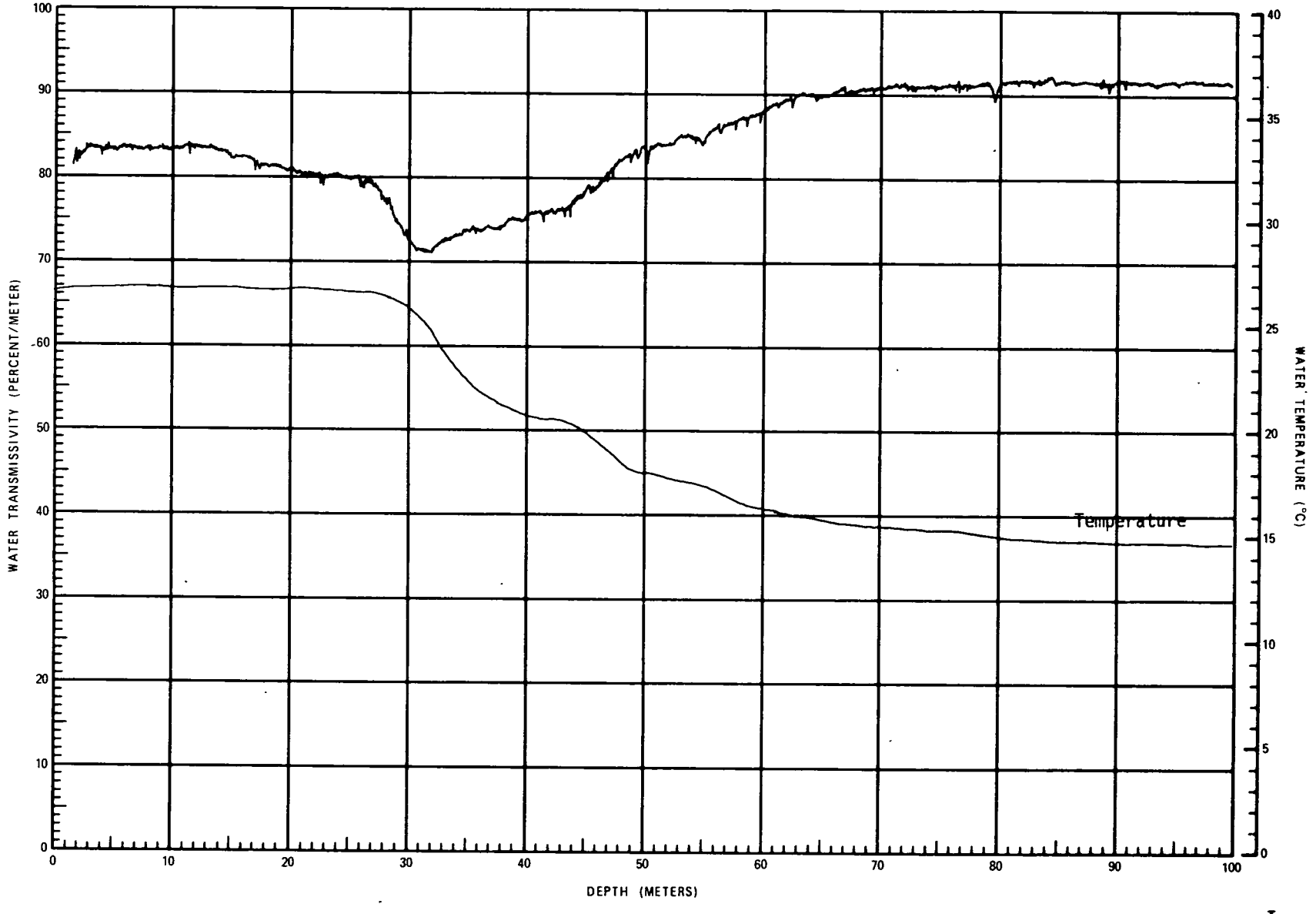
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 20 May 1970
TIME 1435 L.A.T.
STATION SCOR 15

LAT 4°33' N
LONG 82°56' W
WATER DEPTH 1650 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 27.3° C

TRANSMISSIVITY PROFILE



T1 (3/72)

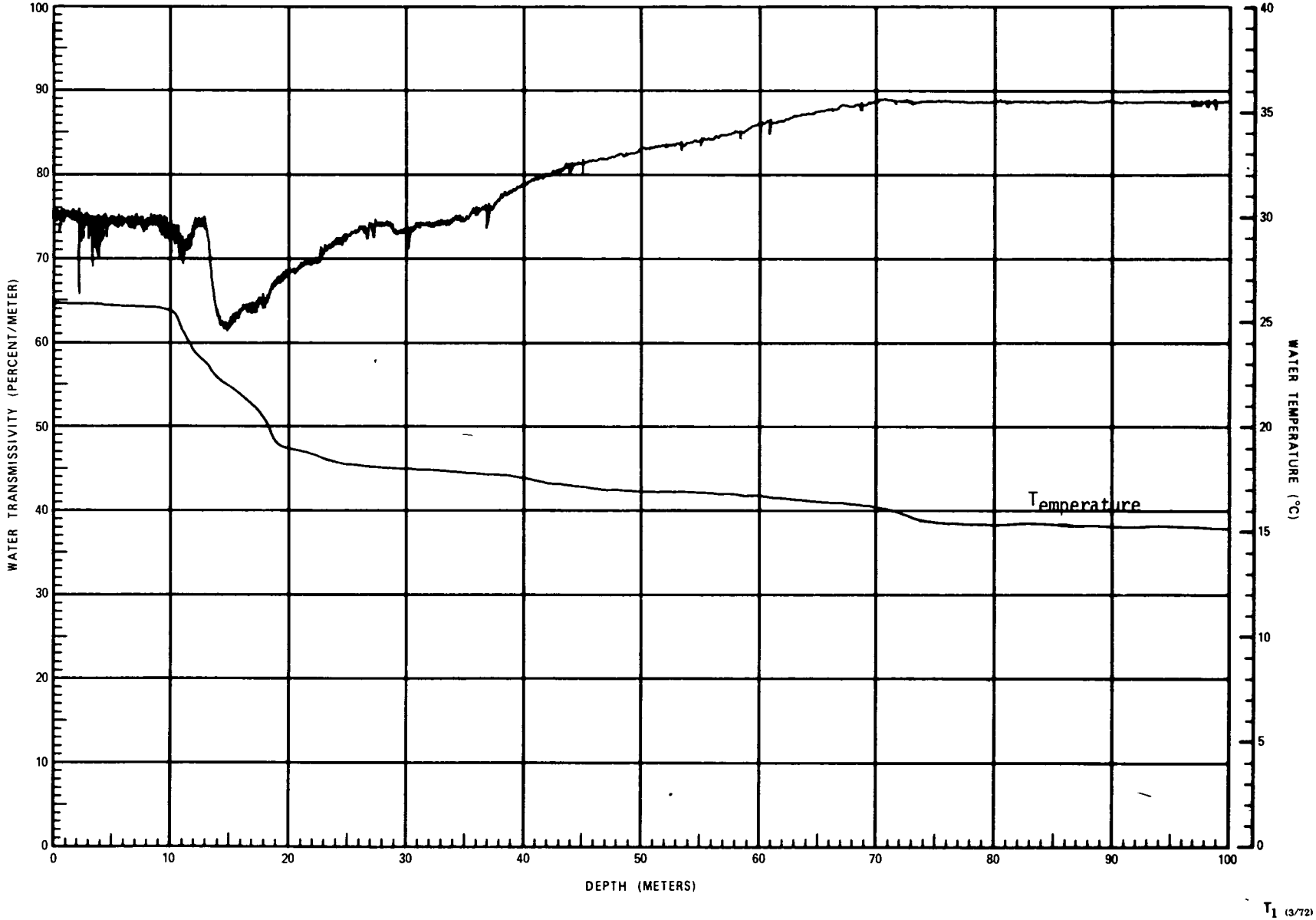
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 21 May 1970
TIME 1025 L.A.T.
STATION SCOR 16

LAT 6°27' N
LONG 79°57' W
WATER DEPTH 2000 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 26.0° C

TRANSMISSIVITY PROFILE



T1 (3/72)

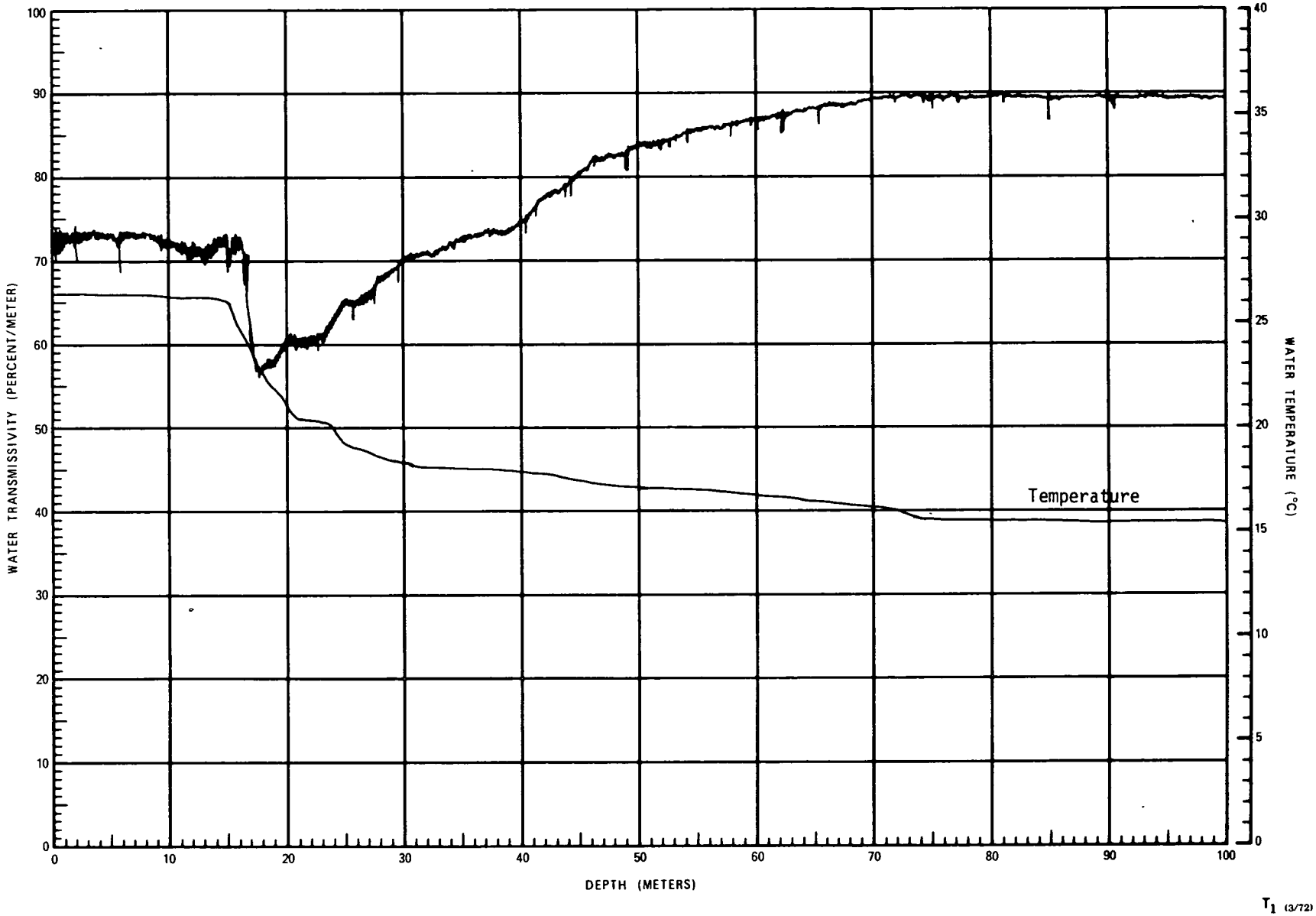
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 21 May 1970
TIME 1430 L.A.T.
STATION SCOR 16

LAT $6^{o}27'$ N
LONG $79^{o}57'$ W
WATER DEPTH 2000 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 26.4^{o} C

TRANSMISSIVITY PROFILE



T_1 (3/72)

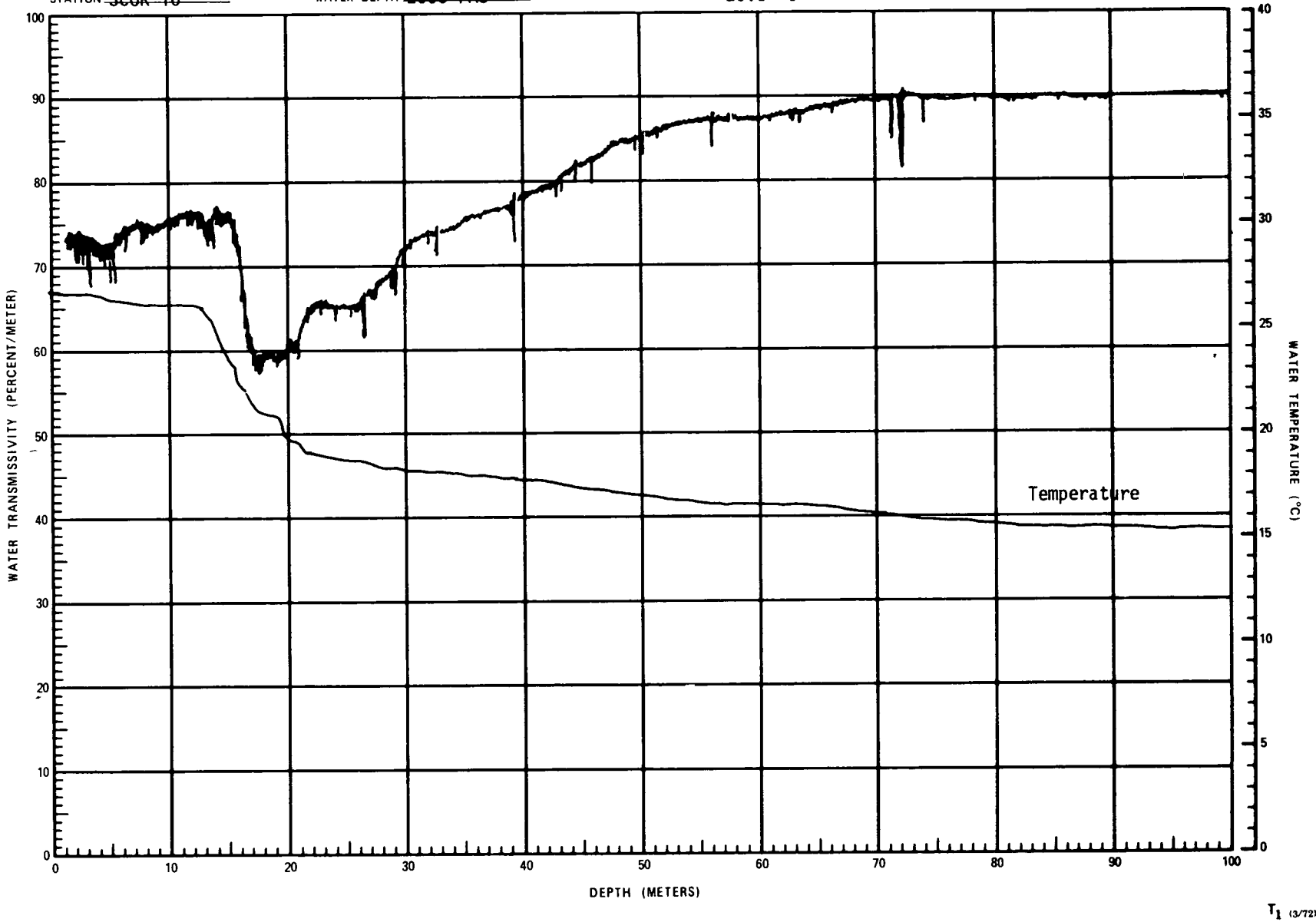
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 21 May 1970
TIME 18:50 L.A.T.
STATION SCOR 16

LAT 6°27' N
LONG 79°57' W
WATER DEPTH 2000 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 26.8° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

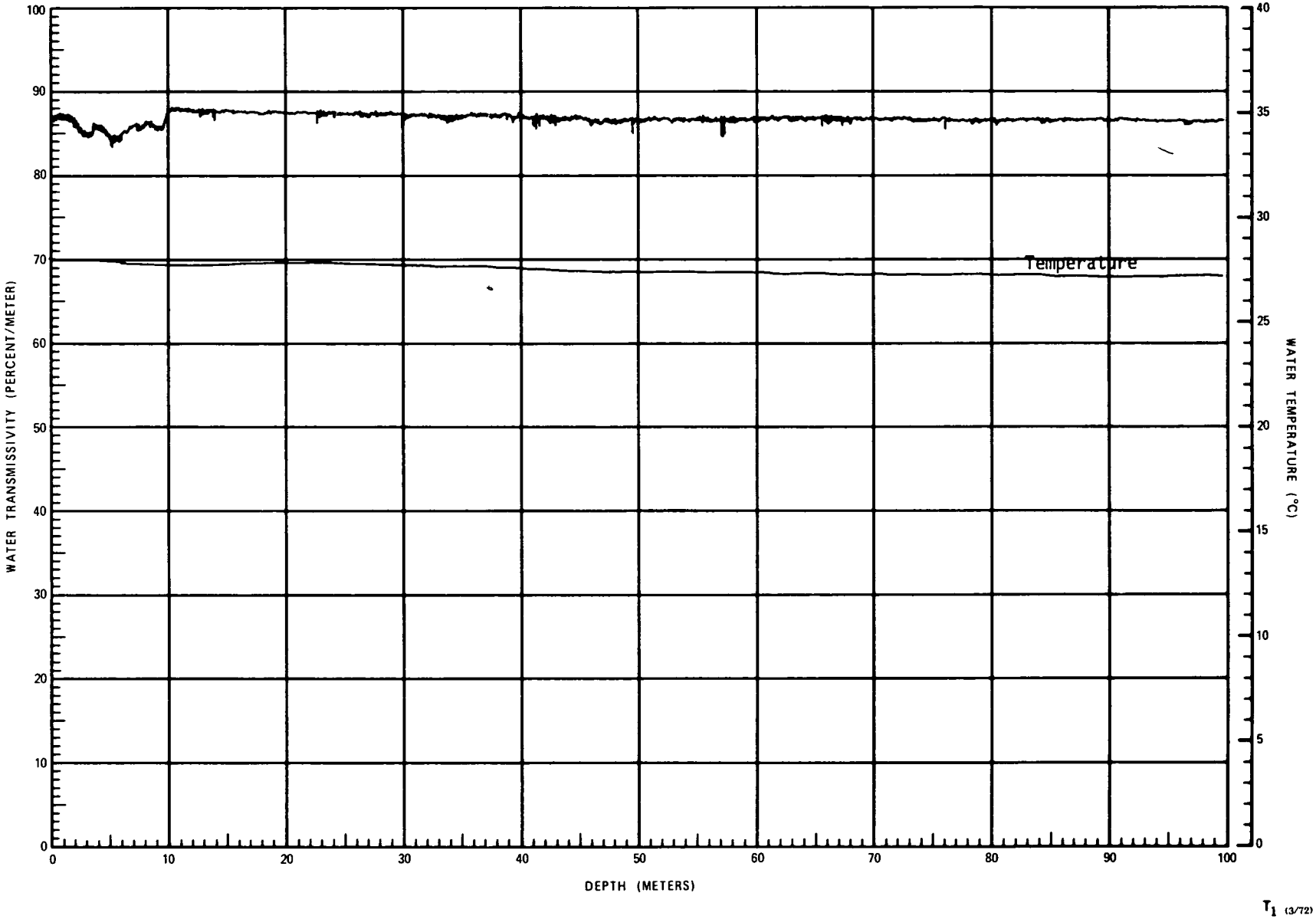
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1020 L.A.T.
STATION SCOR 17

LAT 16°52' N
LONG 76°4' W
WATER DEPTH 980 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 28.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

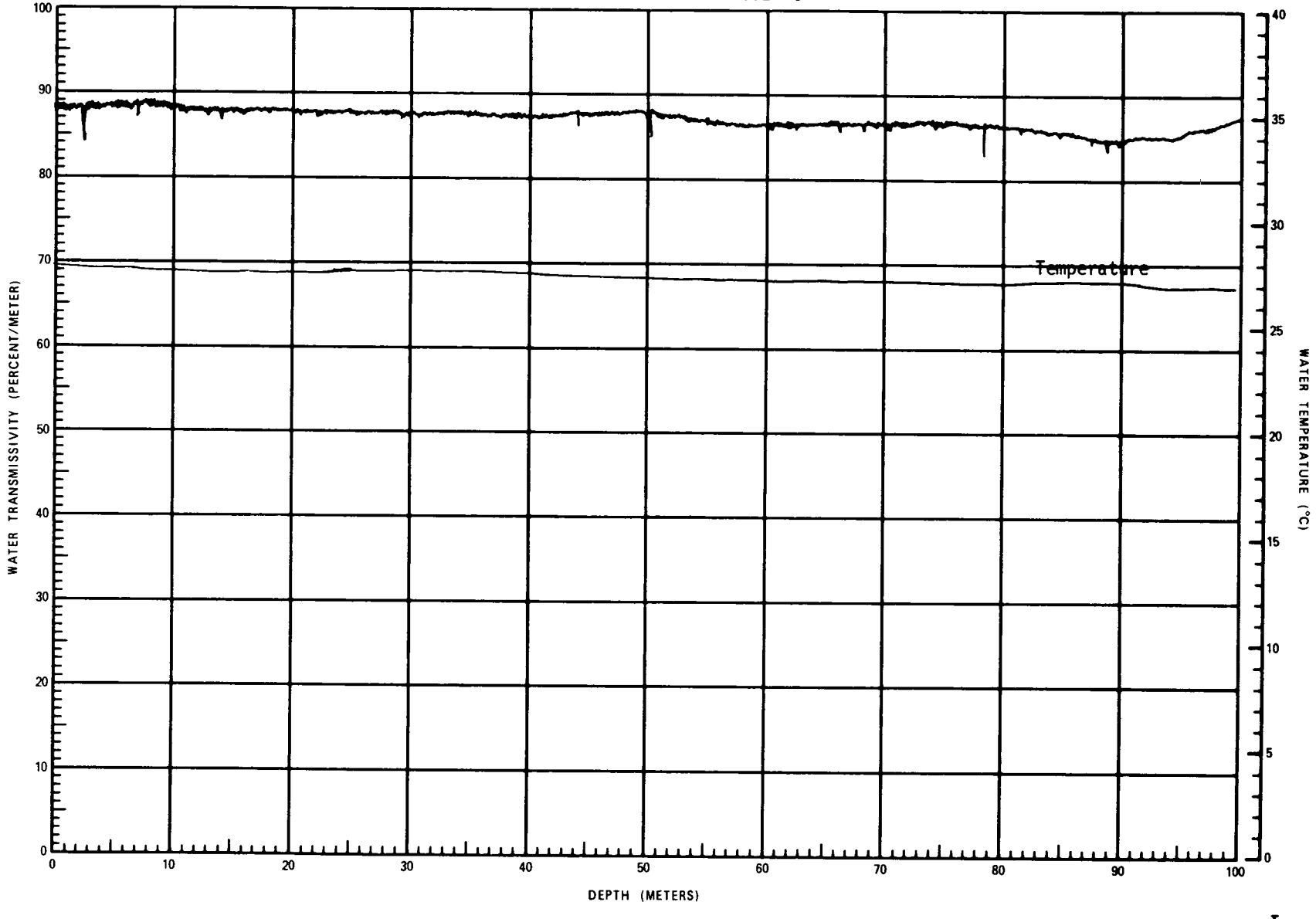
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1420 L.A.T.
STATION SCOR 17

LAT 16°52' N
LONG 76°4' W
WATER DEPTH 980 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 28.2° C

TRANSMISSIVITY PROFILE



T1 (3/72)

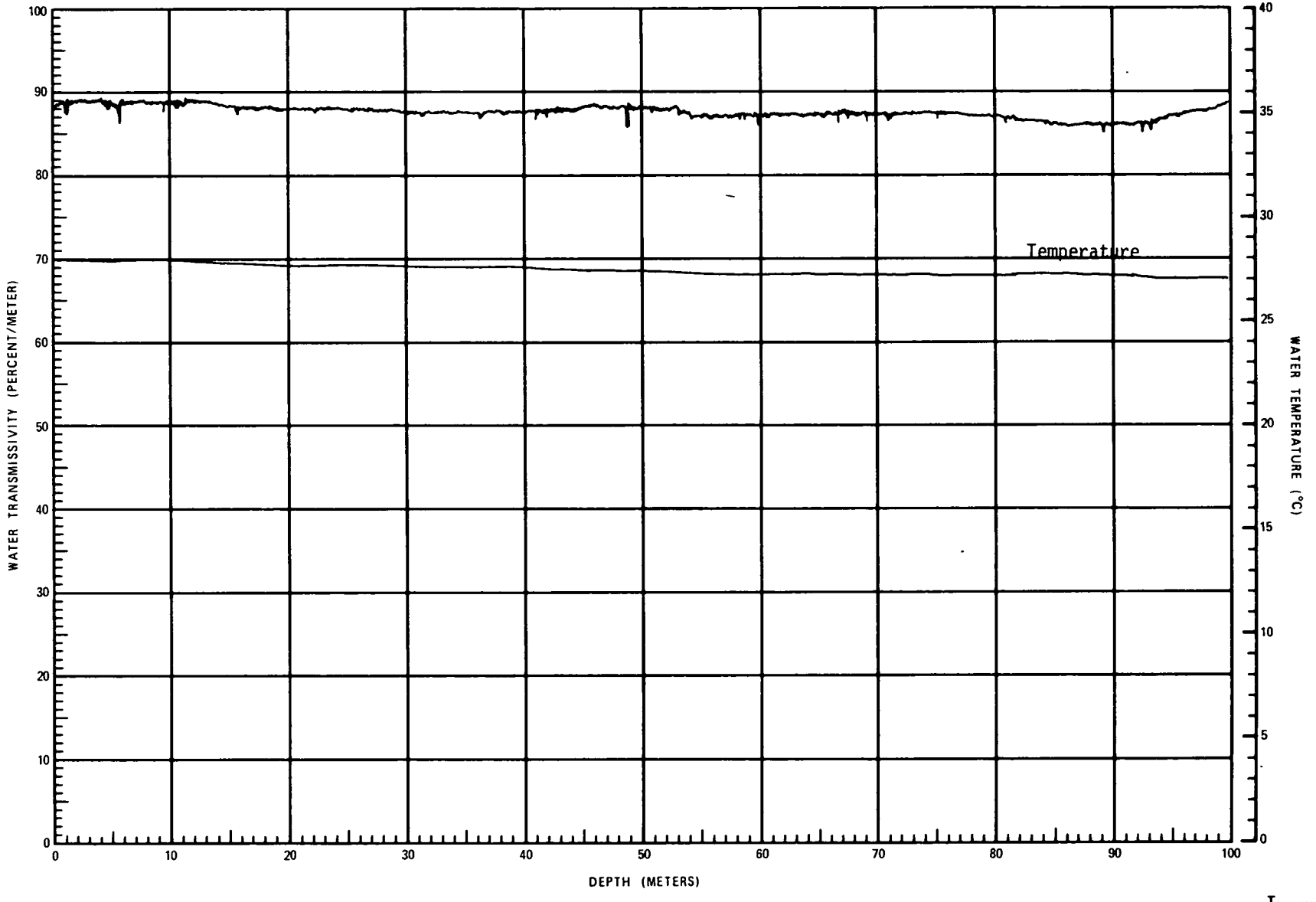
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1445 L.A.T.
STATION SCOR 17

LAT $16^{o}52'$ N
LONG $76^{o}4'$ W
WATER DEPTH 980 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 28.2^{o} C

TRANSMISSIVITY PROFILE



T_1 (3/72)

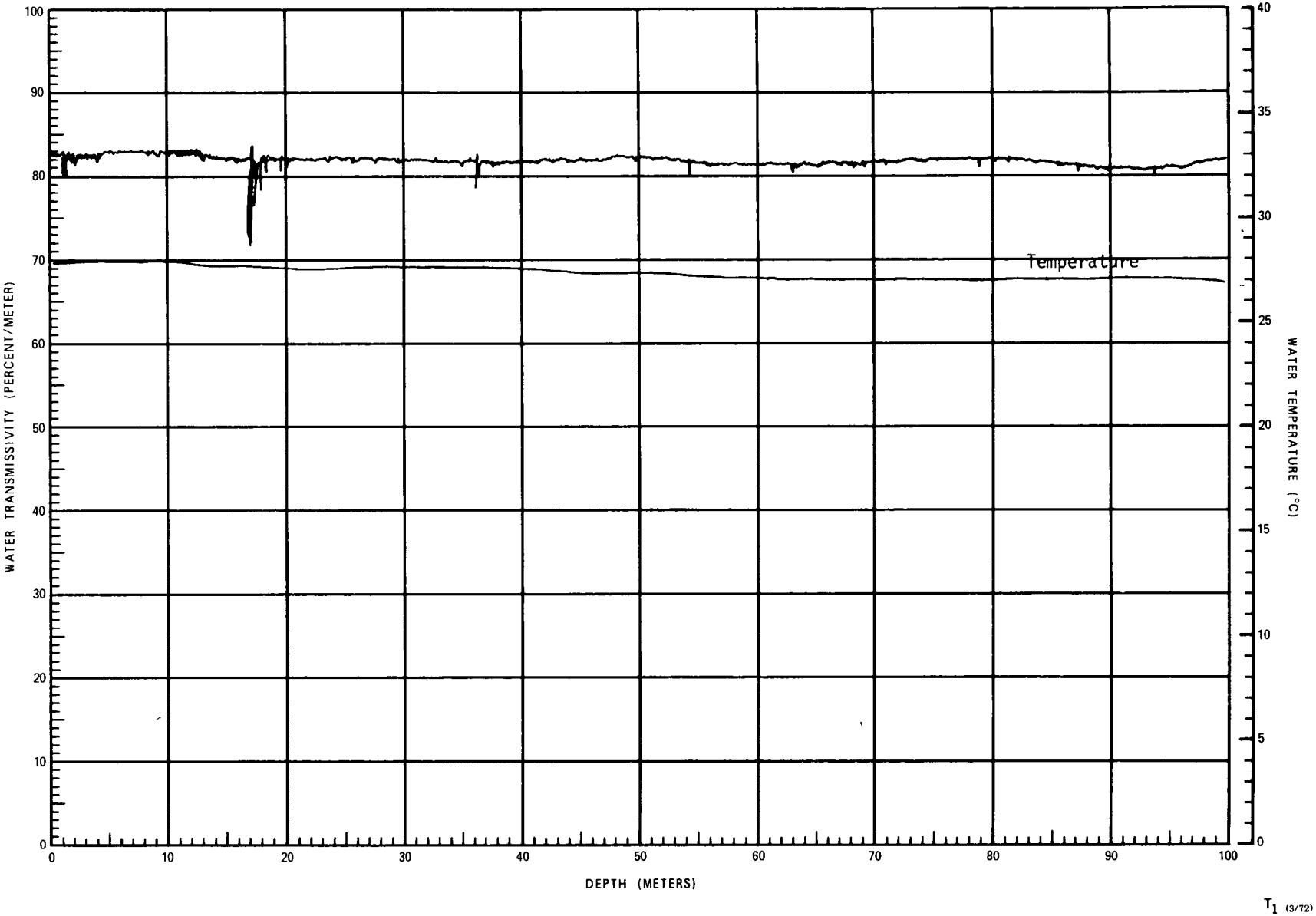
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1500 L.A.T.
STATION SCOR 17

LAT $16^{o}52'$ N
LONG $76^{o}4'$ W
WATER DEPTH 980 FMS

SPECTRAL FILTER λ = 581 nm
BUCKET TEMP 28.2^{o} C

TRANSMISSIVITY PROFILE



T_1 (3/72)

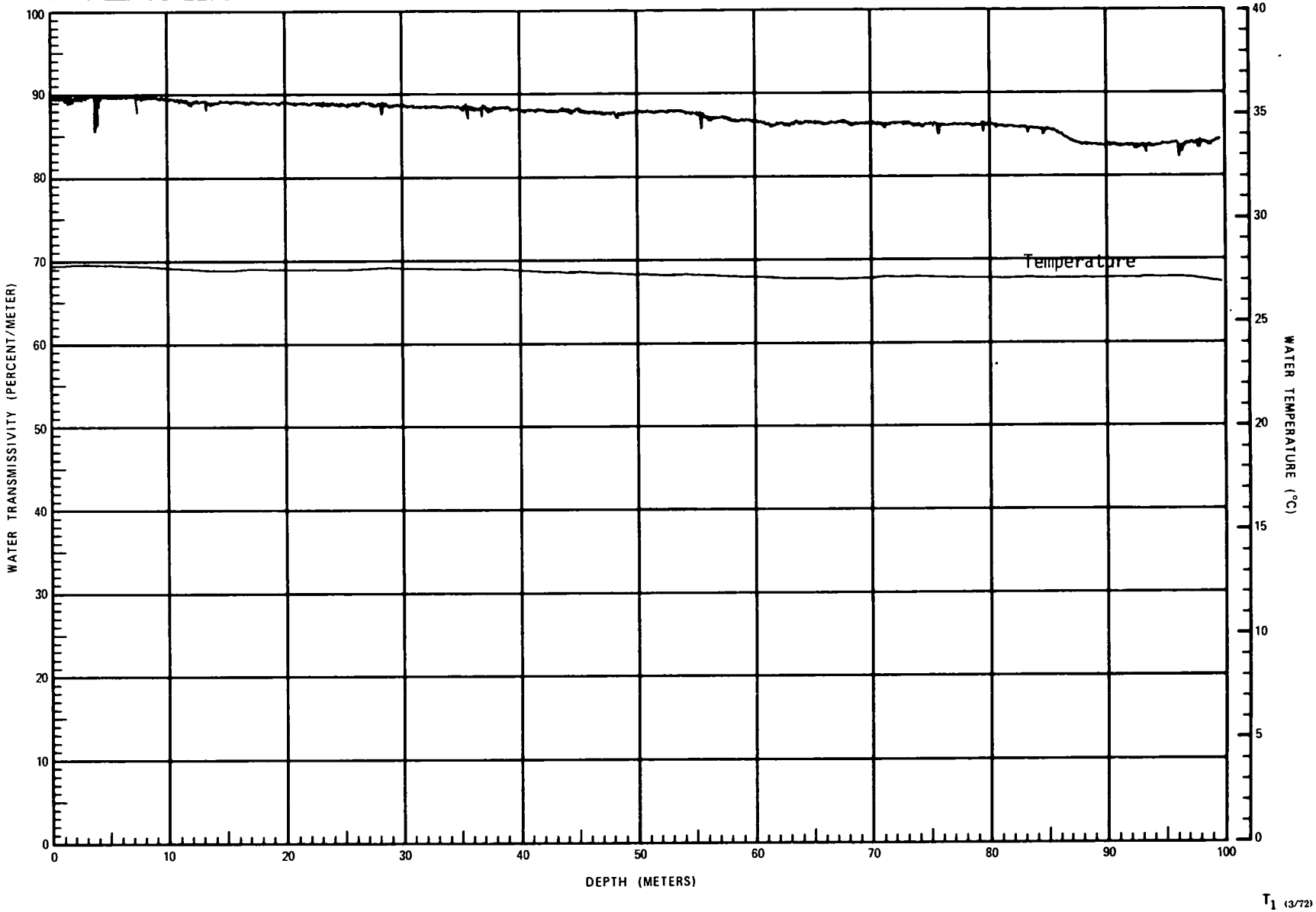
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1515 L.A.T.
STATION SCOR 17

LAT 16°52' N
LONG 76°4' W
WATER DEPTH 980 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 28.2° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

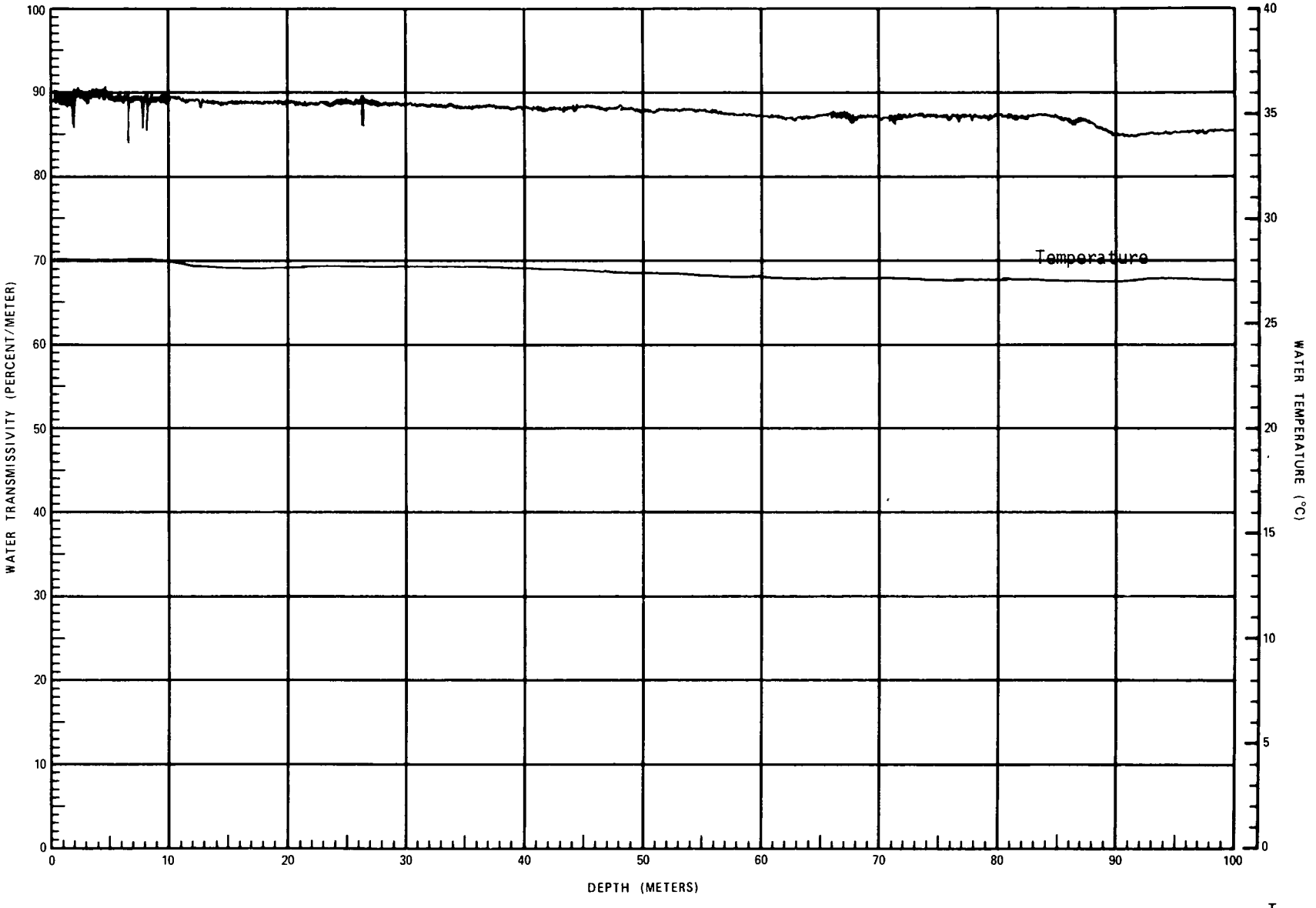
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1530 L.A.T.
STATION SCOR 17

LAT $16^{o}52'$ N
LONG $76^{o}4'$ W
WATER DEPTH 980 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 28.2^{o} C

TRANSMISSIVITY PROFILE



T_1 (3/72)

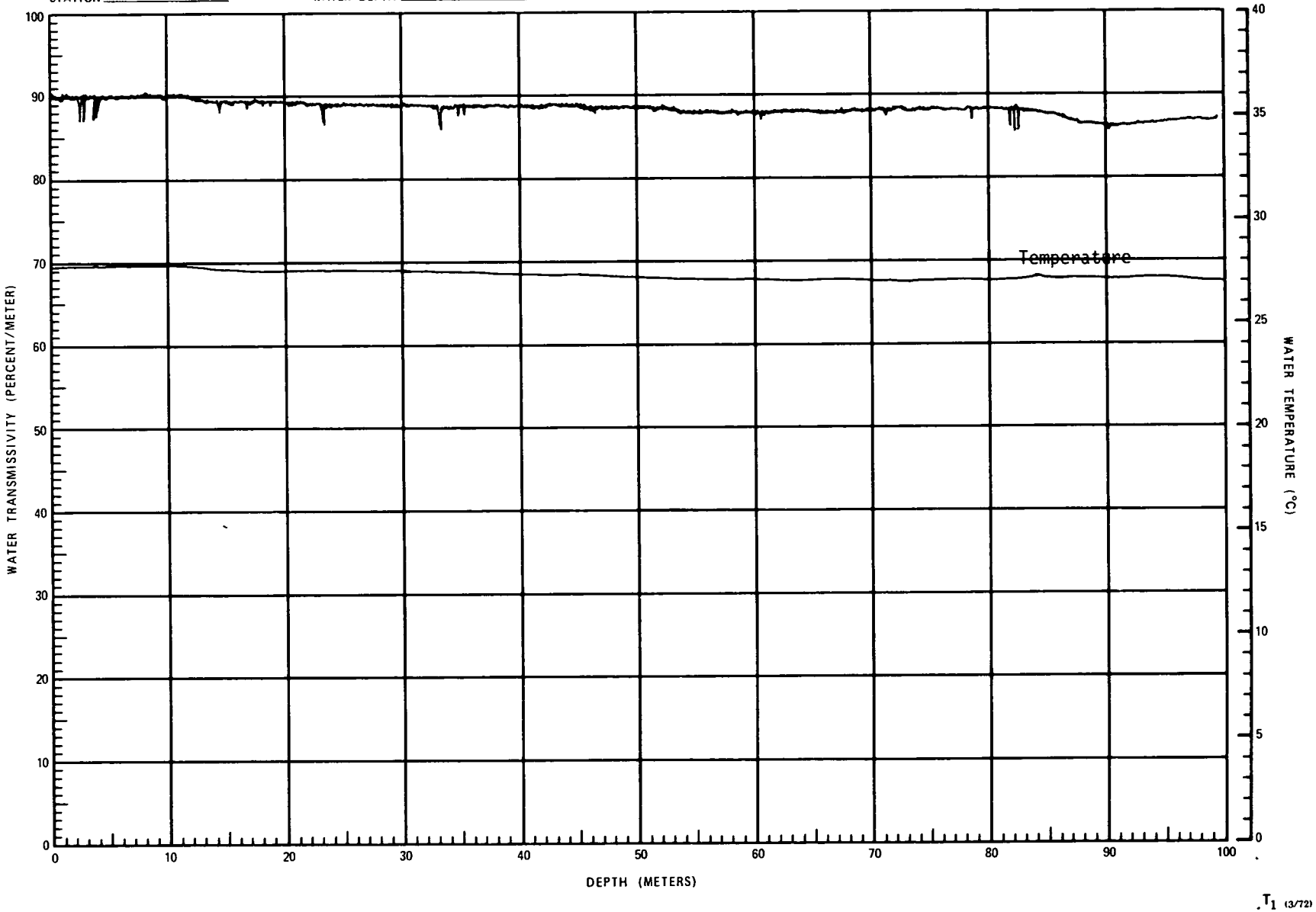
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 28 May 1970
TIME 1545 L.A.T.
STATION SCOR 17

LAT 16°52' N
LONG 76°4' W
WATER DEPTH 980 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 28.0° C

TRANSMISSIVITY PROFILE



T1 (3/72)

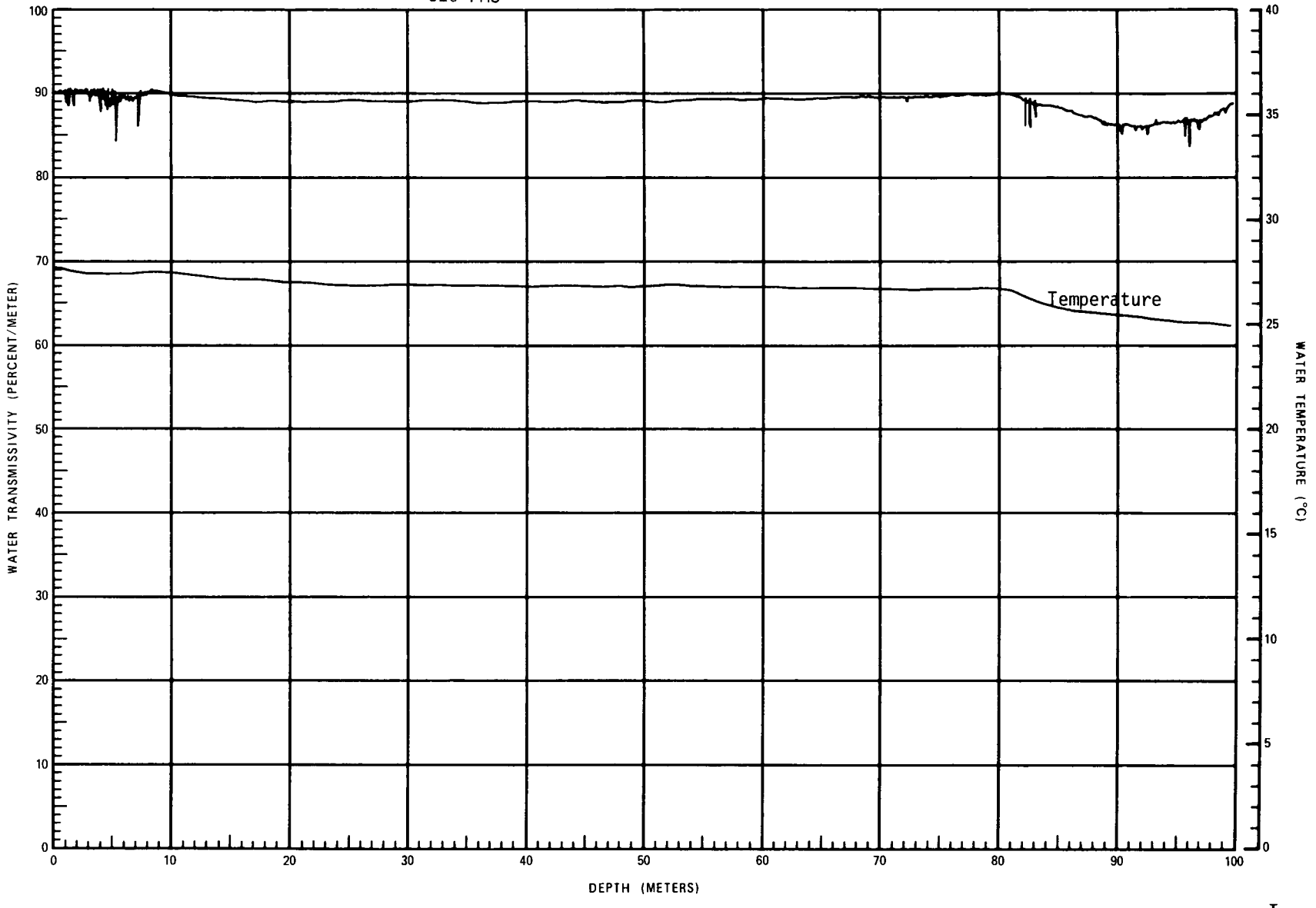
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 0945 L.A.T.
STATION SCOR 18

LAT 19°21' N
LONG 73°47' W
WATER DEPTH 320 FMS

SPECTRAL FILTER λ = 491 nm
BUCKET TEMP 27.8° C

TRANSMISSIVITY PROFILE



T1 (3/72

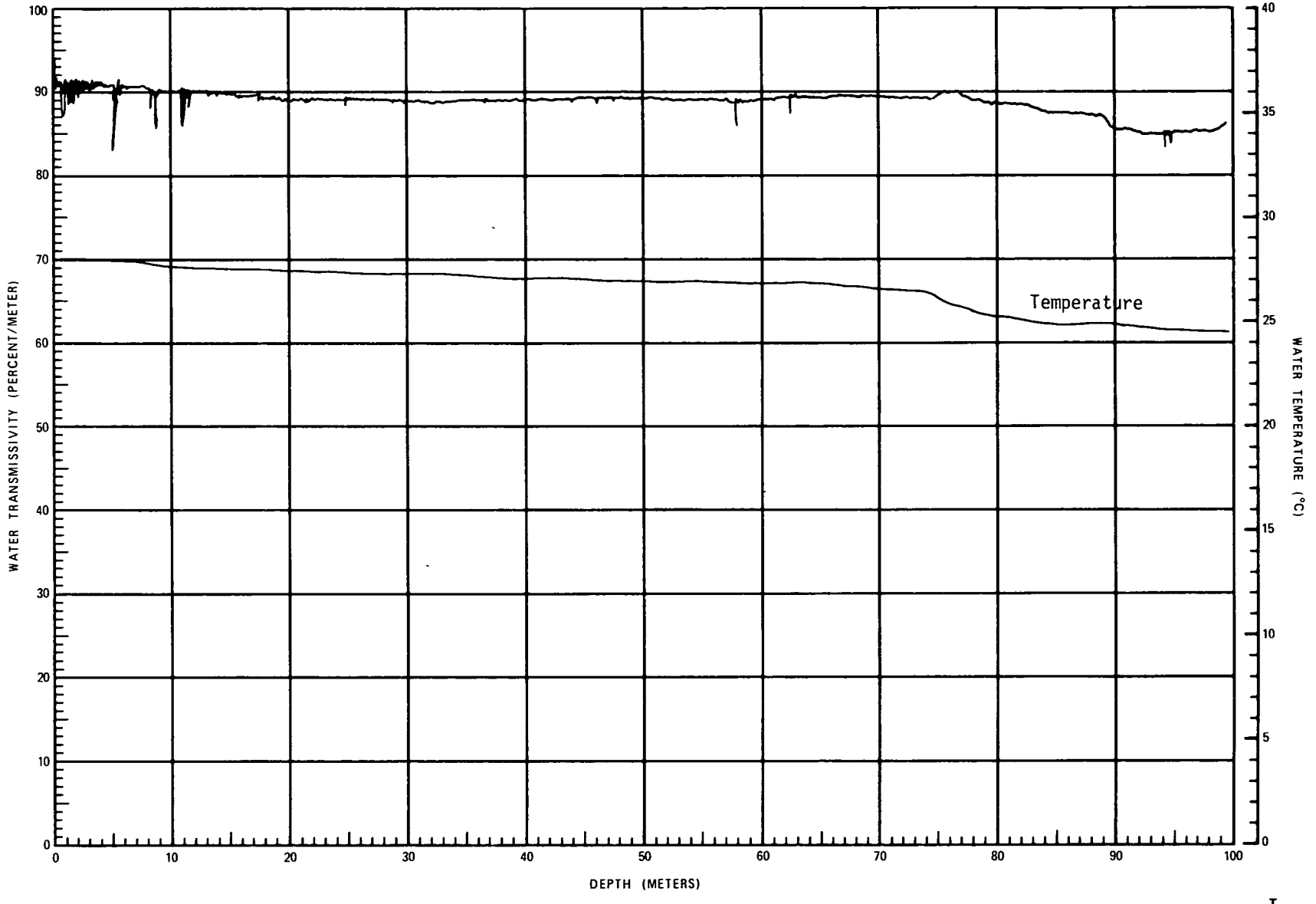
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 1600 L.A.T.
STATION SCOR 18

LAT 19°33' N
LONG 73°56' W
WATER DEPTH 320 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 28.3° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

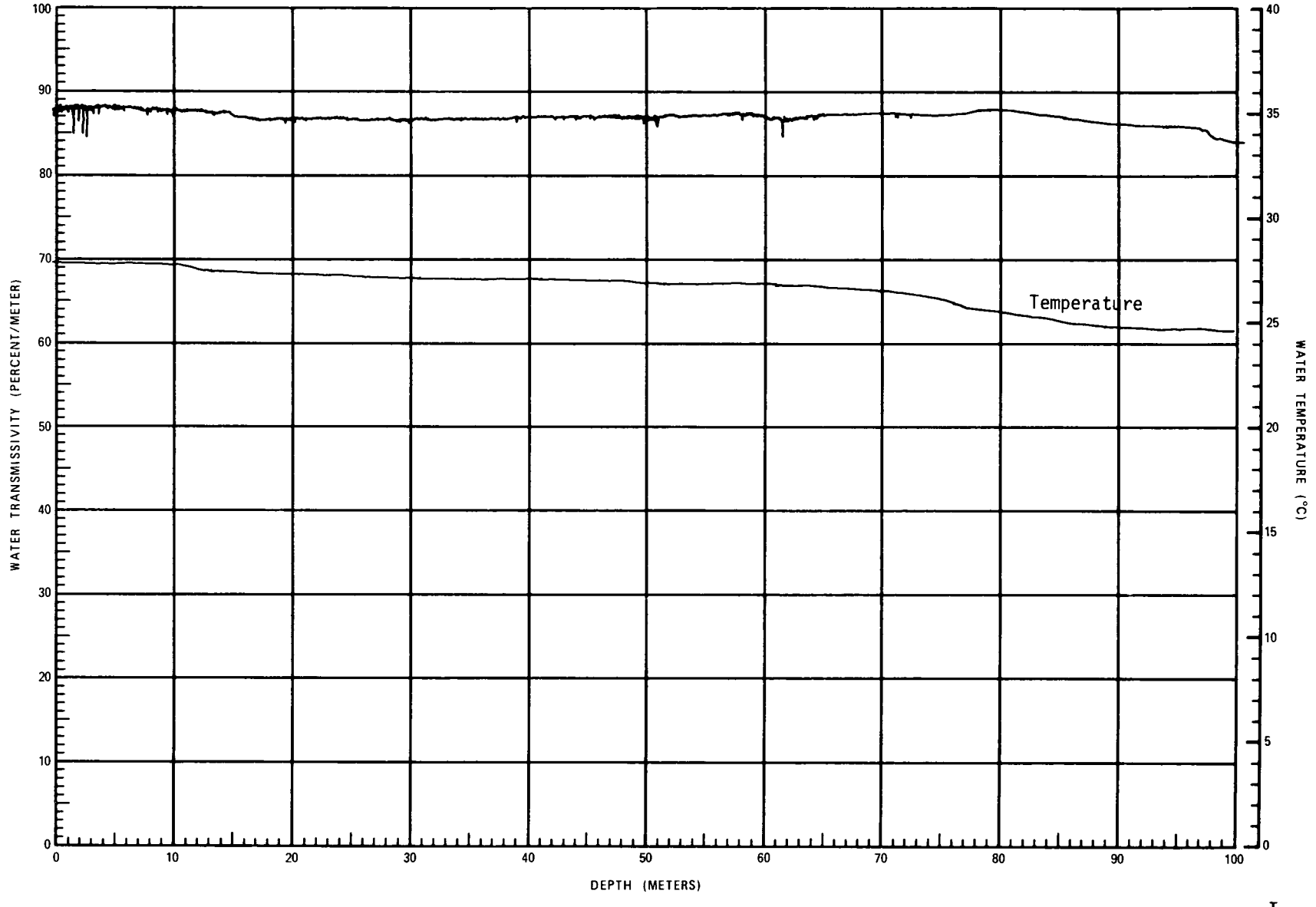
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 16:10 L.A.T.
STATION SCOR 18

LAT 19°33' N
LONG 73°56' W
WATER DEPTH 320 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 28.3° C

TRANSMISSIVITY PROFILE



T1 (3/72)

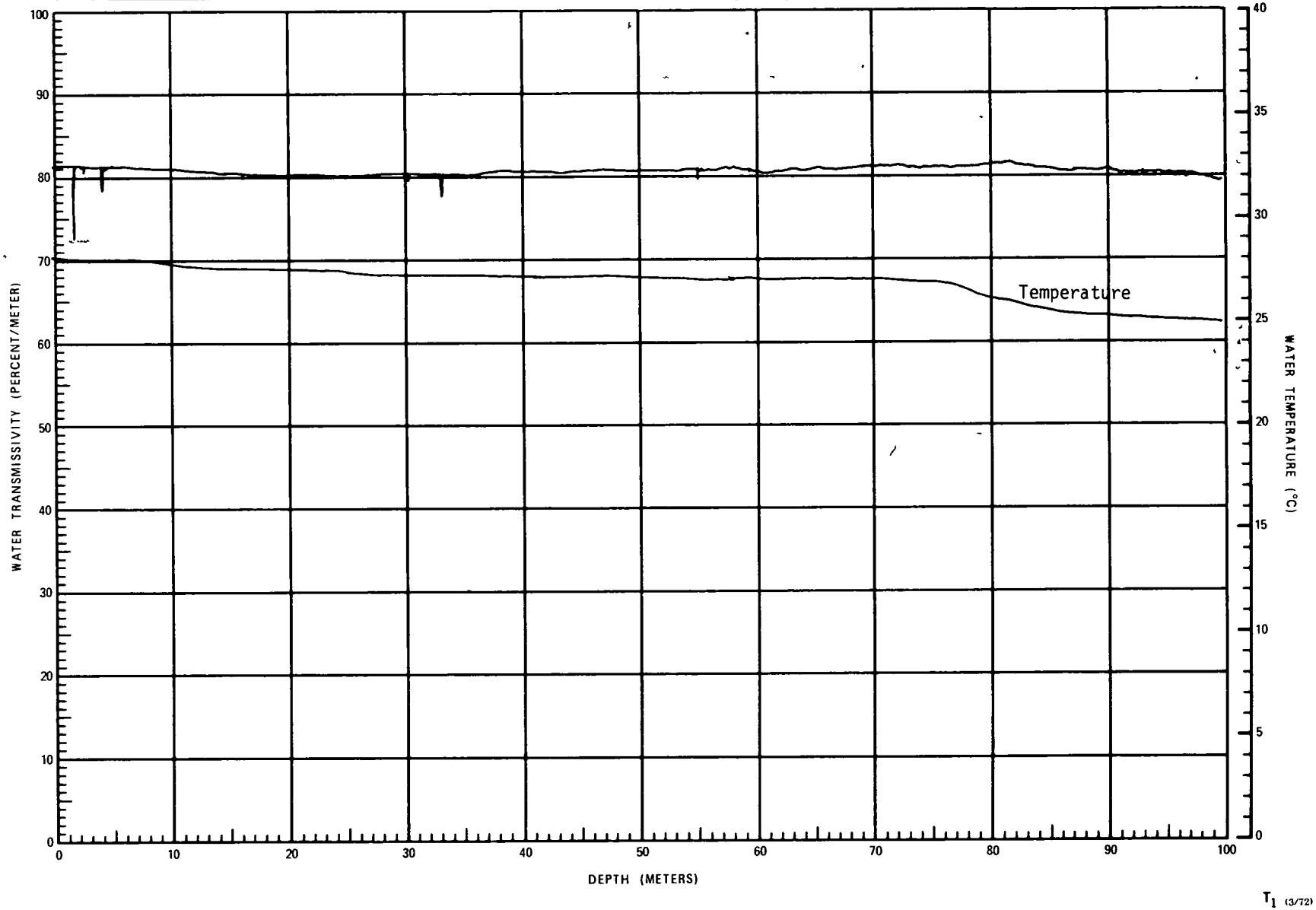
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 1625 L.A.T.
STATION SCOR 18

LAT 19°33' N
LONG 73°56' W
WATER DEPTH 320 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 28.1° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

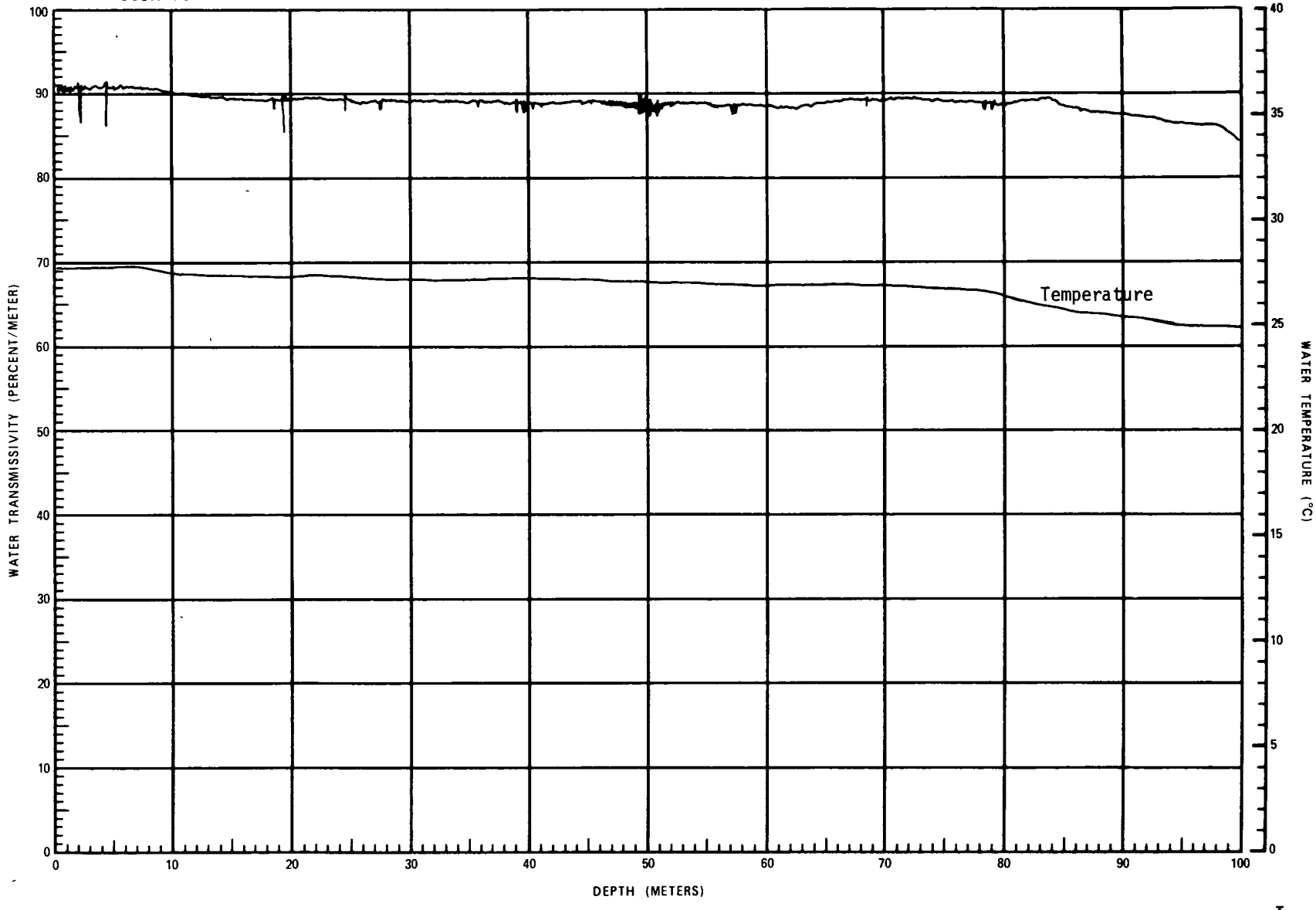
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 1640 L.A.T.
STATION SCOR 18

LAT 19°33' N
LONG 75°56' W
WATER DEPTH 320 FSM

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 28.1° C

TRANSMISSIVITY PROFILE



T1 (3/72)

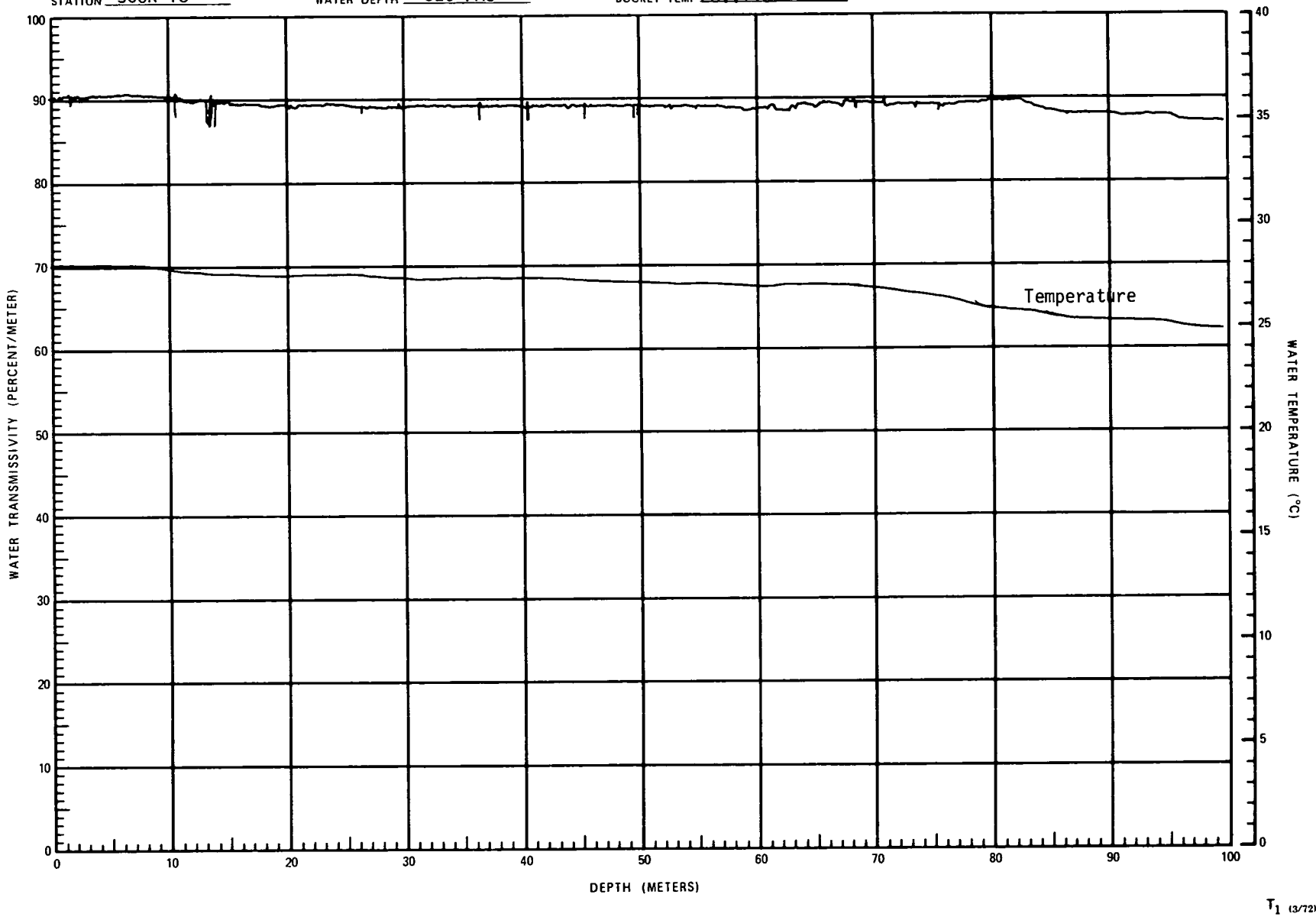
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 1655 L.A.T.
STATION SCOR 18

LAT 19°33' N
LONG 73°56' W
WATER DEPTH 320 FMS

SPECTRAL FILTER λ = 473 nm
BUCKET TEMP 28.1° C

TRANSMISSIVITY PROFILE



T1 (3/72)

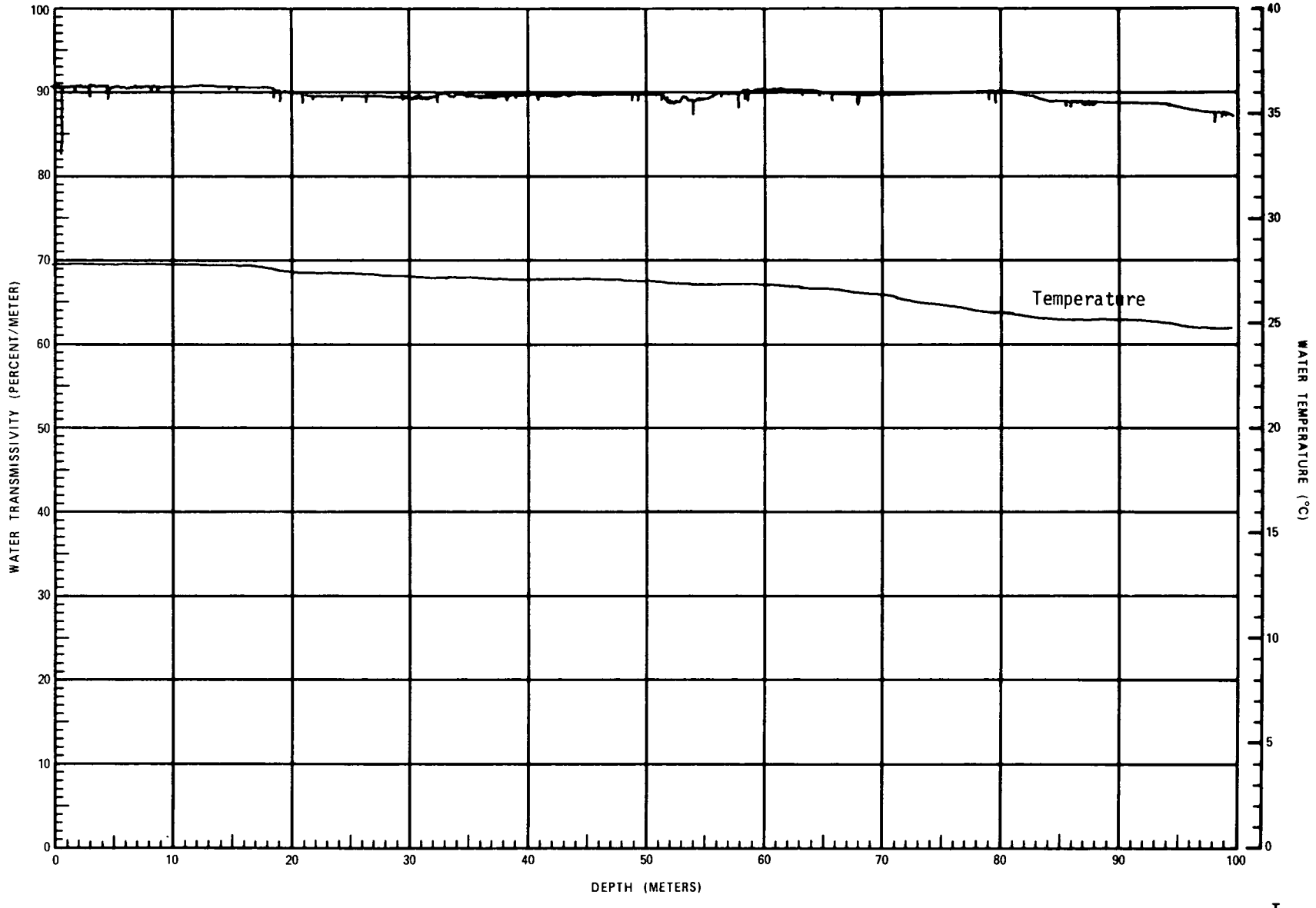
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 29 May 1970
TIME 18:55 L.A.T.
STATION SCOR 18

LAT 19°33' N
LONG 73°56' W
WATER DEPTH 320 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 28.3° C

TRANSMISSIVITY PROFILE



T1 (3/72

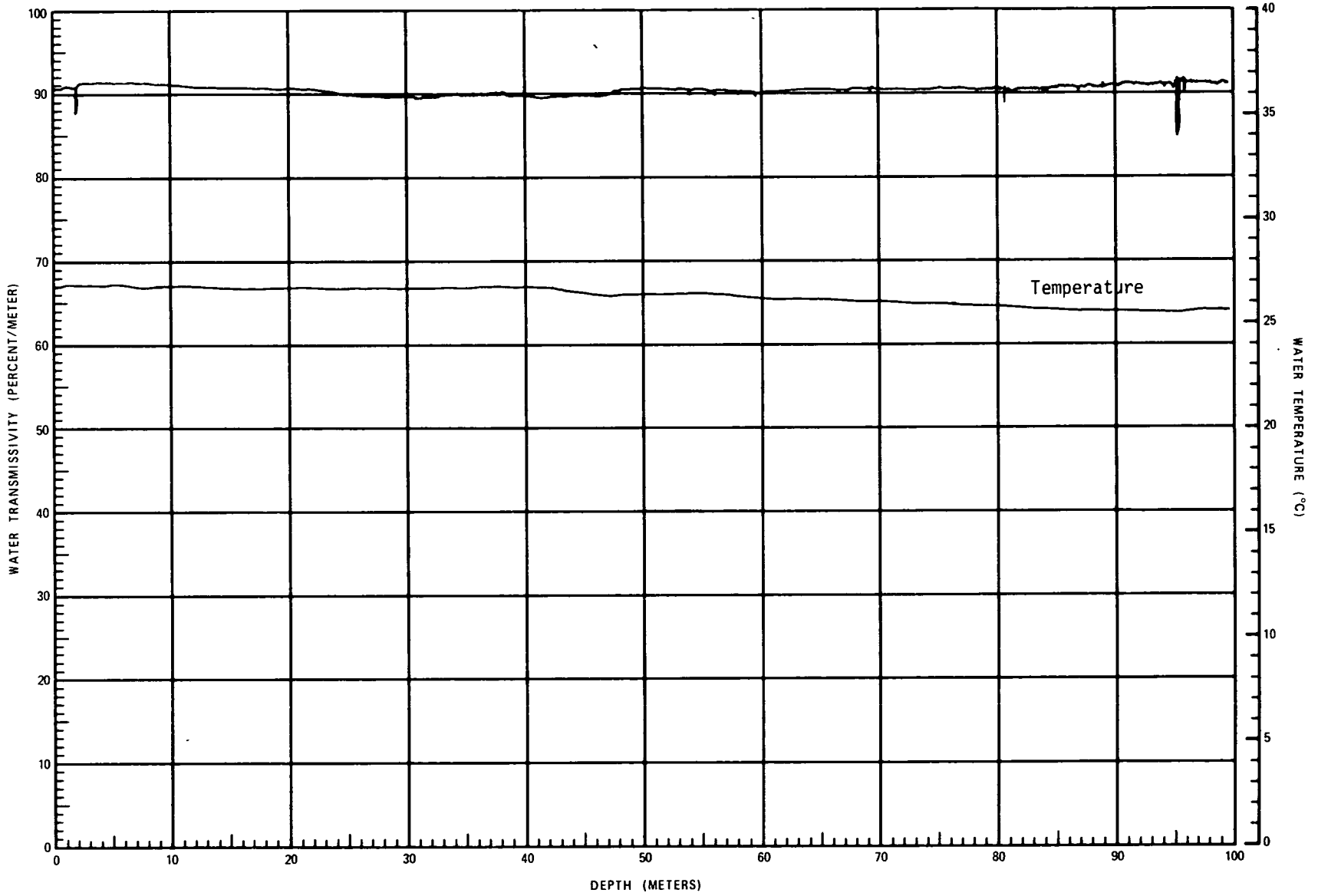
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 30 May 1970
TIME 0950 L.A.T.
STATION SCOR 19

LAT 20°20' N
LONG 70°57' W
WATER DEPTH 2150 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 27.0° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

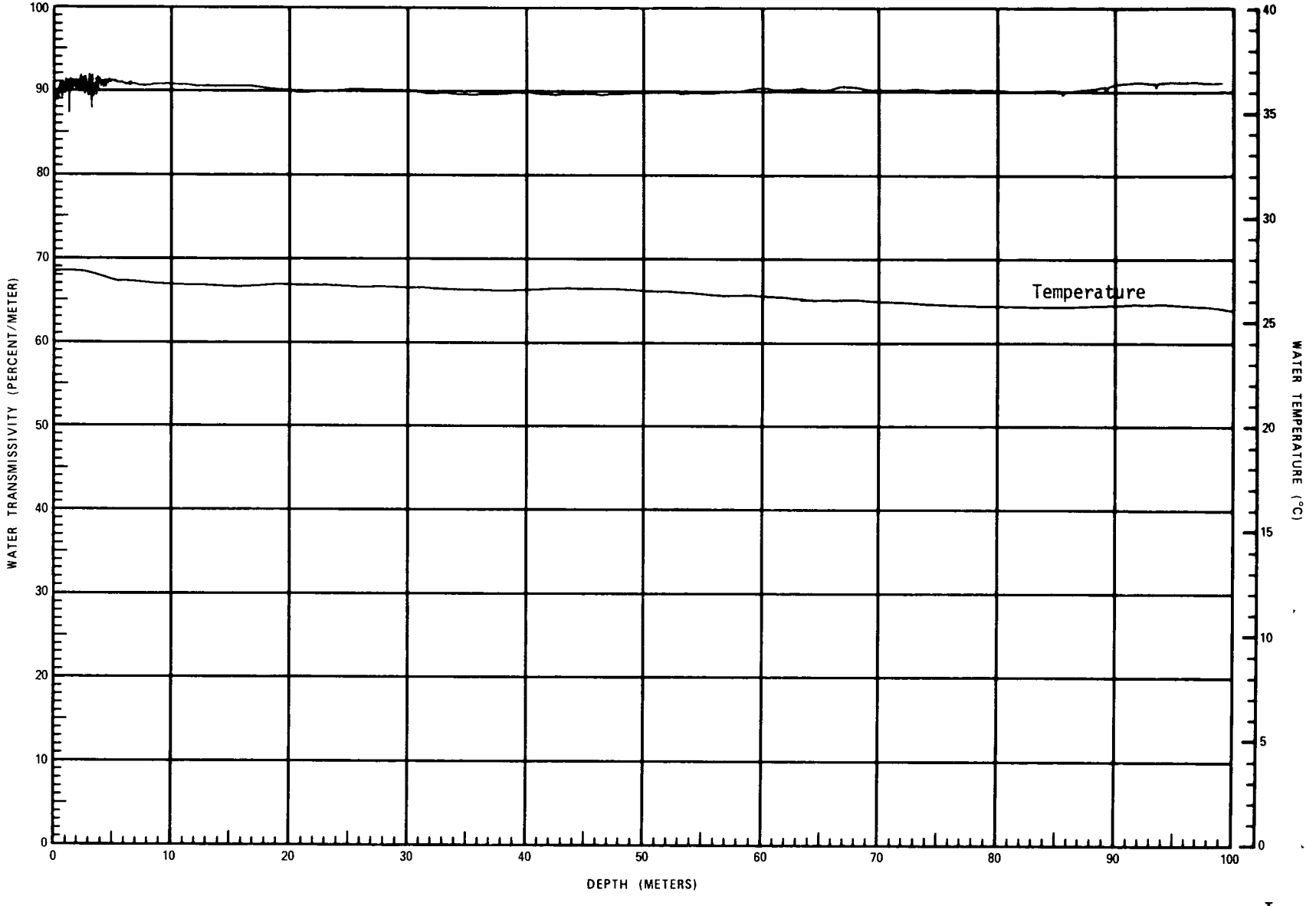
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 30 May 1970
TIME 1415 L.A.T.
STATION SCOR 19

LAT $20^{o}20'$ N
LONG $70^{o}57'$ W
WATER DEPTH 2150 FMS

Data on way up
SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 27.7^{o} C

TRANSMISSIVITY PROFILE



T1 (3/72

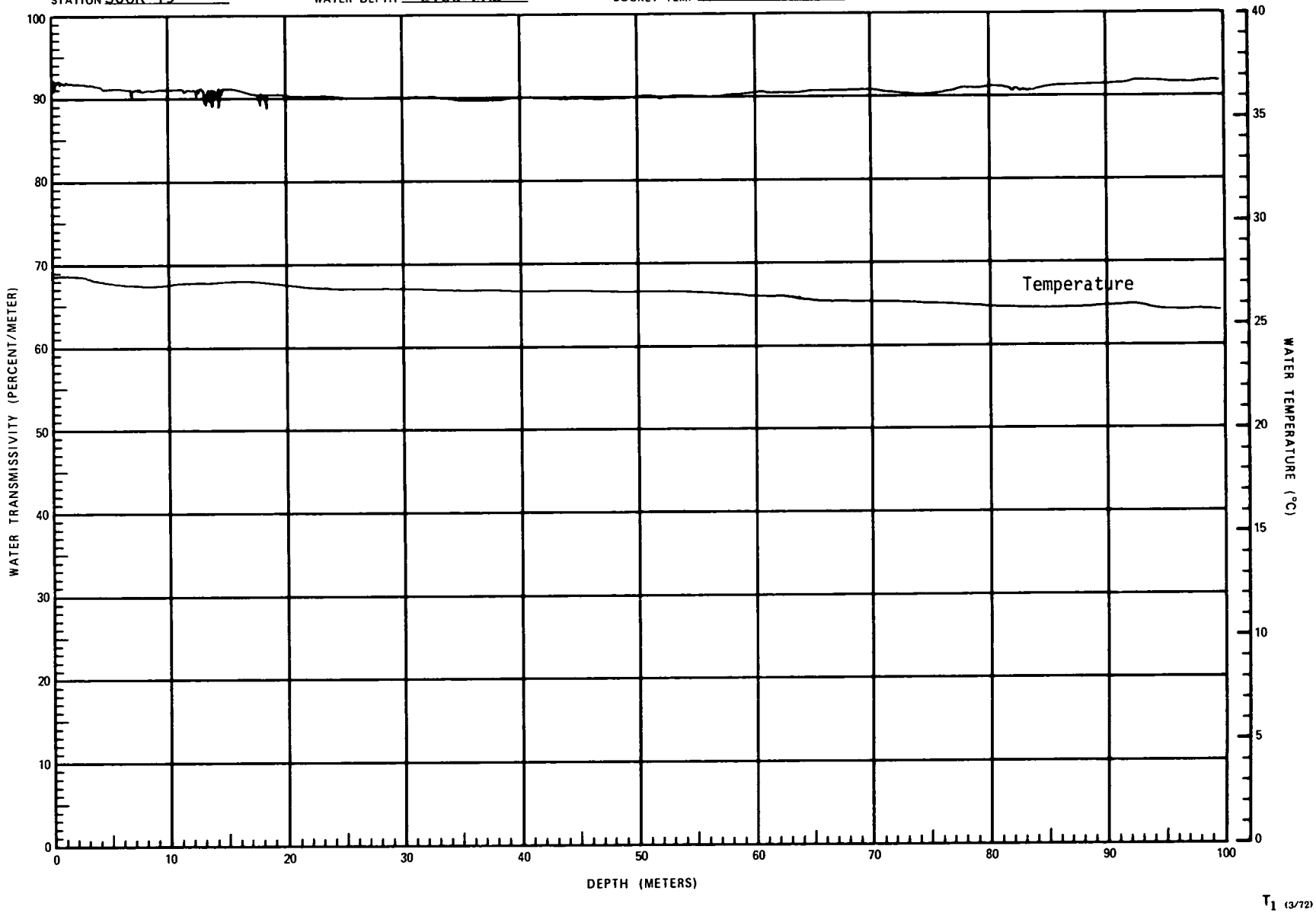
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 30 May 1970
TIME 1430 L.A.T.
STATION SCOR 19

LAT 20°21' N
LONG 70°56' W
WATER DEPTH 2150 FMS

λ = 491 nm
SPECTRAL FILTER
BUCKET TEMP 27.7° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

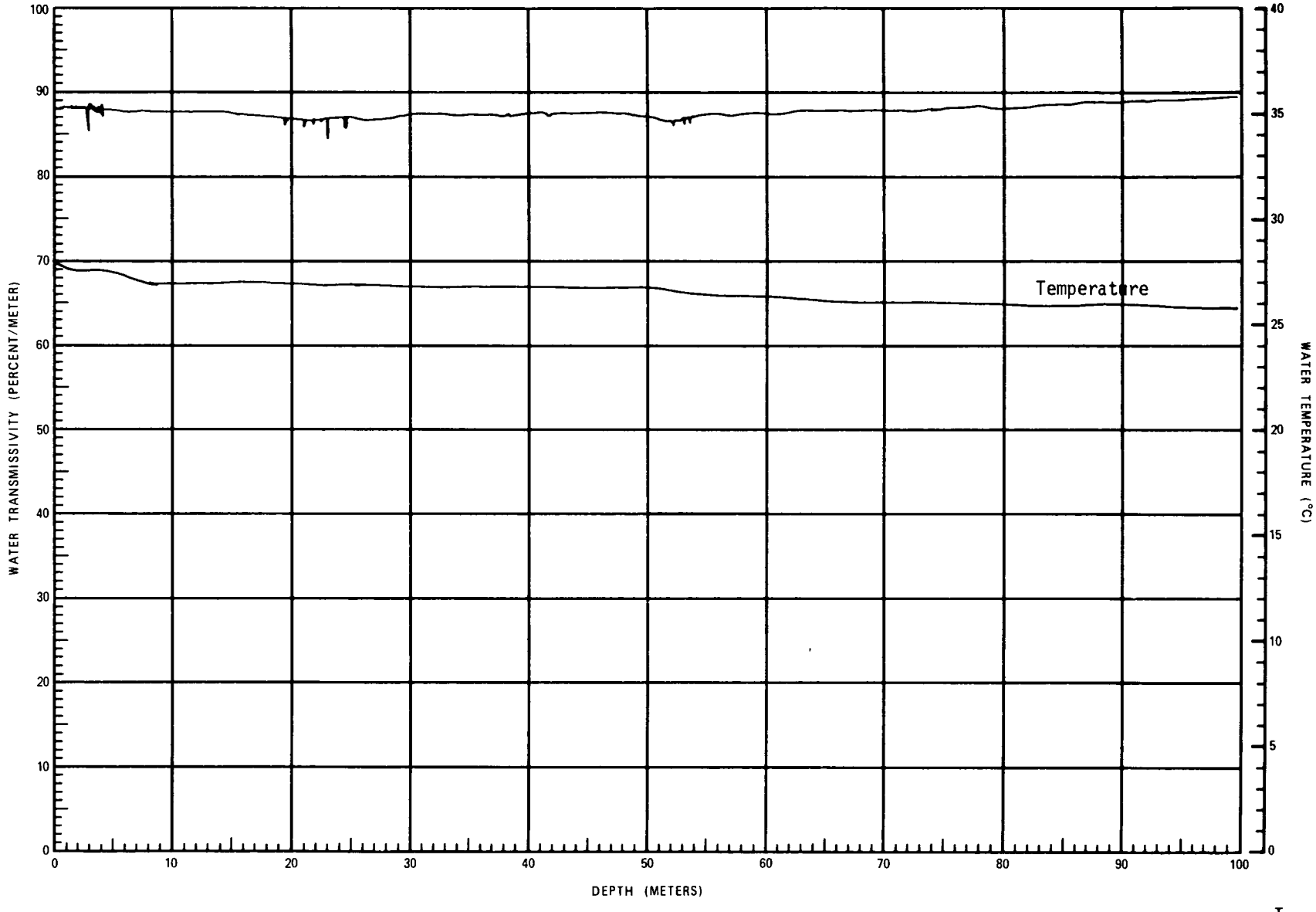
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 30 May 1970
TIME 1510 L.A.T.
STATION SCOR 19

LAT $20^{o}20'$ N
LONG $70^{o}56'$ W
WATER DEPTH 2150 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP 27.7^{o} C

TRANSMISSIVITY PROFILE



T_1 (3/72)

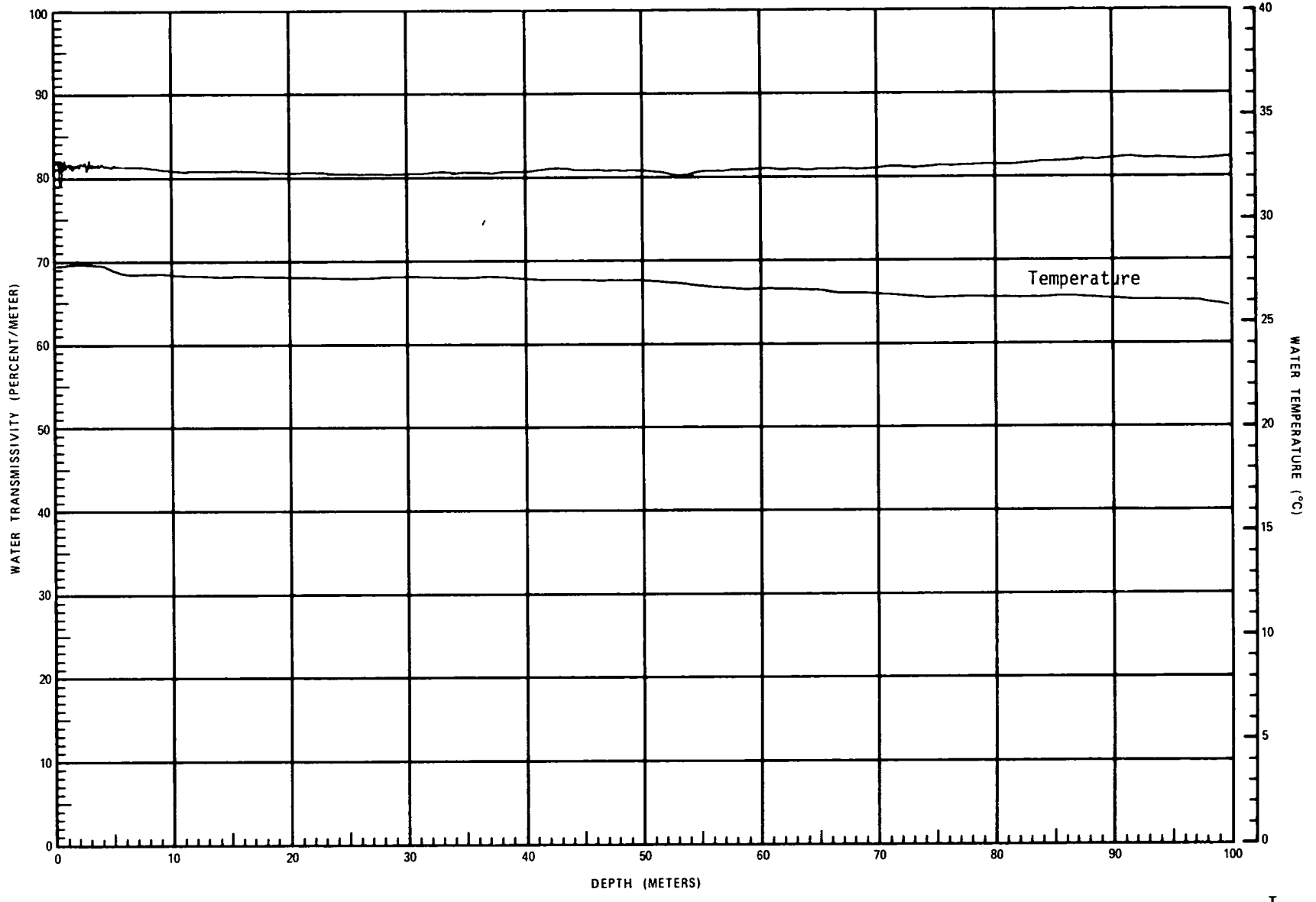
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 30 May 1970 LAT 20°20' N $\bar{\lambda}$ =581 nm

TIME 1520 L.A.T. LONG 70°56' W SPECTRAL FILTER

STATION SCOR 19 WATER DEPTH 2150 FMS BUCKET TEMP 27.7° C

TRANSMISSIVITY PROFILE



T1 (3/72)

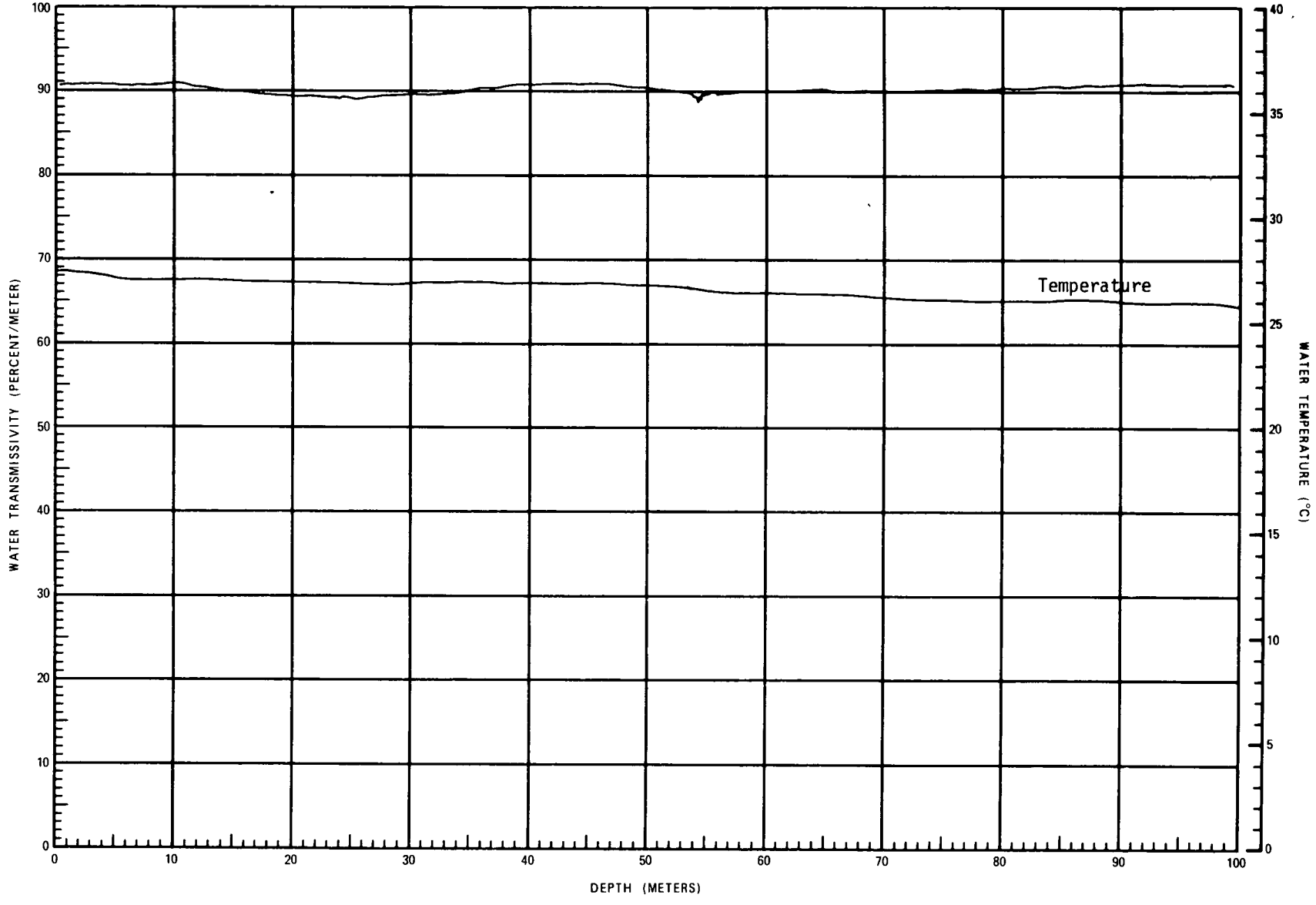
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 30 May 1970
TIME 1540 L.A.T.
STATION SCOR 19

LAT 20°20' N
LONG 70°56' W
WATER DEPTH 2150 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 27.7° C

TRANSMISSIVITY PROFILE



T1 (3/72

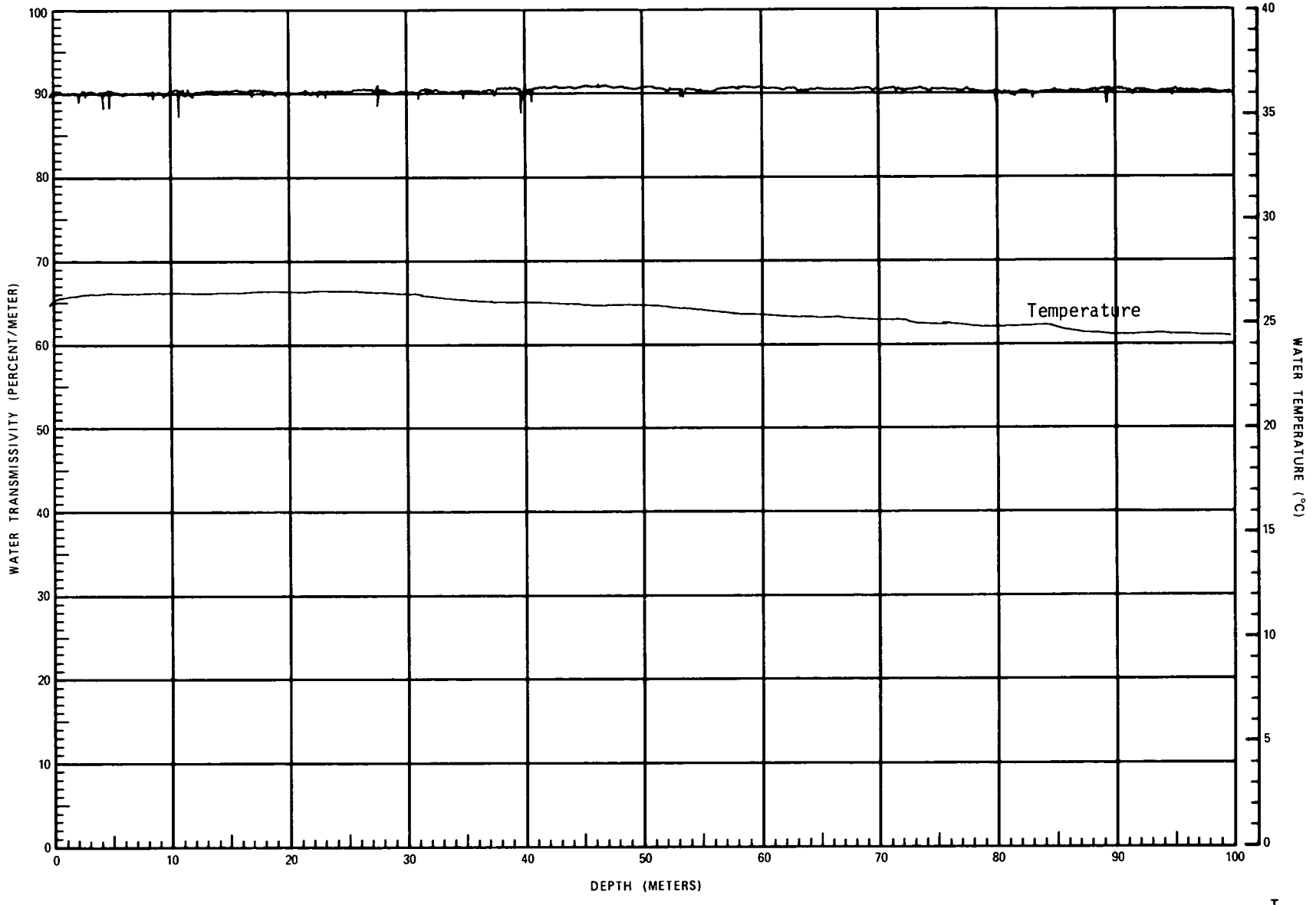
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 31 May 1970 LAT 22°30' N SPECTRAL FILTER $\bar{\lambda}$ = 473 nm

TIME 1008 L.A.I. LONG 68°24' W BUCKET TEMP 26.3° C

STATION SCOR 20 WATER DEPTH 3000 FMS

TRANSMISSIVITY PROFILE



T_1 (3/72)

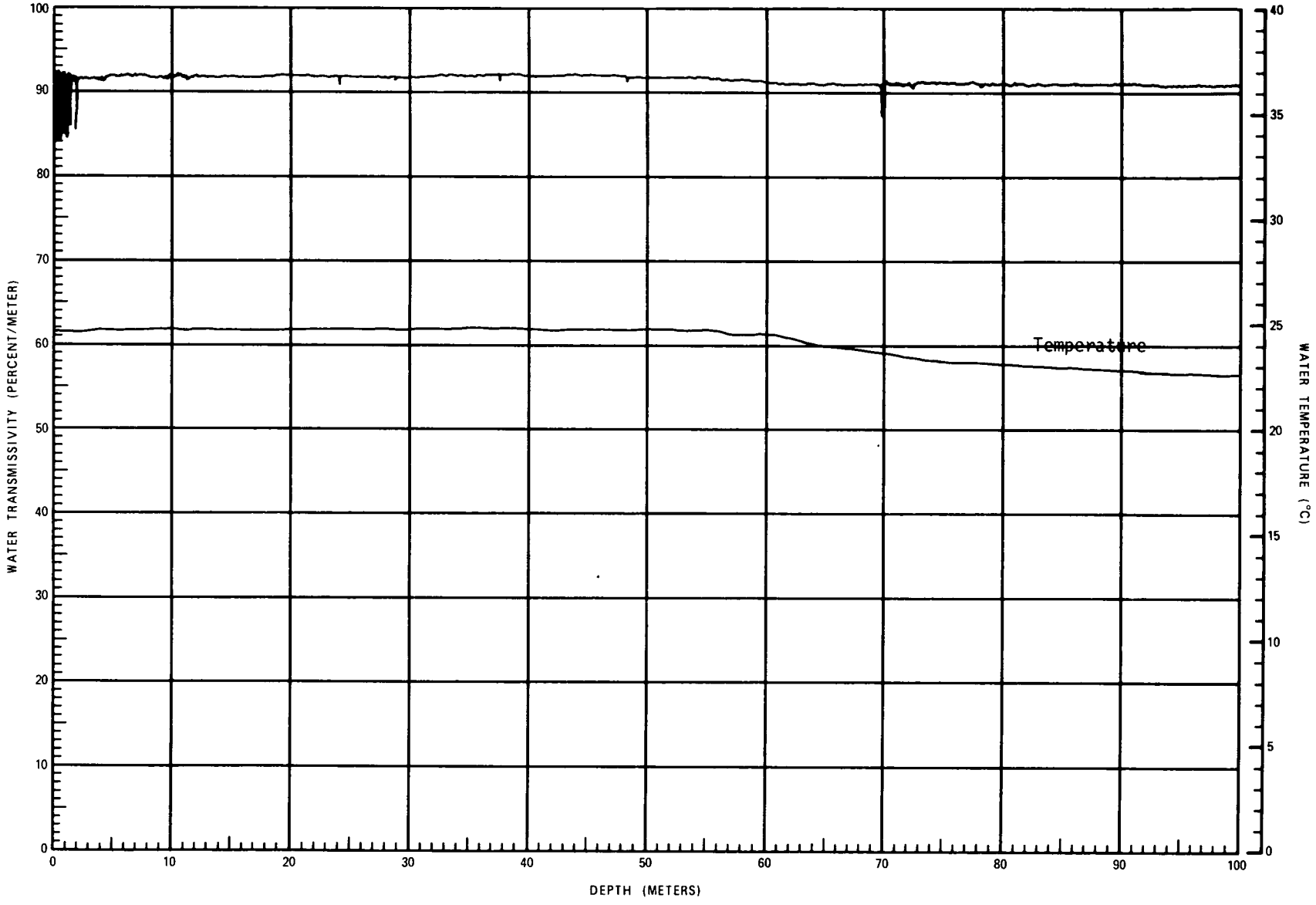
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 1 June 1970
TIME 0930 L.A.T.
STATION SCOR 21

LAT 25°45' N
LONG 65°38' W
WATER DEPTH 2880 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 24.3° C

TRANSMISSIVITY PROFILE



T1 (3/72

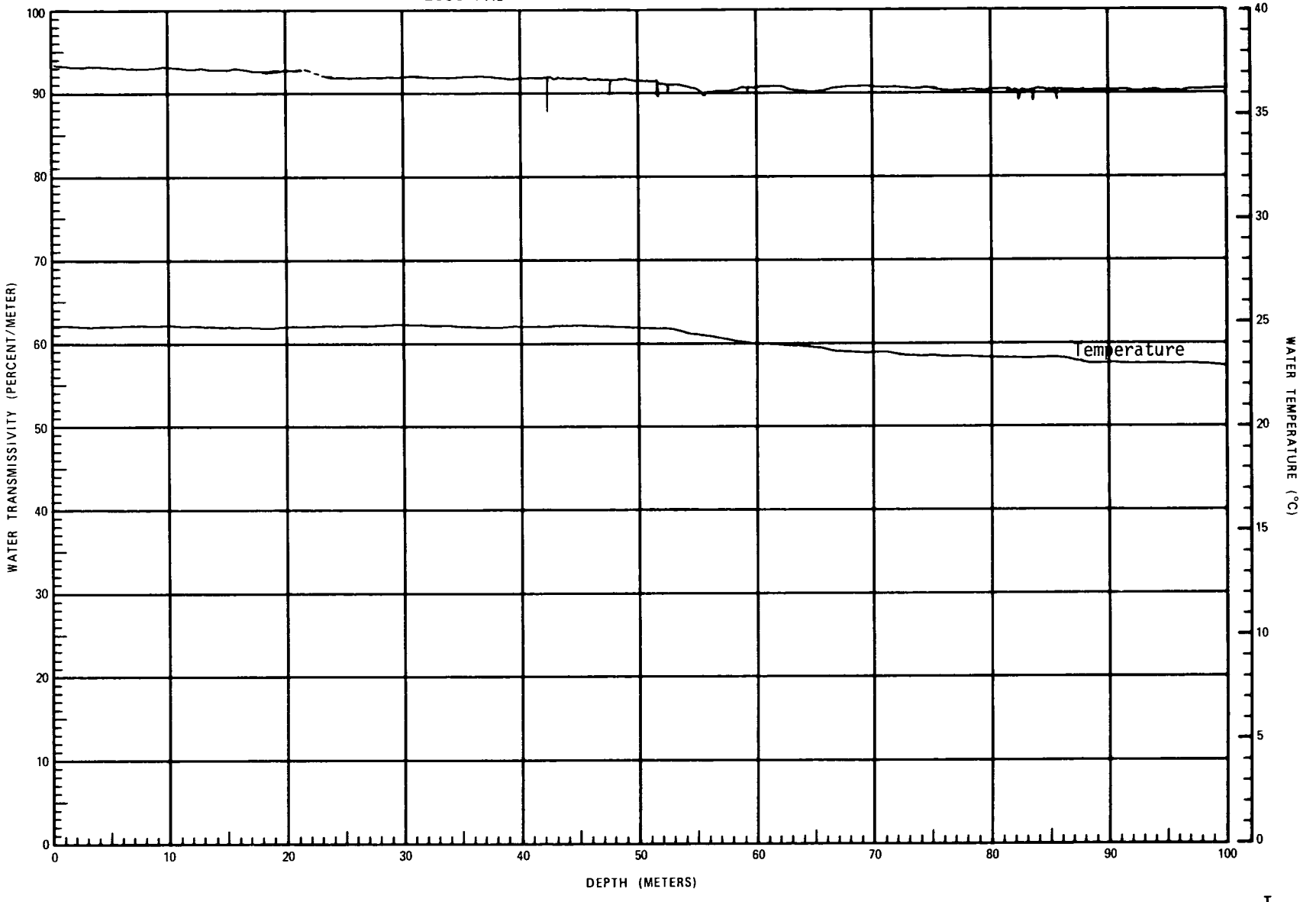
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 1 June 1970 LAT 25°45' N

TIME 1430 L.A.T. LONG 65°38' W SPECTRAL FILTER λ = 473 nm

STATION SCOR 21 WATER DEPTH 2880 FMS BUCKET TEMP 24.6° C

TRANSMISSIVITY PROFILE



T1 (3/72)

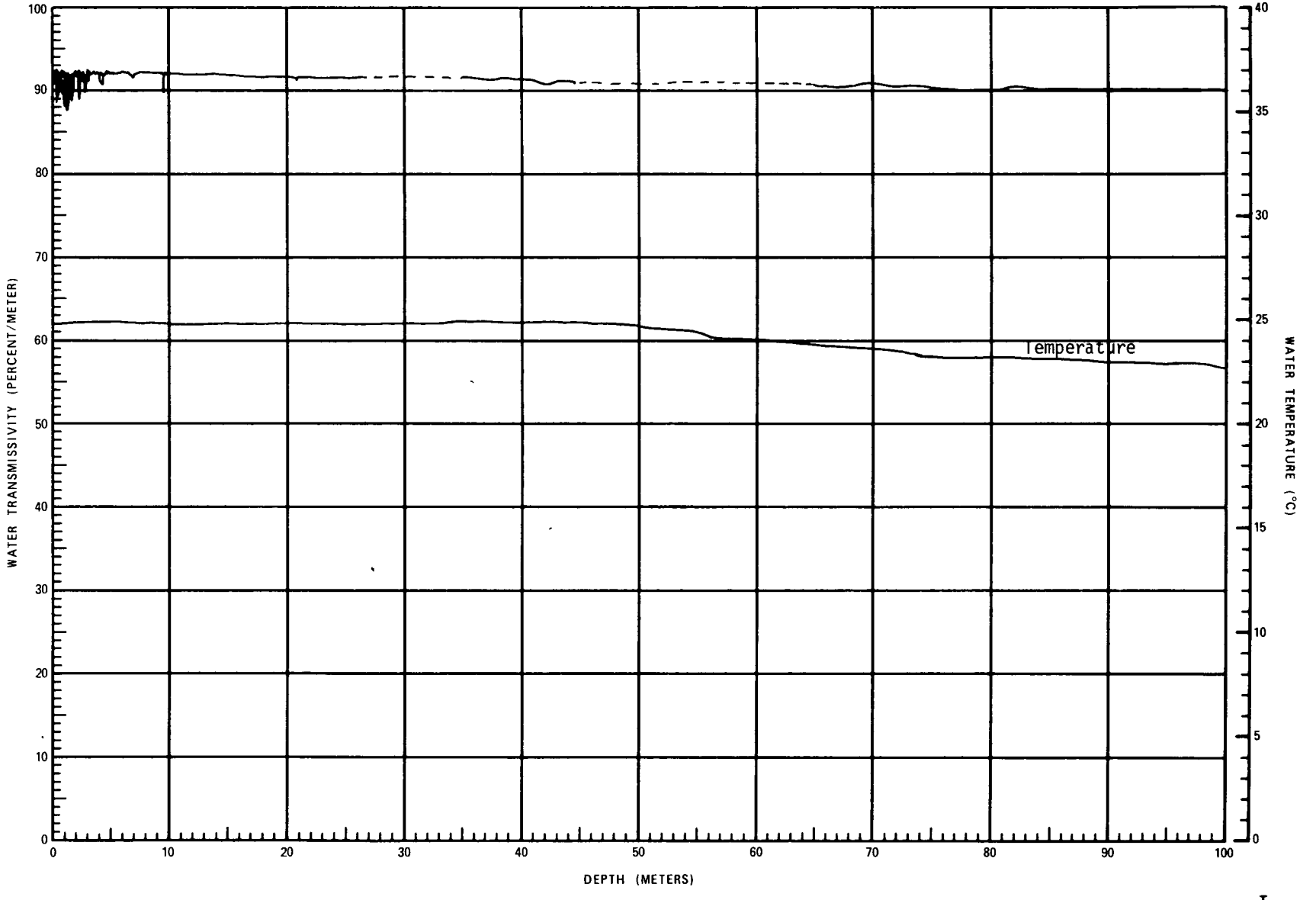
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 1 June 1970
TIME 1500 L.A.T.
STATION SCOR 21

LAT 26°45' N
LONG 65°38' W
WATER DEPTH 2880 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 450 nm
BUCKET TEMP 24.6° C

TRANSMISSIVITY PROFILE



T1 (3/72)

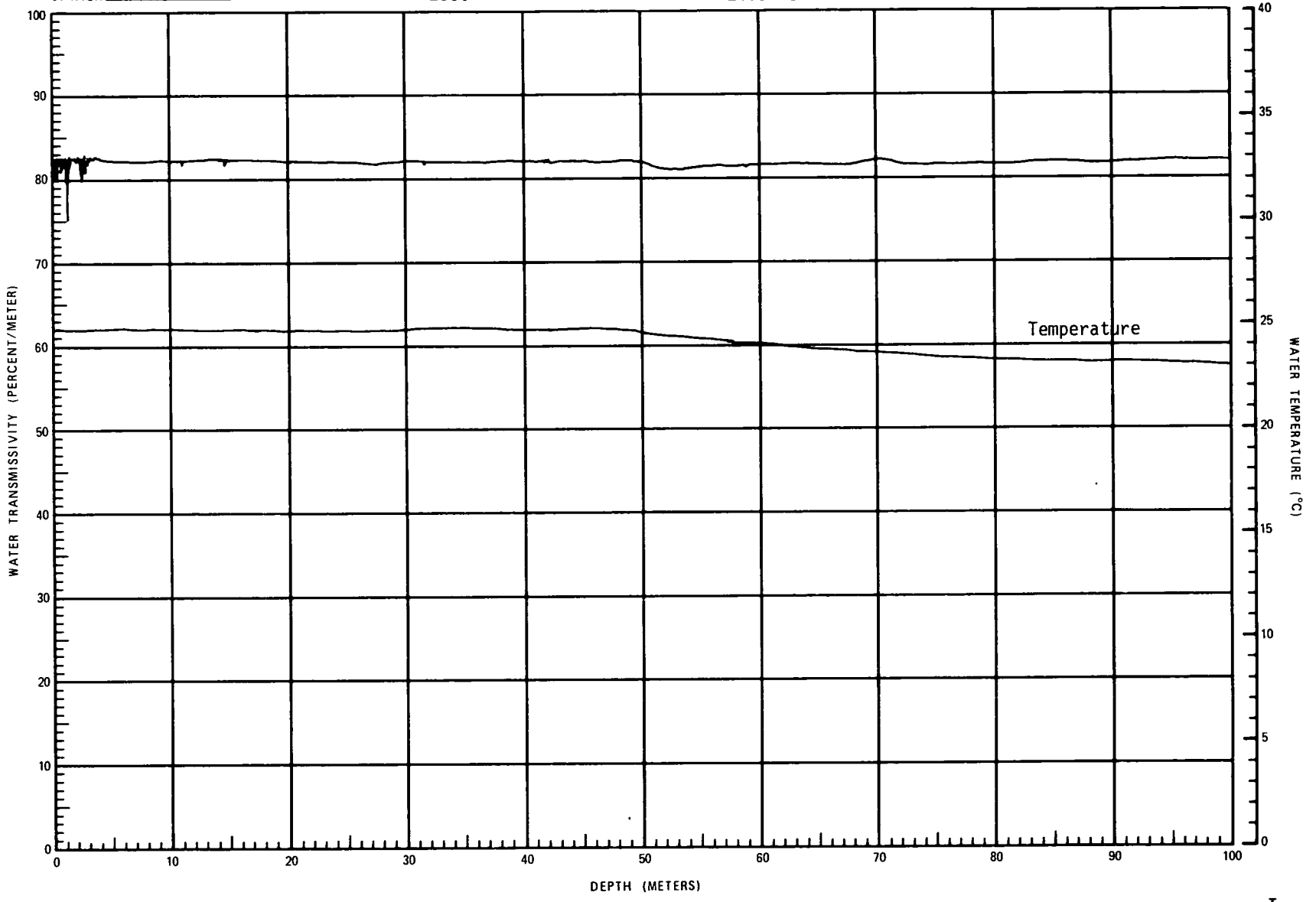
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 1 June 1970
TIME 1515 L.A.T.
STATION SCOR 21

LAT 25°45' N
LONG 65°38' W
WATER DEPTH 2880

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 24.6° C

TRANSMISSIVITY PROFILE



T1 (3/72)

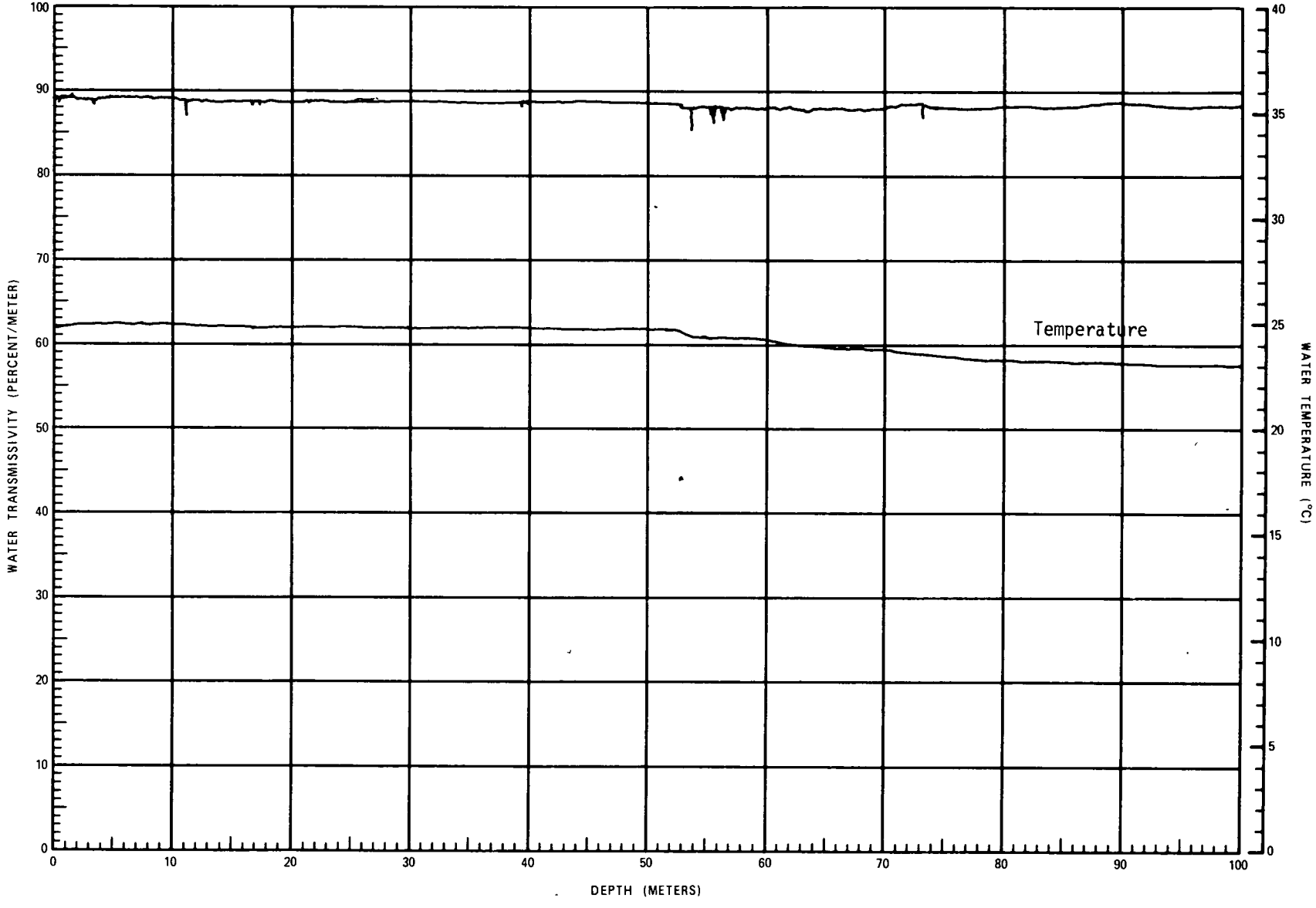
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 01 June 1970
TIME 15:40 L.A.T.
STATION SCOR 21

LAT 25°45' N
LONG 65° 38' W
WATER DEPTH 2880 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 535 nm
BUCKET TEMP

TRANSMISSIVITY PROFILE



T1 (3/72

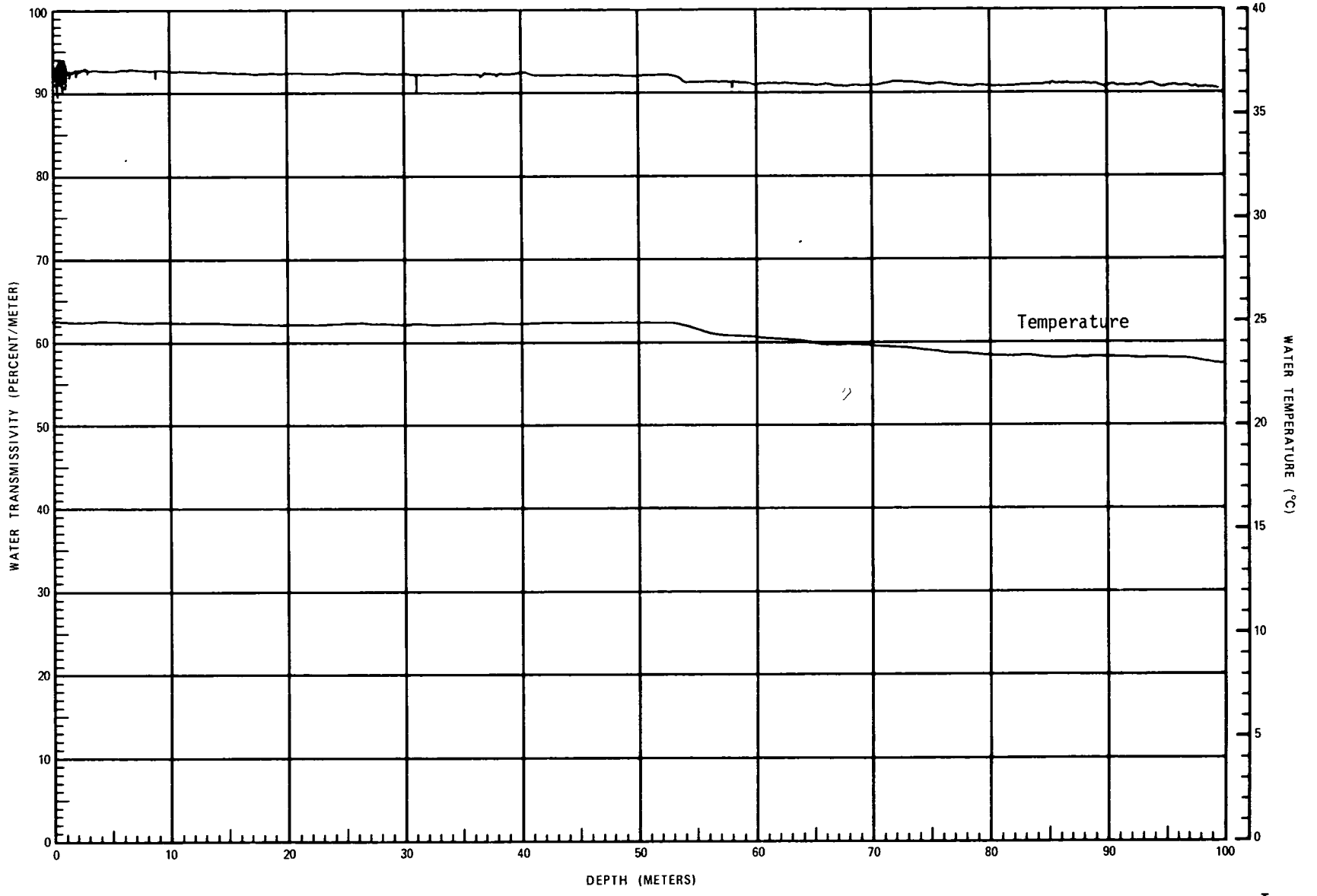
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 1 June 1970
TIME 1600 L.A.T.
STATION SCOR 21

LAT 25°45' N
LONG 65°38' W
WATER DEPTH 2880 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 24.6° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

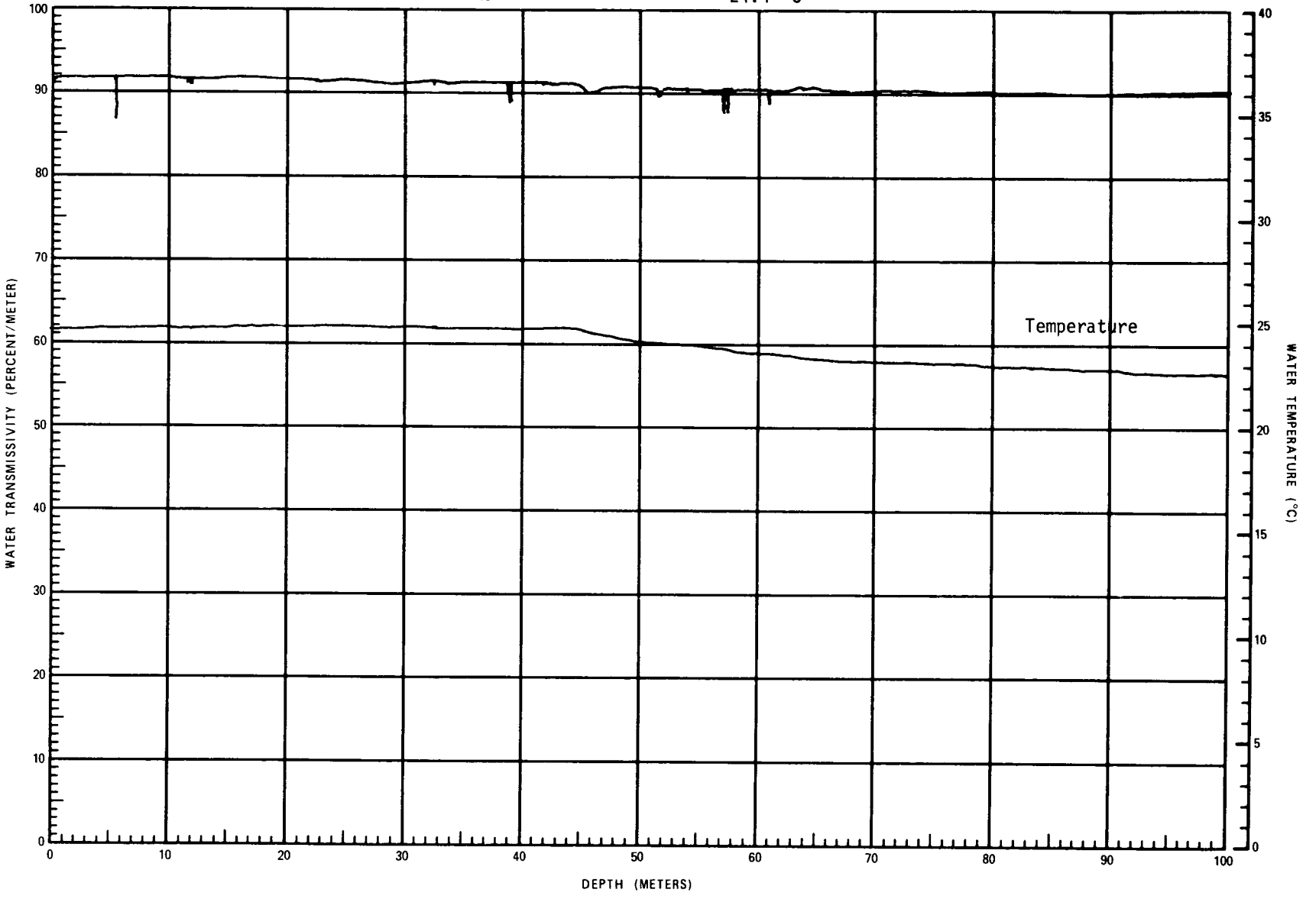
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 01 June 1970
TIME 19:30 L.A.T.
STATION SCOR 21

LAT 25°45' N
LONG 65°38' W
WATER DEPTH 2880 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 24.4° C

TRANSMISSIVITY PROFILE



-0104-

T_1 (3/72)

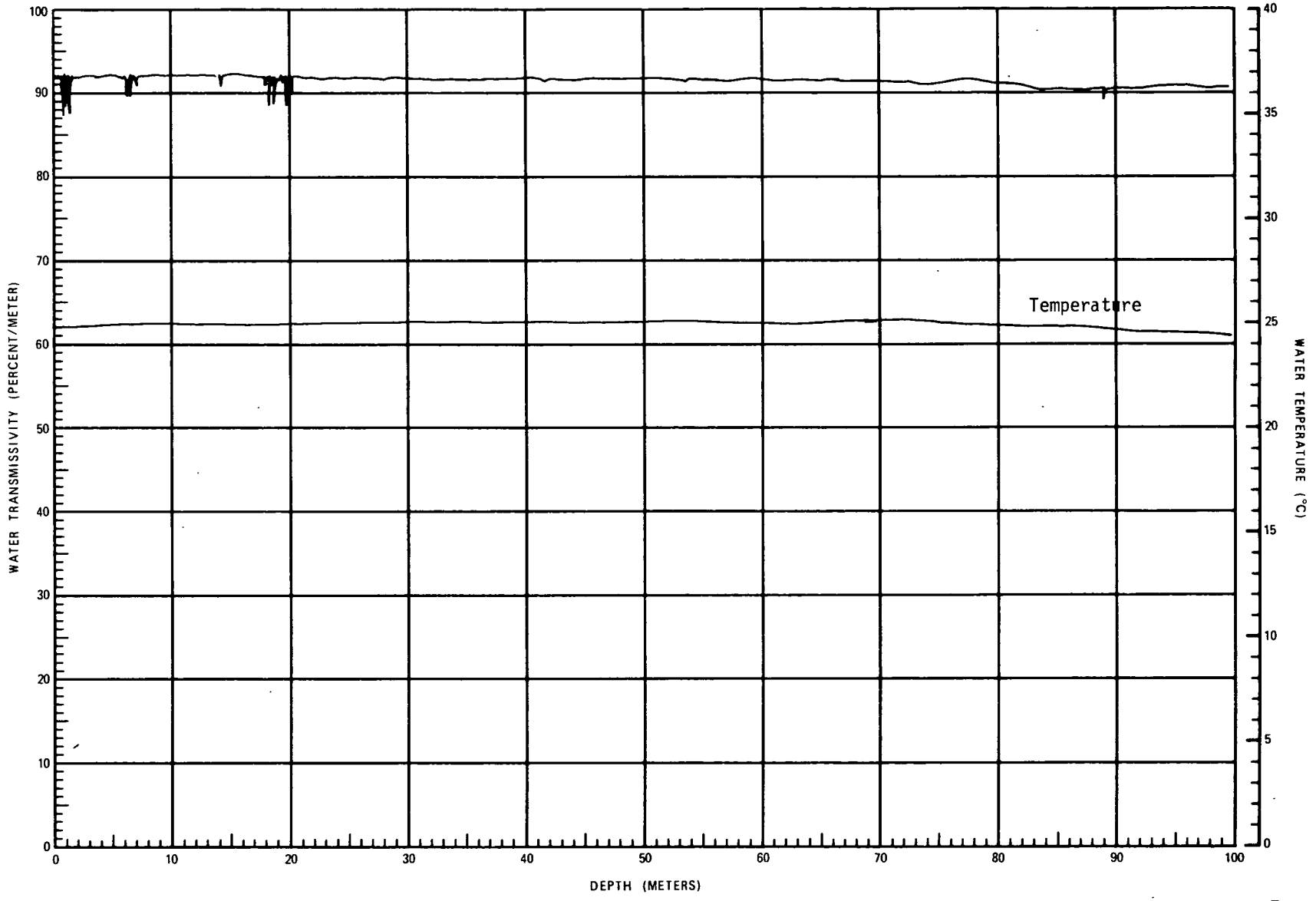
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 02 June 1970 LAT 25°38' N $\bar{\lambda}$ = 491 nm

TIME 1110 L.A.T. LONG 69°44' W SPECTRAL FILTER

STATION SCOR 22 WATER DEPTH 3000 FMS BUCKET TEMP 24.8° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

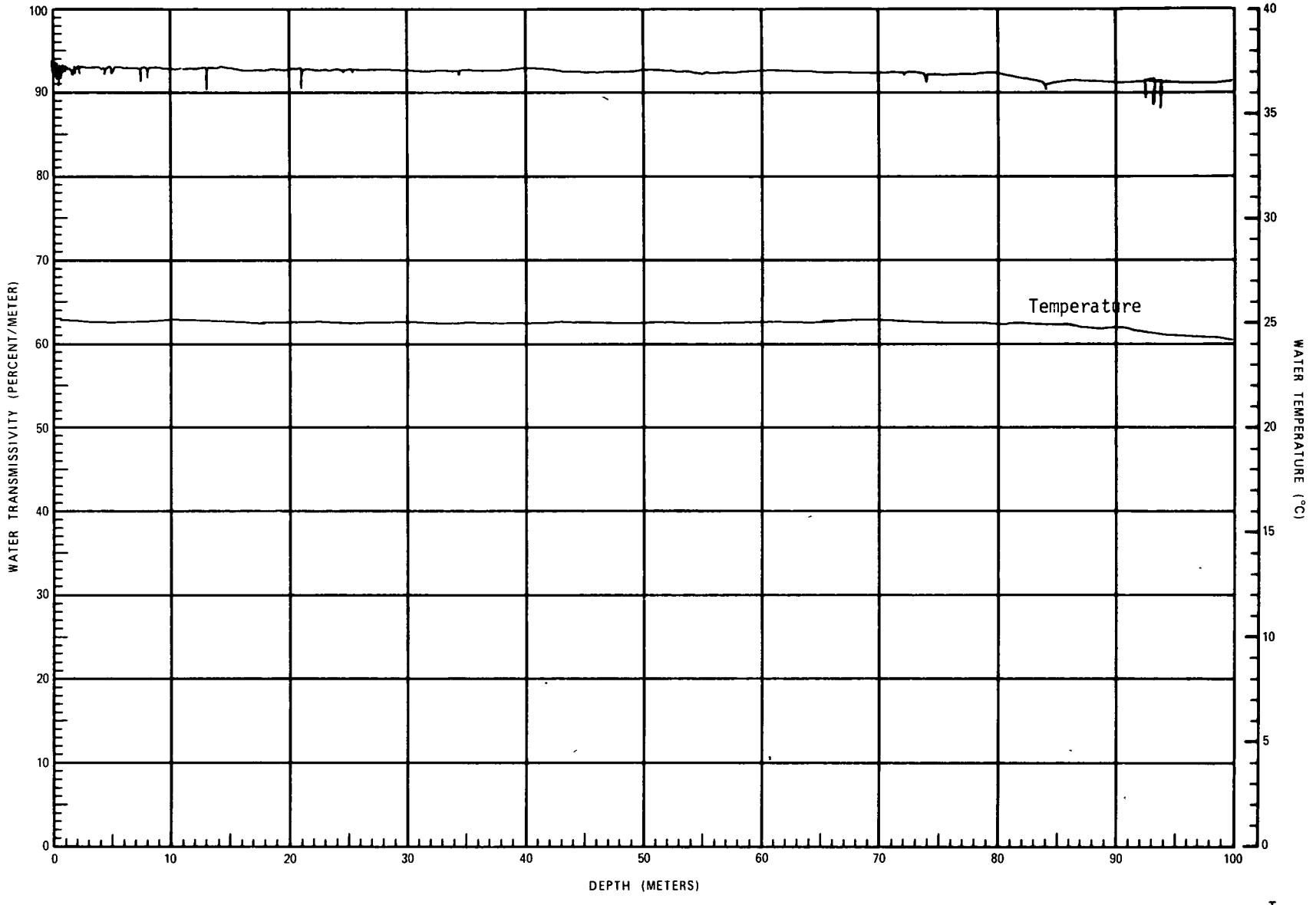
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 02 June 1970
TIME 1345 L.A.T.
STATION SCOR 22

LAT 25°38' N
LONG 69°44' W
WATER DEPTH 3000 FMS

$\bar{\lambda}$ = 491 nm
SPECTRAL FILTER
BUCKET TEMP 24.9° C

TRANSMISSIVITY PROFILE



T_1 (3/72)

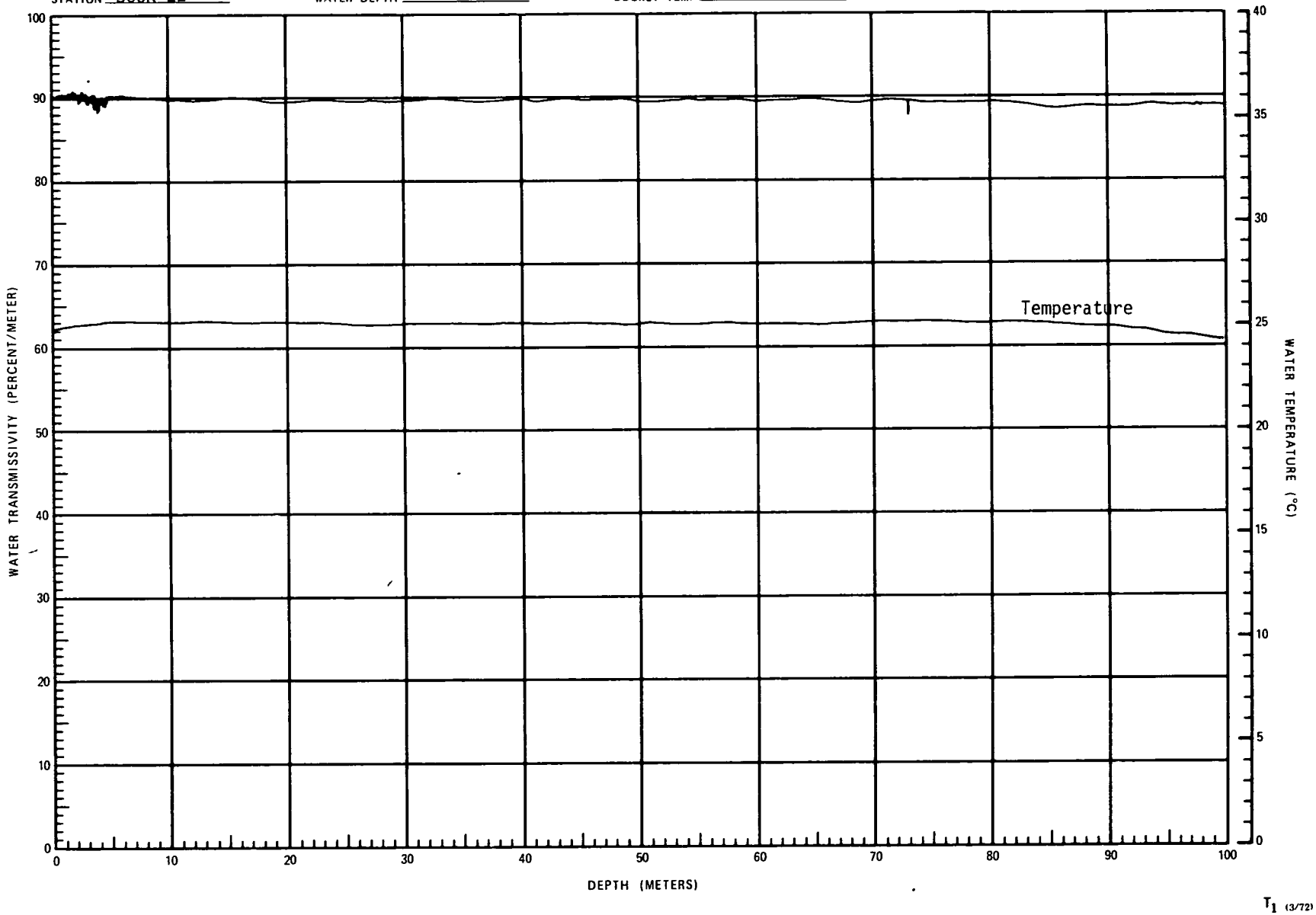
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 02 June 1970
TIME 1400 L.A.T.
STATION SCOR 22

LAT 25°38' N
LONG 69°44' W
WATER DEPTH 3000 FMS

SPECTRAL FILTER λ = 535 nm
BUCKET TEMP 24.9° C

TRANSMISSIVITY PROFILE



T1 (3/72)

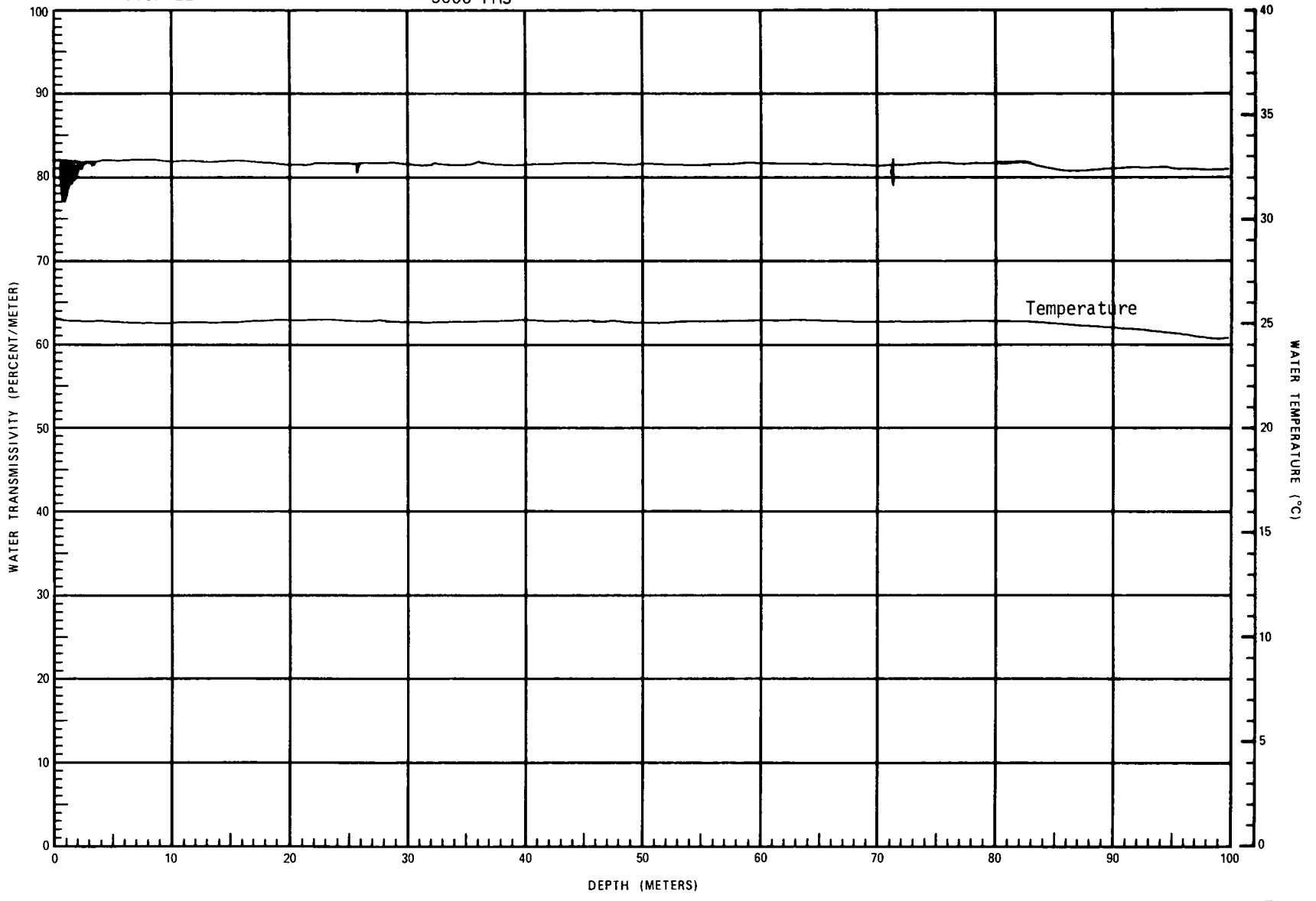
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 02 June 1970
TIME 1415 L.A.T.
STATION SCOR 22

LAT 25°38' N
LONG 69°44' W
WATER DEPTH 3000 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 24.9° C

TRANSMISSIVITY PROFILE



T1 (3/72

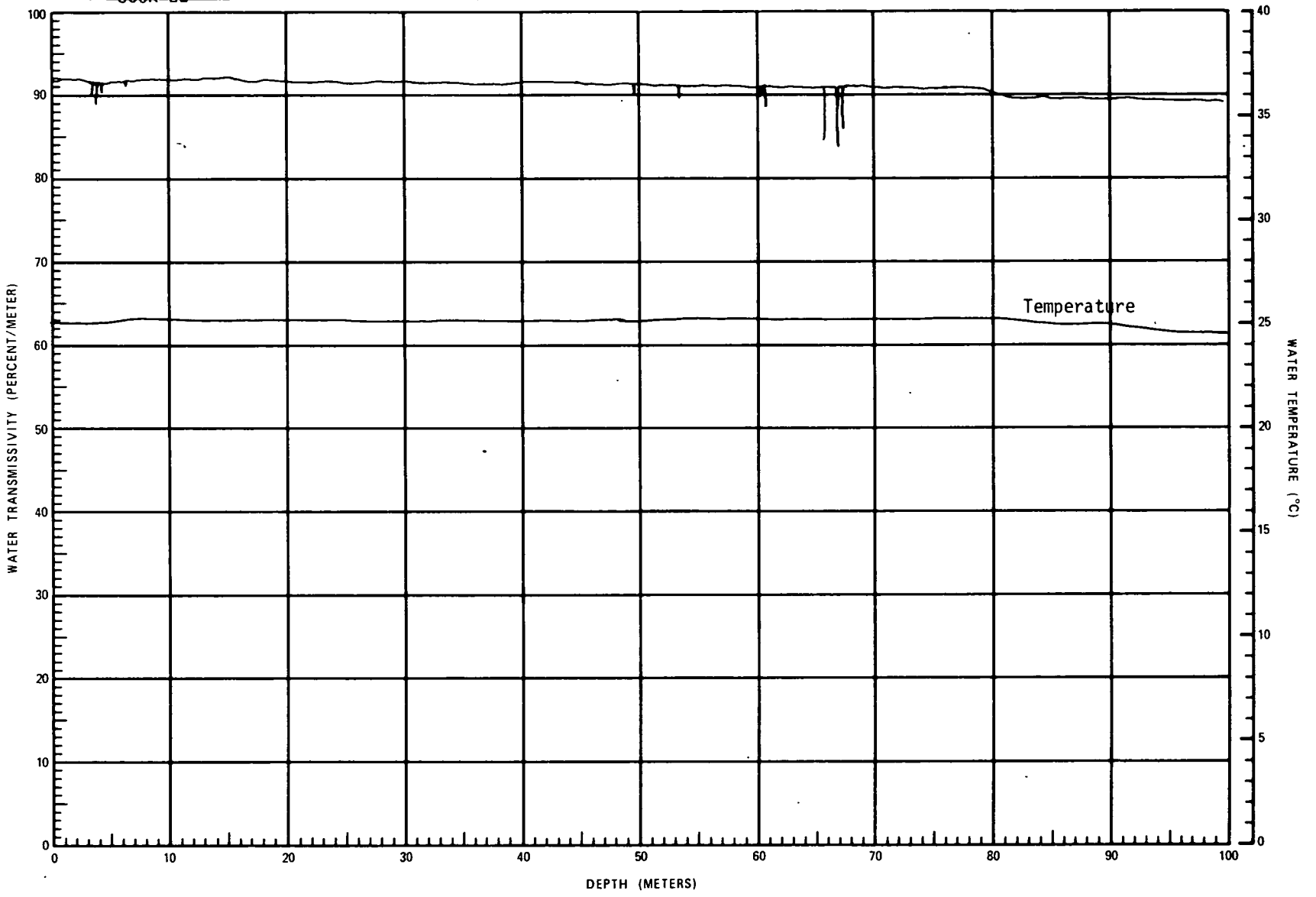
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 02 June 1970 LAT 25°38' N

TIME 1435 L.A.T. LONG 69°44' W SPECTRAL FILTER λ = 450 nm

STATION SCOR 22 WATER DEPTH 3000 FMS BUCKET TEMP 24.9° C

TRANSMISSIVITY PROFILE



T1 (3/72)

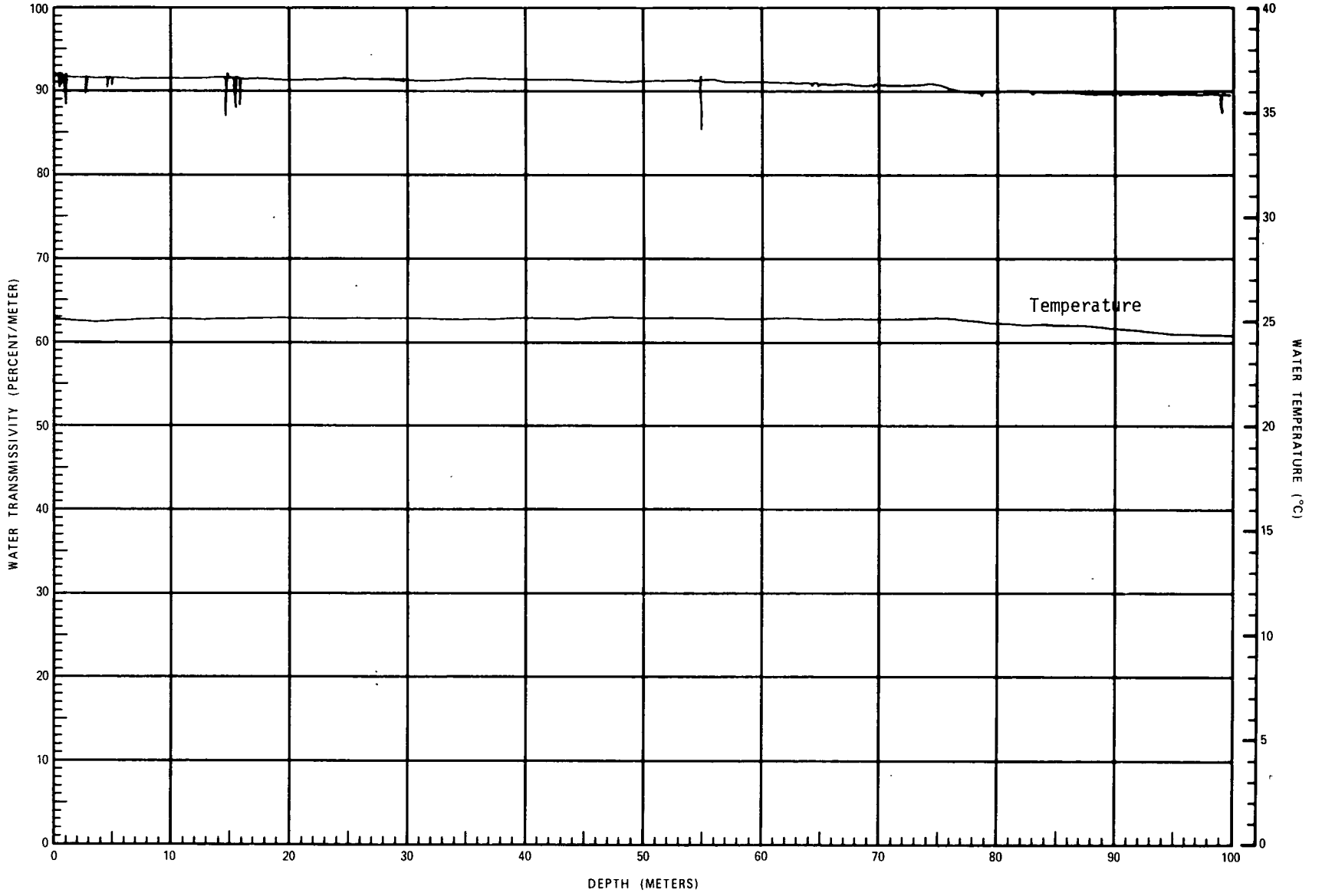
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 02 June 1970 LAT 25°38' N

TIME 1440 L.A.T. LONG 69°44' W SPECTRAL FILTER λ = 473 nm

STATION SCOR 22 WATER DEPTH 3000 FMS BUCKET TEMP 24.9° C

TRANSMISSIVITY PROFILE



T1 (3/72)

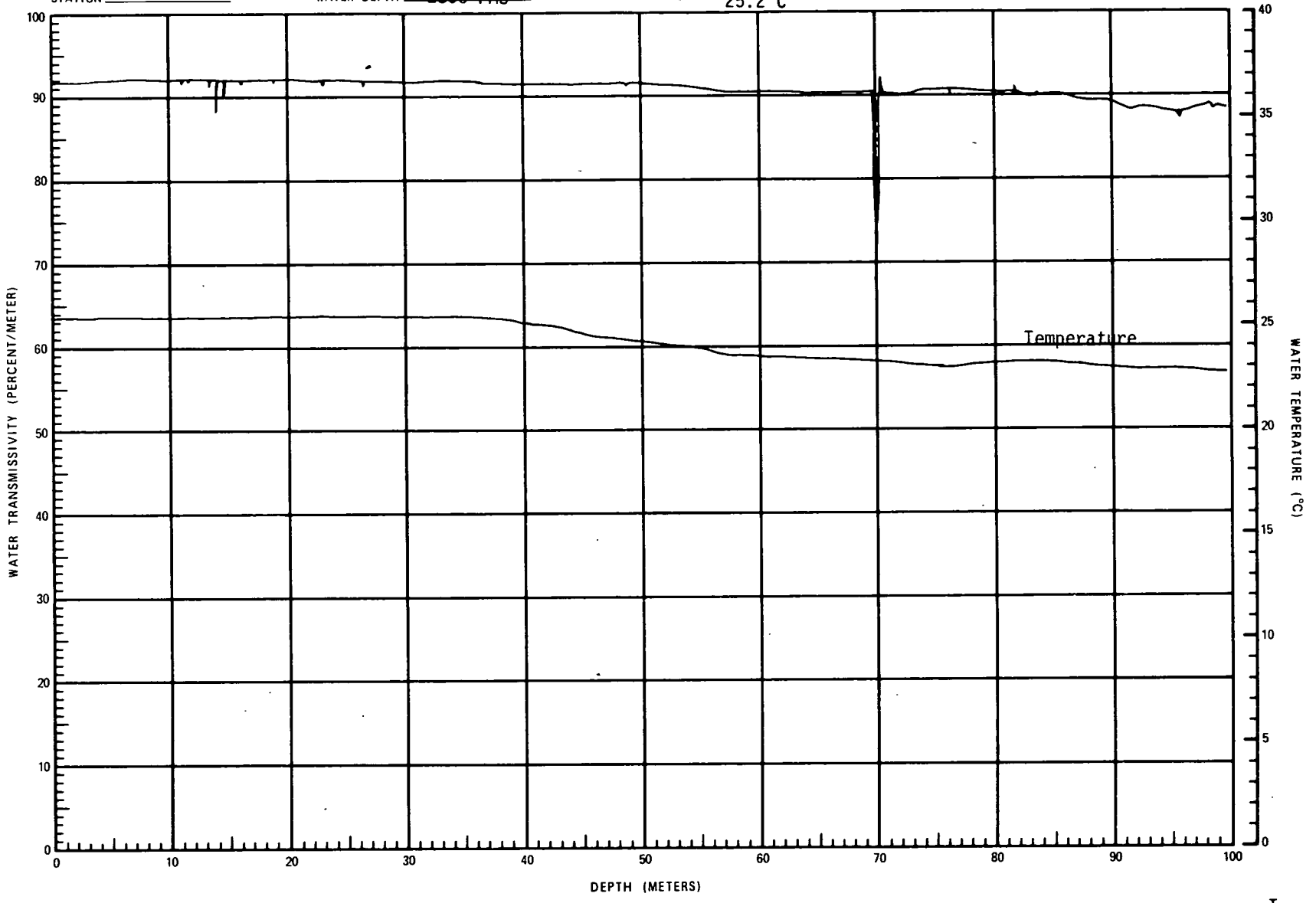
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 03 June 1970
TIME 1100 L.A.T.
STATION SCOR 23

LAT 25°47' N
LONG 74°14' W
WATER DEPTH 2800 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 473 nm
BUCKET TEMP 25.2°C

TRANSMISSIVITY PROFILE



T_1 (3/72)

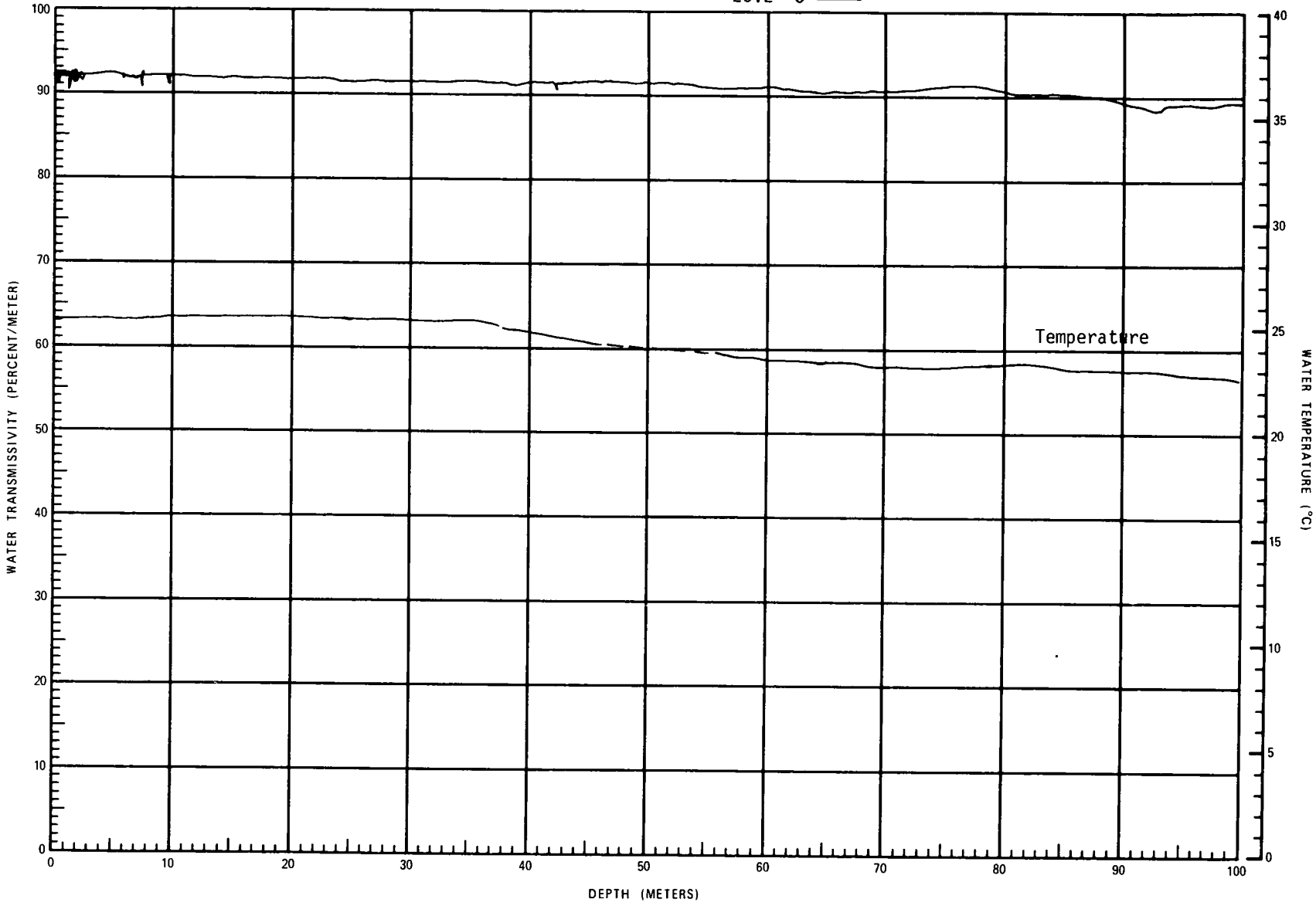
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 03 June 1970
TIME 1115 L.A.T.
STATION SCOR 23

LAT 25°47' N
LONG 74°14' W
WATER DEPTH 2800 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 491 nm
BUCKET TEMP 25.2° C

TRANSMISSIVITY PROFILE



T1 (3/72)

VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 03 June 1970 LAT 25°47' N

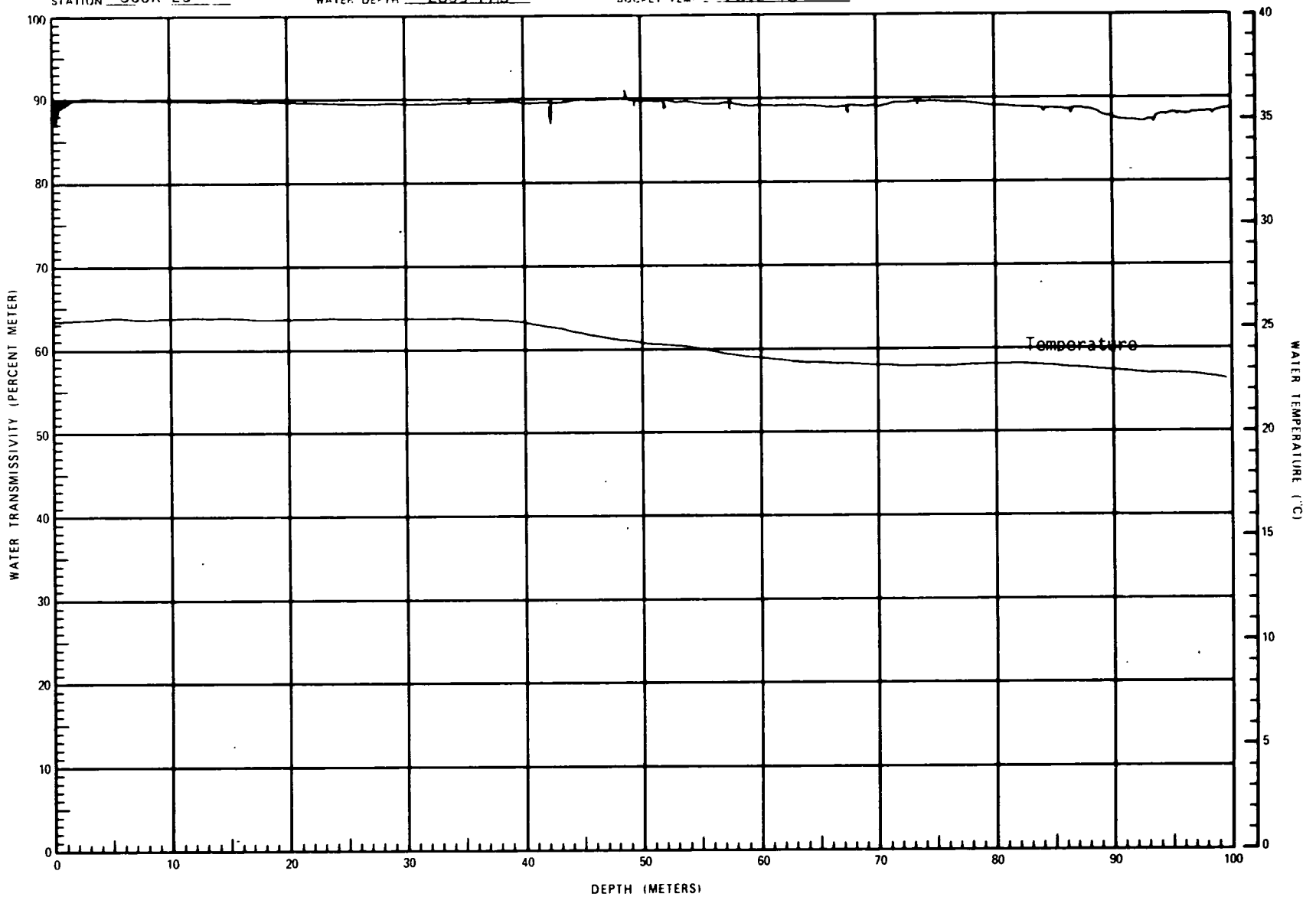
TIME 1125 L.A.T. LONG 74°14' W

STATION SCOR 23 WATER DEPTH 2800 FMS

SPECTRAL FILTER λ = 535 nm

BUCKET TEMP 25.2° C

TRANSMISSIVITY PROFILE



T_1 (3.72)

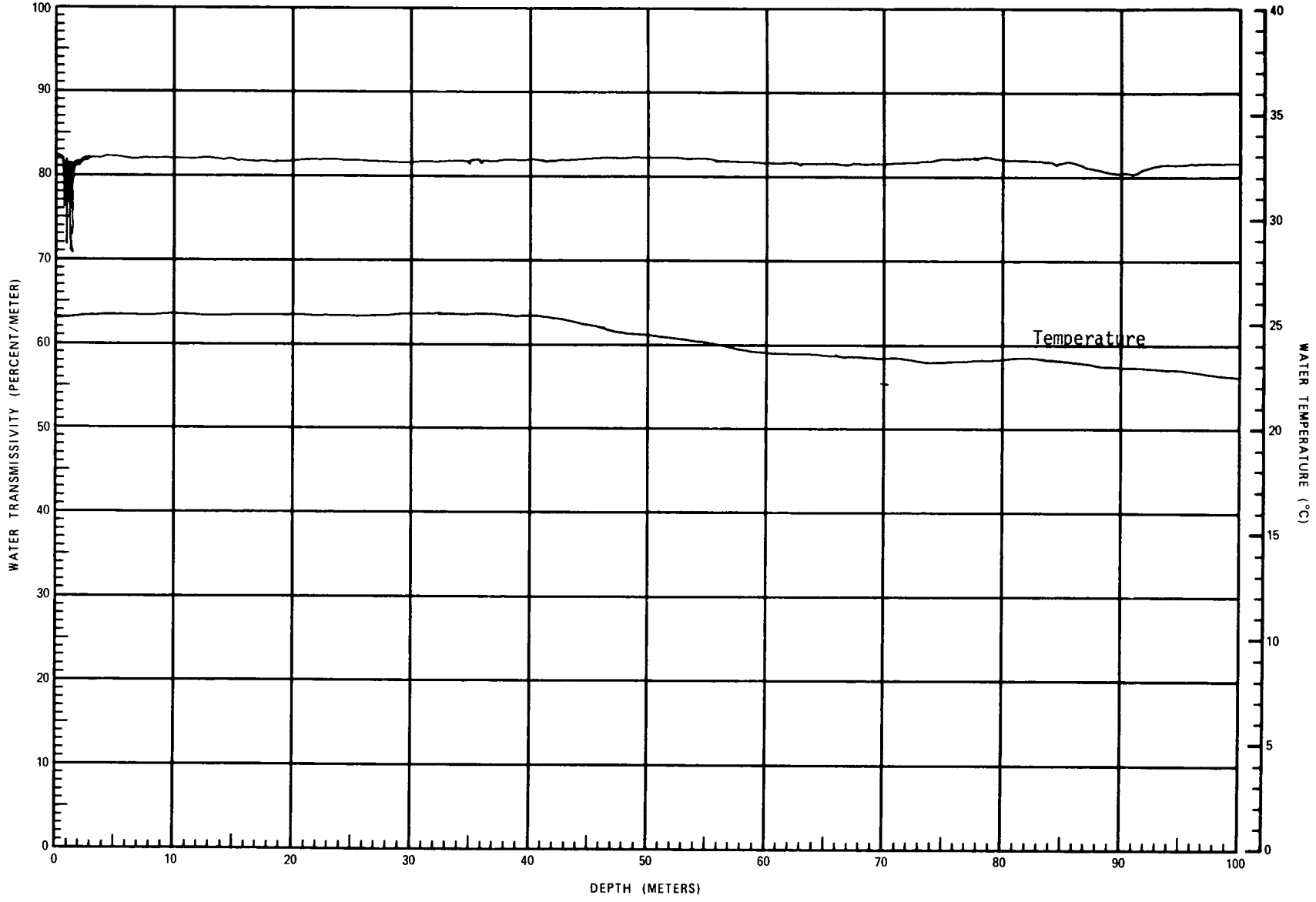
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 03 June 1970
TIME 1135 L.A.T.
STATION SCOR 23

LAT 25°47' N
LONG 74°14' W
WATER DEPTH 2800 FMS

SPECTRAL FILTER $\bar{\lambda}$ = 581 nm
BUCKET TEMP 25.2° C

TRANSMISSIVITY PROFILE



T1 (3/72

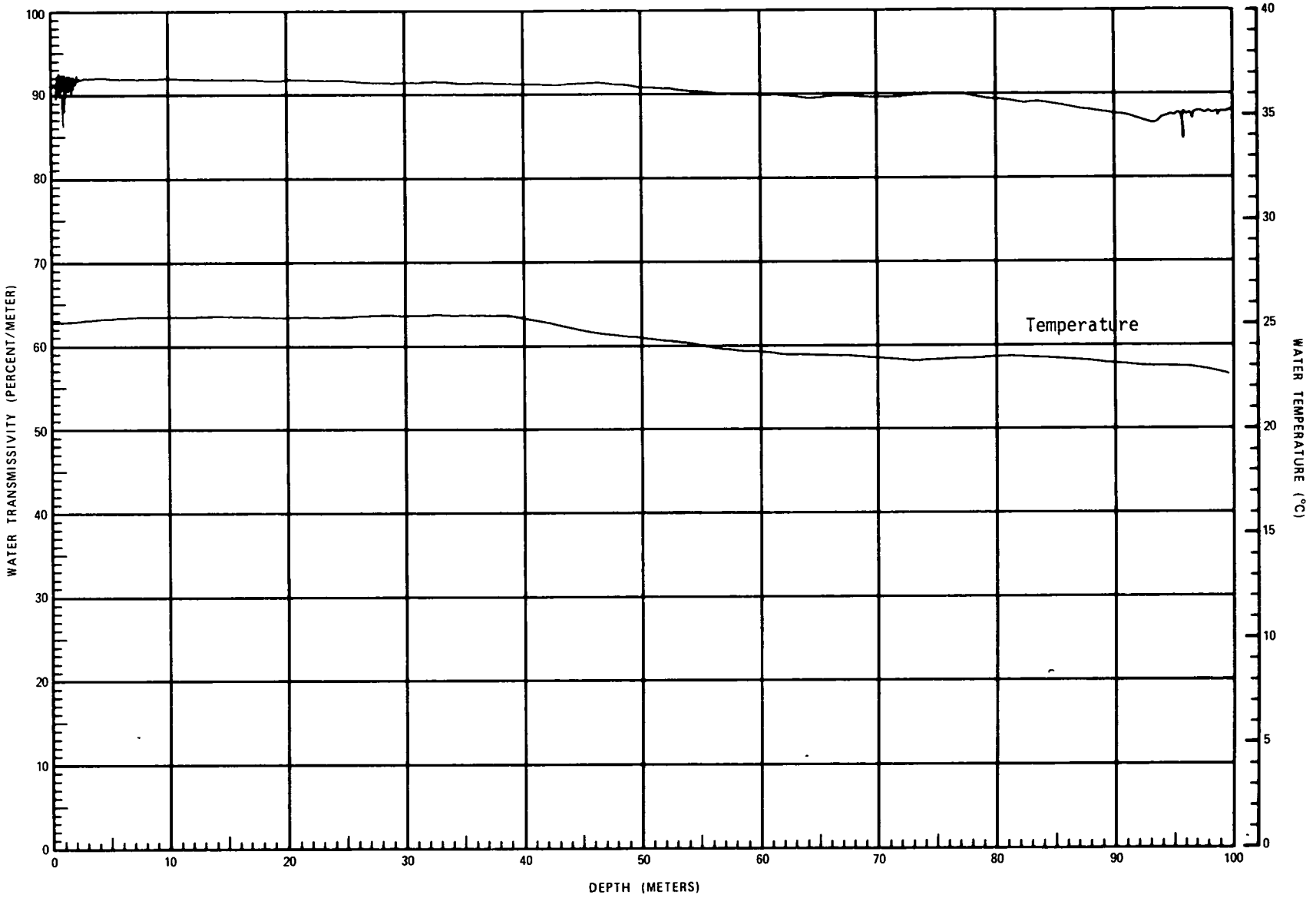
VISIBILITY LABORATORY UNIVERSITY OF CALIFORNIA SAN DIEGO

DATE 03 June 1970
TIME 1145 L.A.T.
STATION SCOR 23

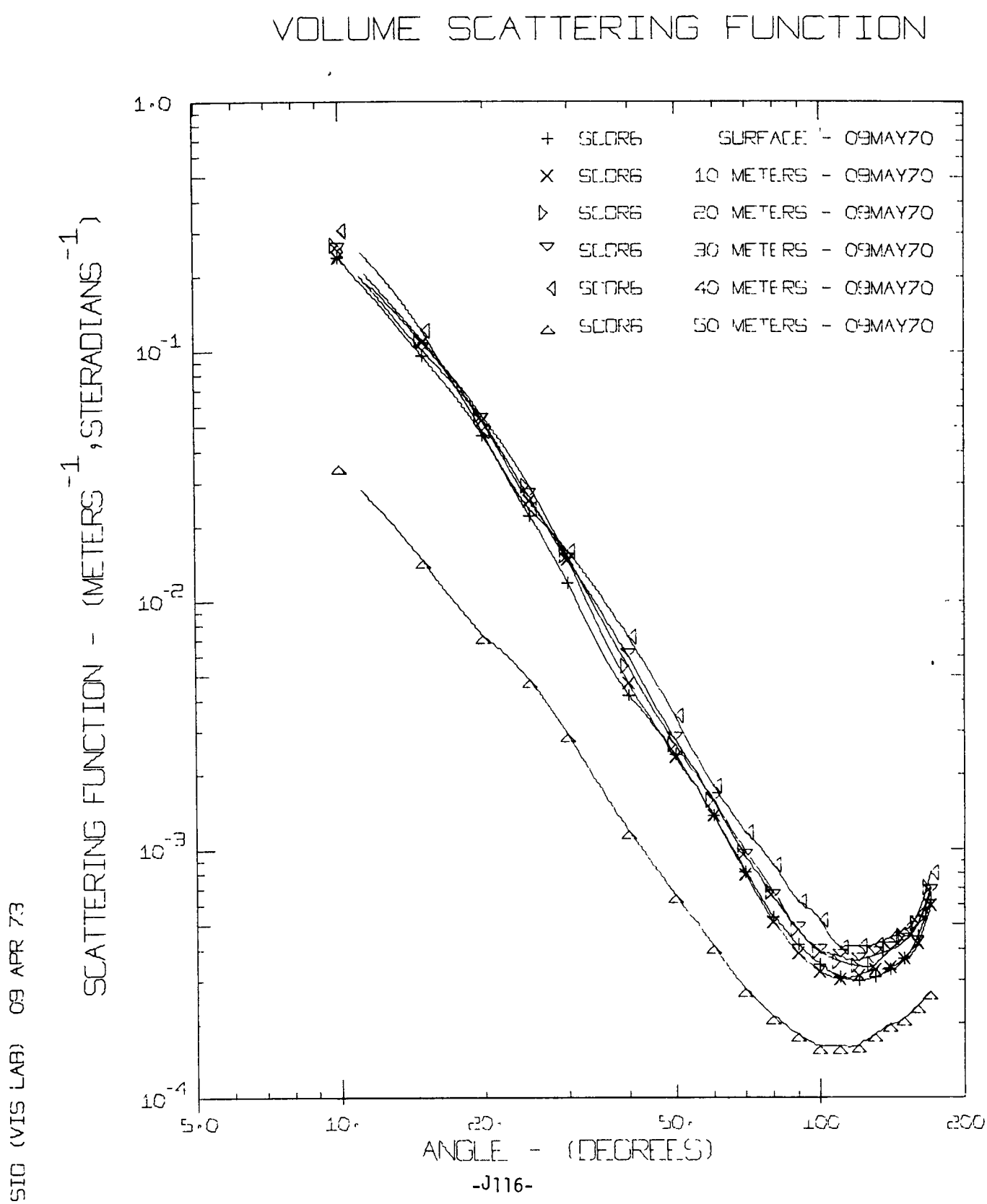
LAT 25°47' N
LONG 74°14' W
WATER DEPTH 2800 FMS

$\bar{\lambda}$ = 450 nm
SPECTRAL FILTER
BUCKET TEMP 25.2° C

TRANSMISSIVITY PROFILE



T_1 (3/72)



SIO (VIS LAB) 09 APR 73

SCOR6 SURFACE - 09MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.3700E-01
2	1.5000E 01	9.5000E-02
3	2.0000E 01	4.5900E-02
4	2.5000E 01	2.1900E-02
5	3.0000E 01	1.1700E-02
6	4.0000E 01	4.1200E-03
7	5.0000E 01	2.3700E-03
8	6.0000E 01	1.3500E-03
9	7.0000E 01	8.0700E-04
10	8.0000E 01	5.3300E-04
11	9.0000E 01	4.1000E-04
12	1.0000E 02	3.4400E-04
13	1.1000E 02	3.0600E-04
14	1.2000E 02	2.9500E-04
15	1.3000E 02	3.0500E-04
16	1.4000E 02	3.2700E-04
17	1.5000E 02	3.6200E-04
18	1.6000E 02	4.4800E-04
19	1.7000E 02	6.2300E-04

SCOR6 10 METERS - 09MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.3700E-01
2	1.5000E 01	1.0900E-01
3	2.0000E 01	5.2700E-02
4	2.5000E 01	2.5100E-02
5	3.0000E 01	1.4700E-02
6	4.0000E 01	4.6200E-03
7	5.0000E 01	2.3100E-03
8	6.0000E 01	1.3500E-03
9	7.0000E 01	7.8800E-04
10	8.0000E 01	5.0900E-04
11	9.0000E 01	3.8200E-04
12	1.0000E 02	3.2100E-04
13	1.1000E 02	2.9900E-04
14	1.2000E 02	3.0900E-04
15	1.3000E 02	3.2700E-04
16	1.4000E 02	3.3500E-04
17	1.5000E 02	3.6200E-04
18	1.6000E 02	4.1800E-04
19	1.7000E 02	5.9500E-04

SCOR6 20 METERS - 09MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.6600E-01
2	1.5000E 01	1.1100E-01
3	2.0000E 01	5.5200E-02
4	2.5000E 01	2.8900E-02
5	3.0000E 01	1.5100E-02
6	4.0000E 01	5.4300E-03
7	5.0000E 01	2.6000E-03
8	6.0000E 01	1.5500E-03
9	7.0000E 01	9.7000E-04
10	8.0000E 01	6.7100E-04
11	9.0000E 01	4.7100E-04
12	1.0000E 02	3.8600E-04
13	1.1000E 02	3.5200E-04
14	1.2000E 02	3.3900E-04
15	1.3000E 02	3.4200E-04
16	1.4000E 02	3.9300E-04
17	1.5000E 02	4.4500E-04
18	1.6000E 02	5.0300E-04
19	1.7000E 02	6.9900E-04

SCOR6 30 METERS - 09MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.5400E-01
2	1.5000E 01	1.0100E-01
3	2.0000E 01	5.2700E-02
4	2.5000E 01	2.6300E-02
5	3.0000E 01	1.4400E-02
6	4.0000E 01	5.9500E-03
7	5.0000E 01	2.7200E-03
8	6.0000E 01	1.5500E-03
9	7.0000E 01	9.2600E-04
10	8.0000E 01	6.4100E-04
11	9.0000E 01	4.7100E-04
12	1.0000E 02	3.8600E-04
13	1.1000E 02	3.6900E-04
14	1.2000E 02	3.5500E-04
15	1.3000E 02	3.7500E-04
16	1.4000E 02	3.9300E-04
17	1.5000E 02	4.2500E-04
18	1.6000E 02	5.0300E-04
19	1.7000E 02	6.6800E-04

SCORE 40 KEYS - 09MAY70

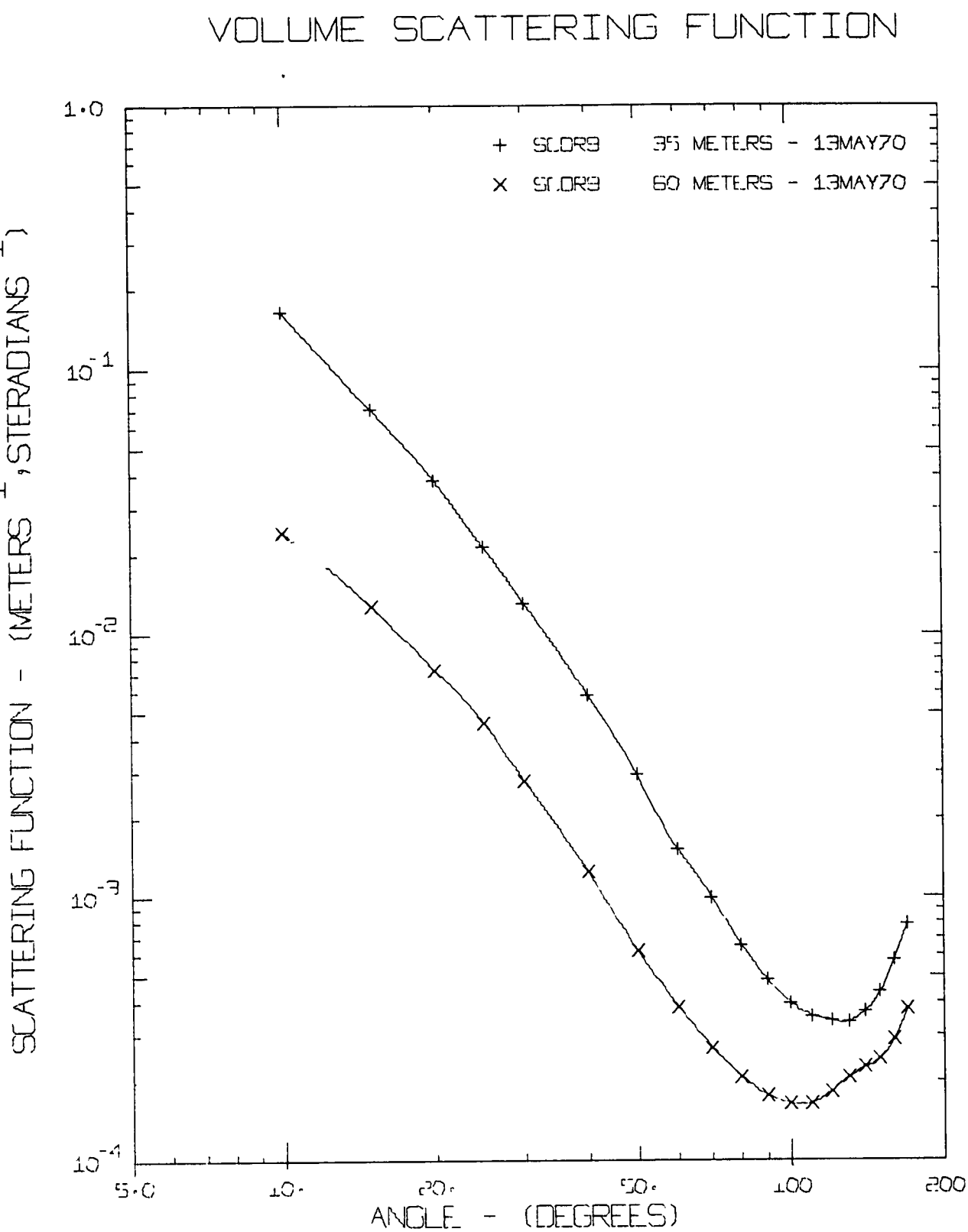
SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	3.0500E-01
2	1.5000E 01	1.2200E-01
3	2.0000E 01	4.8000E-02
4	2.5000E 01	2.3500E-02
5	3.0000E 01	1.5800E-02
6	4.0000E 01	7.1600E-03
7	5.0000E 01	3.4200E-03
8	6.0000E 01	1.7800E-03
9	7.0000E 01	1.1600E-03
10	8.0000E 01	8.6500E-04
11	9.0000E 01	6.2000E-04
12	1.0000E 02	5.2100E-04
13	1.1000E 02	4.0400E-04
14	1.2000E 02	4.0900E-04
15	1.3000E 02	4.1200E-04
16	1.4000E 02	4.2100E-04
17	1.5000E 02	4.7700E-04
18	1.6000E 02	5.5200E-04
19	1.7000E 02	7.0300E-04

SCORE 50 KEYS - 09MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	3.0000E-01
2	1.5000E 01	1.4700E-01
3	2.0000E 01	7.2700E-02
4	2.5000E 01	4.7900E-02
5	3.0000E 01	2.8700E-02
6	4.0000E 01	1.3300E-02
7	5.0000E 01	6.3000E-03
8	6.0000E 01	4.0800E-03
9	7.0000E 01	2.7300E-03
10	8.0000E 01	2.1200E-03
11	9.0000E 01	1.7900E-03
12	1.0000E 02	1.5100E-03
13	1.1000E 02	1.6100E-03
14	1.2000E 02	1.6200E-03
15	1.3000E 02	1.7900E-03
16	1.4000E 02	1.9700E-03
17	1.5000E 02	2.0900E-03
18	1.6000E 02	2.3000E-03
19	1.7000E 02	2.5300E-03



SIO (VIS LAB) 03 APR 73

SCOR9 35 METERS - 13MAY70

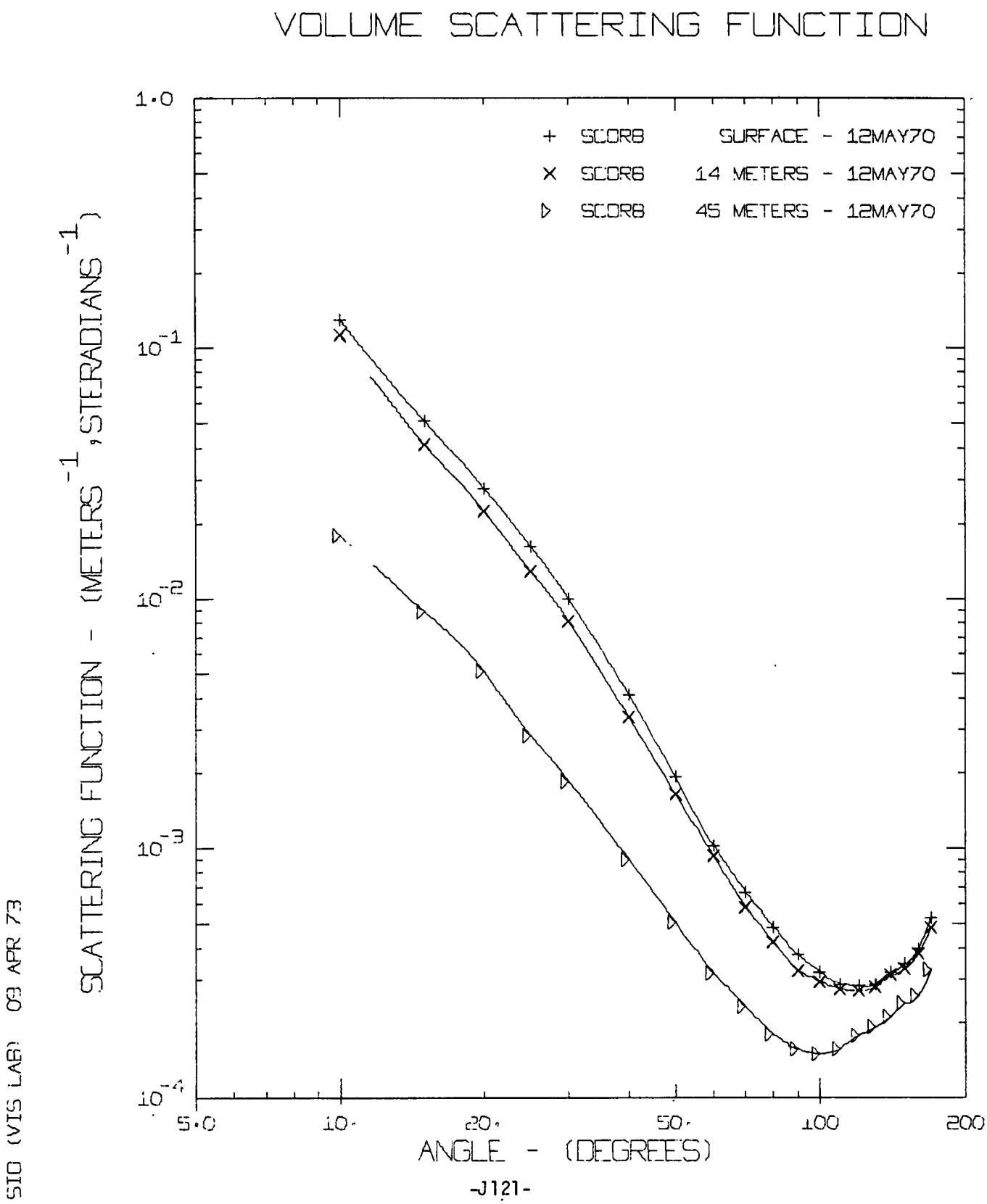
SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	1.6400E-01
2	1.5000E 01	7.0400E-02
3	2.0000E 01	3.8200E-02
4	2.5000E 01	2.1400E-02
5	3.0000E 01	1.3100E-02
6	4.0000E 01	5.8200E-03
7	5.0000E 01	2.9100E-03
8	6.0000E 01	1.5100E-03
9	7.0000E 01	9.9300E-04
10	8.0000E 01	6.5600E-04
11	9.0000E 01	4.8200E-04
12	1.0000E 02	3.9500E-04
13	1.1000E 02	3.5200E-04
14	1.2000E 02	3.3900E-04
15	1.3000E 02	3.3500E-04
16	1.4000E 02	3.6700E-04
17	1.5000E 02	4.3500E-04
18	1.6000E 02	5.7800E-04
19	1.7000E 02	7.8500E-04

SCOR9 60 METERS - 13MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.4200E-02
2	1.5000E 01	1.2800E-02
3	2.0000E 01	7.2700E-03
4	2.5000E 01	4.5800E-03
5	3.0000E 01	2.7400E-03
6	4.0000E 01	1.2400E-03
7	5.0000E 01	6.2300E-04
8	6.0000E 01	3.8100E-04
9	7.0000E 01	2.6700E-04
10	8.0000E 01	2.0700E-04
11	9.0000E 01	1.7500E-04
12	1.0000E 02	1.6400E-04
13	1.1000E 02	1.6400E-04
14	1.2000E 02	1.8200E-04
15	1.3000E 02	2.0600E-04
16	1.4000E 02	2.2600E-04
17	1.5000E 02	2.4400E-04
18	1.6000E 02	2.8900E-04
19	1.7000E 02	3.7500E-04



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SCOR8 SURFACE - 12MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	1.3000E-01
2	1.5000E 01	5.1000E-02
3	2.0000E 01	2.7600E-02
4	2.5000E 01	1.6200E-02
5	3.0000E 01	9.9700E-03
6	4.0000E 01	4.1200E-03
7	5.0000E 01	1.9200E-03
8	6.0000E 01	1.0200E-03
9	7.0000E 01	6.7100E-04
10	8.0000E 01	4.8600E-04
11	9.0000E 01	3.7400E-04
12	1.0000E 02	3.2100E-04
13	1.1000E 02	2.8600E-04
14	1.2000E 02	2.8200E-04
15	1.3000E 02	2.8500E-04
16	1.4000E 02	3.1900E-04
17	1.5000E 02	3.4500E-04
18	1.6000E 02	4.0000E-04
19	1.7000E 02	5.3100E-04

SCOR8 14 METERS - 12MAY70

SCATTERING FUNCTION

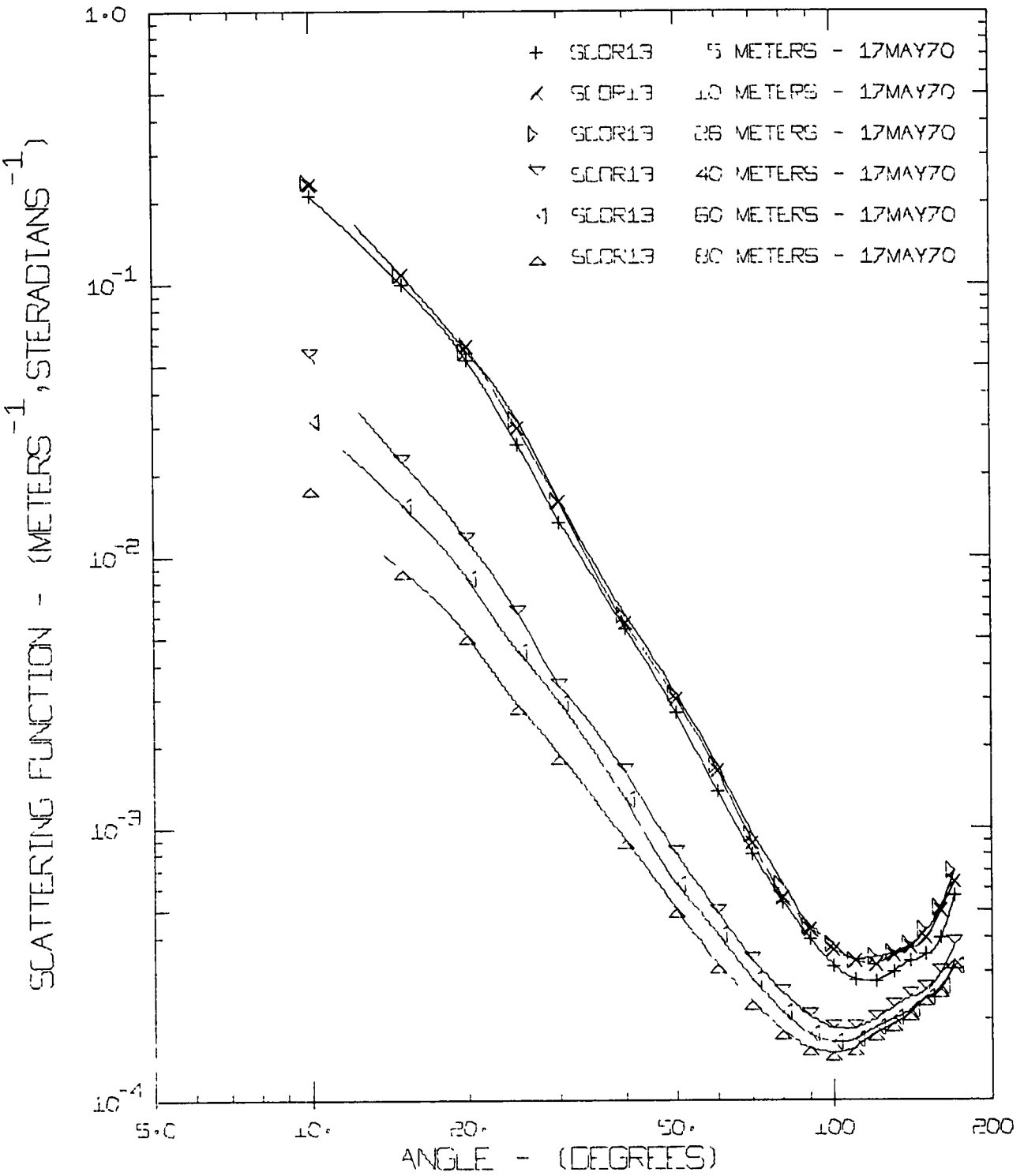
	ANGLE (DEG)	SIGMA
1	1.0000E 01	1.1300E-01
2	1.5000E 01	4.1400E-02
3	2.0000E 01	2.2400E-02
4	2.5000E 01	1.2900E-02
5	3.0000E 01	8.1000E-03
6	4.0000E 01	3.3500E-03
7	5.0000E 01	1.6400E-03
8	6.0000E 01	9.3500E-04
9	7.0000E 01	5.9400E-04
10	8.0000E 01	4.2300E-04
11	9.0000E 01	3.2500E-04
12	1.0000E 02	2.9300E-04
13	1.1000E 02	2.7300E-04
14	1.2000E 02	2.6900E-04
15	1.3000E 02	2.7800E-04
16	1.4000E 02	3.1200E-04
17	1.5000E 02	3.3000E-04
18	1.6000E 02	3.8200E-04
19	1.7000E 02	4.8400E-04

SCOR8 45 METERS - 12MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	1.7900E-02
2	1.5000E 01	6.8700E-03
3	2.0000E 01	3.1500E-03
4	2.5000E 01	2.8200E-03
5	3.0000E 01	1.9500E-03
6	4.0000E 01	6.0100E-04
7	5.0000E 01	3.0700E-04
8	6.0000E 01	2.1700E-04
9	7.0000E 01	2.3200E-04
10	8.0000E 01	1.8000E-04
11	9.0000E 01	1.5600E-04
12	1.0000E 02	1.5000E-04
13	1.1000E 02	1.5700E-04
14	1.2000E 02	1.7400E-04
15	1.3000E 02	1.9200E-04
16	1.4000E 02	2.1100E-04
17	1.5000E 02	2.2900E-04
18	1.6000E 02	2.3800E-04
19	1.7000E 02	3.2700E-04

VOLUME SCATTERING FUNCTION



SIO (VIS LAB) 03 APR 73

SCOR13 5 METERS - 17MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.1100E-01
2	1.5000E 01	9.9500E-02
3	2.0000E 01	5.2700E-02
4	2.5000E 01	2.5800E-02
5	3.0000E 01	1.3400E-02
6	4.0000E 01	5.4300E-03
7	5.0000E 01	2.6600E-03
8	6.0000E 01	1.3600E-03
9	7.0000E 01	8.0400E-04
10	8.0000E 01	5.3600E-04
11	9.0000E 01	3.9500E-04
12	1.0000E 02	3.1400E-04
13	1.1000E 02	2.7900E-04
14	1.2000E 02	2.7600E-04
15	1.3000E 02	2.9800E-04
16	1.4000E 02	3.2700E-04
17	1.5000E 02	3.4500E-04
18	1.6000E 02	3.9900E-04
19	1.7000E 02	5.6800E-04

SCOR13 10 METERS - 17MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.3200E-01
2	1.5000E 01	1.0900E-01
3	2.0000E 01	5.9100E-02
4	2.5000E 01	2.9500E-02
5	3.0000E 01	1.5800E-02
6	4.0000E 01	5.6800E-03
7	5.0000E 01	2.9800E-03
8	6.0000E 01	1.6200E-03
9	7.0000E 01	8.8500E-04
10	8.0000E 01	5.5800E-04
11	9.0000E 01	4.2900E-04
12	1.0000E 02	3.6000E-04
13	1.1000E 02	3.2800E-04
14	1.2000E 02	3.1700E-04
15	1.3000E 02	3.4200E-04
16	1.4000E 02	3.6700E-04
17	1.5000E 02	3.9700E-04
18	1.6000E 02	5.0300E-04
19	1.7000E 02	6.3800E-04

SCOR13 28 METERS - 17MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.3700E-01
2	1.5000E 01	1.0900E-01
3	2.0000E 01	5.6400E-02
4	2.5000E 01	3.1700E-02
5	3.0000F 01	1.6100E-02
6	4.0000E 01	6.0900E-03
7	5.0000E 01	3.1200E-03
8	6.0000E 01	1.7000E-03
9	7.0000E 01	9.4800E-04
10	8.0000F 01	6.2600E-04
11	9.0000E 01	4.3900E-04
12	1.0000E 02	3.7700E-04
13	1.1000E 02	3.2800E-04
14	1.2000E 02	3.3900E-04
15	1.3000E 02	3.5000E-04
16	1.4000E 02	3.7500E-04
17	1.5000E 02	4.2500E-04
18	1.6000F 02	5.1500E-04
19	1.7000E 02	6.9900E-04

SCOR13 40 METERS - 17MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	5.4300E-02
2	1.5000E 01	2.2200E-02
3	2.0000E 01	1.1500E-02
4	2.5000E 01	6.1800E-03
5	3.0000E 01	3.3200E-03
6	4.0000E 01	1.6000E-03
7	5.0000E 01	8.0300E-04
8	6.0000E 01	4.9000E-04
9	7.0000E 01	3.2800E-04
10	8.0000E 01	2.4900E-04
11	9.0000E 01	2.0500E-04
12	1.0000E 02	1.8500E-04
13	1.1000E 02	1.8500E-04
14	1.2000E 02	2.0000E-04
15	1.3000E 02	2.2100E-04
16	1.4000E 02	2.4200E-04
17	1.5000E 02	2.5600E-04
18	1.6000E 02	2.9600E-04
19	1.7000E 02	3.7500E-04

SCOR13 60 METERS - 17MAY70

SCATTERING FUNCTION

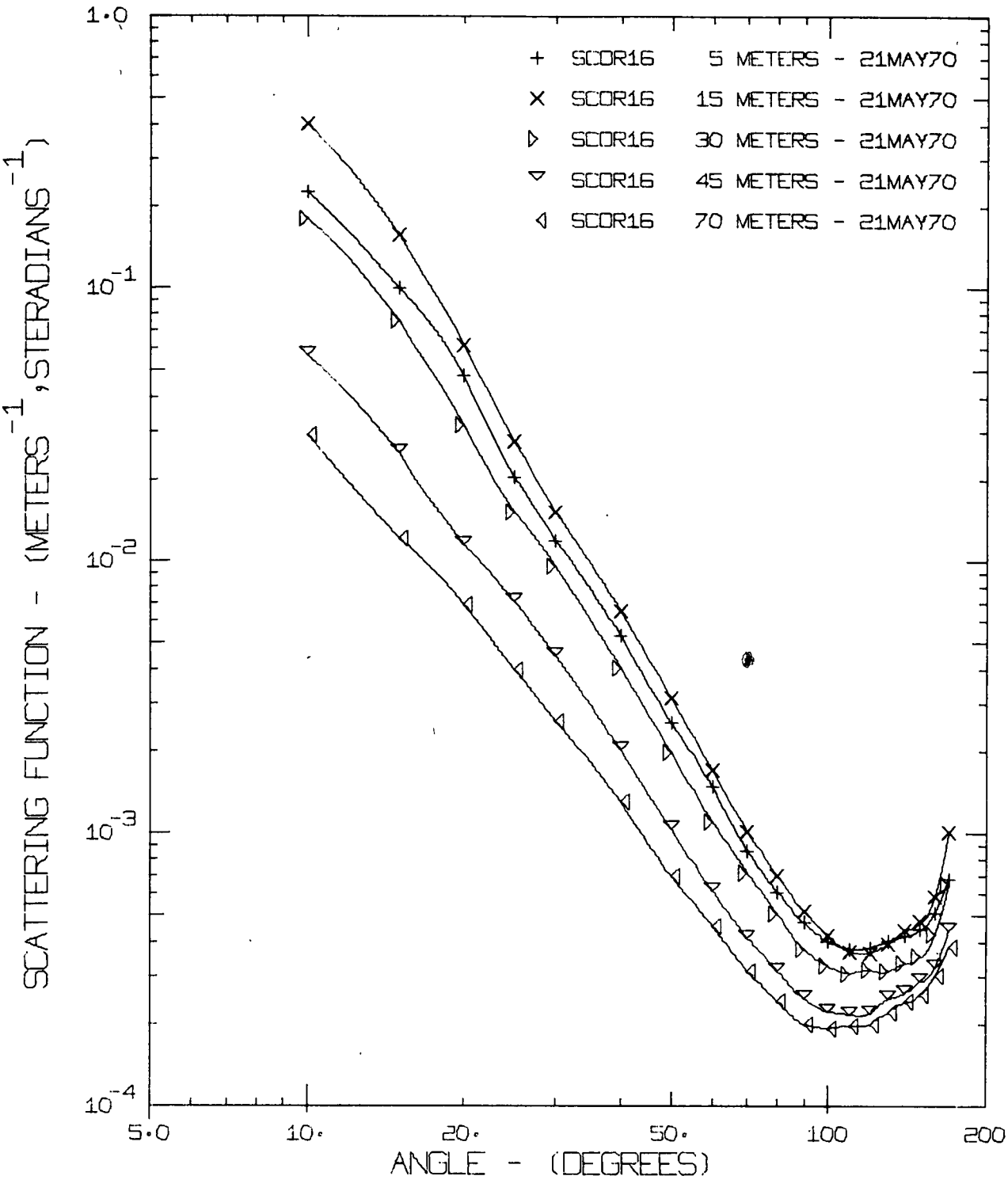
	ANGLE (DEG)	SIGMA
1	1.0000E 01	3.1200E-02
2	1.5000E 01	1.5400E-02
3	2.0000E 01	8.3500E-03
4	2.5000E 01	4.4700E-03
5	3.0000E 01	2.8700E-03
6	4.0000E 01	1.2700E-03
7	5.0000E 01	6.2300E-04
8	6.0000E 01	4.0800E-04
9	7.0000E 01	2.7900E-04
10	8.0000E 01	2.1200E-04
11	9.0000E 01	1.7500E-04
12	1.0000E 02	1.6400E-04
13	1.1000E 02	1.6800E-04
14	1.2000E 02	1.8600E-04
15	1.3000E 02	2.0100E-04
16	1.4000E 02	2.1600E-04
17	1.5000E 02	2.3900E-04
18	1.6000E 02	2.6400E-04
19	1.7000E 02	3.1200E-04

SCOR13 80 METERS - 17MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	1.7900E-02
2	1.5000E 01	8.8700E-03
3	2.0000E 01	5.1500E-03
4	2.5000E 01	2.8200E-03
5	3.0000E 01	1.8500E-03
6	4.0000E 01	9.0100E-04
7	5.0000E 01	5.0700E-04
8	6.0000E 01	3.1700E-04
9	7.0000E 01	2.3200E-04
10	8.0000E 01	1.8000E-04
11	9.0000E 01	1.5600E-04
12	1.0000E 02	1.5000E-04
13	1.1000E 02	1.5700E-04
14	1.2000E 02	1.7800E-04
15	1.3000E 02	1.9200E-04
16	1.4000E 02	2.1100E-04
17	1.5000E 02	2.3900E-04
18	1.6000E 02	2.5800E-04
19	1.7000E 02	3.2700E-04

VOLUME SCATTERING FUNCTION



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SCOR16 5 METERS - 21MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.2600E-01
2	1.5000E 01	9.9500E-02
3	2.0000E 01	4.8000E-02
4	2.5000E 01	2.0400E-02
5	3.0000E 01	1.1900E-02
6	4.0000E 01	5.3000E-03
7	5.0000E 01	2.5400E-03
8	6.0000E 01	1.4800E-03
9	7.0000E 01	8.6500E-04
10	8.0000E 01	6.1200E-04
11	9.0000E 01	4.7100E-04
12	1.0000E 02	4.0400E-04
13	1.1000E 02	3.7700E-04
14	1.2000E 02	3.8100E-04
15	1.3000E 02	4.0200E-04
16	1.4000E 02	4.2100E-04
17	1.5000E 02	4.4500E-04
18	1.6000E 02	5.1500E-04
19	1.7000E 02	6.8300E-04

SCOR16 15 METERS - 21MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	4.0200E-01
2	1.5000E 01	1.5700E-01
3	2.0000E 01	6.1900E-02
4	2.5000E 01	2.7600E-02
5	3.0000E 01	1.5100E-02
6	4.0000E 01	6.5300E-03
7	5.0000E 01	3.1200E-03
8	6.0000E 01	1.7000E-03
9	7.0000E 01	1.0100E-03
10	8.0000E 01	7.0300E-04
11	9.0000E 01	5.1600E-04
12	1.0000E 02	4.2300E-04
13	1.1000E 02	3.6900E-04
14	1.2000E 02	3.6400E-04
15	1.3000E 02	3.9300E-04
16	1.4000E 02	4.4100E-04
17	1.5000E 02	4.7700E-04
18	1.6000E 02	5.9100E-04
19	1.7000E 02	1.0100E-03

SCOR16 30 METERS - 21MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	1.8000E-01
2	1.5000E 01	7.5500E-02
3	2.0000E 01	3.1700E-02
4	2.5000E 01	1.5200E-02
5	3.0000E 01	9.5200E-03
6	4.0000E 01	4.0200E-03
7	5.0000E 01	1.9700E-03
8	6.0000E 01	1.1000E-03
9	7.0000E 01	7.1900E-04
10	8.0000E 01	5.0900E-04
11	9.0000E 01	3.7400E-04
12	1.0000E 02	3.2900E-04
13	1.1000E 02	3.0700E-04
14	1.2000E 02	3.1700E-04
15	1.3000E 02	3.1200E-04
16	1.4000E 02	3.3500E-04
17	1.5000E 02	3.5400E-04
18	1.6000E 02	4.2800E-04
19	1.7000E 02	6.5300E-04

SCOR16 45 METERS - 21MAY70

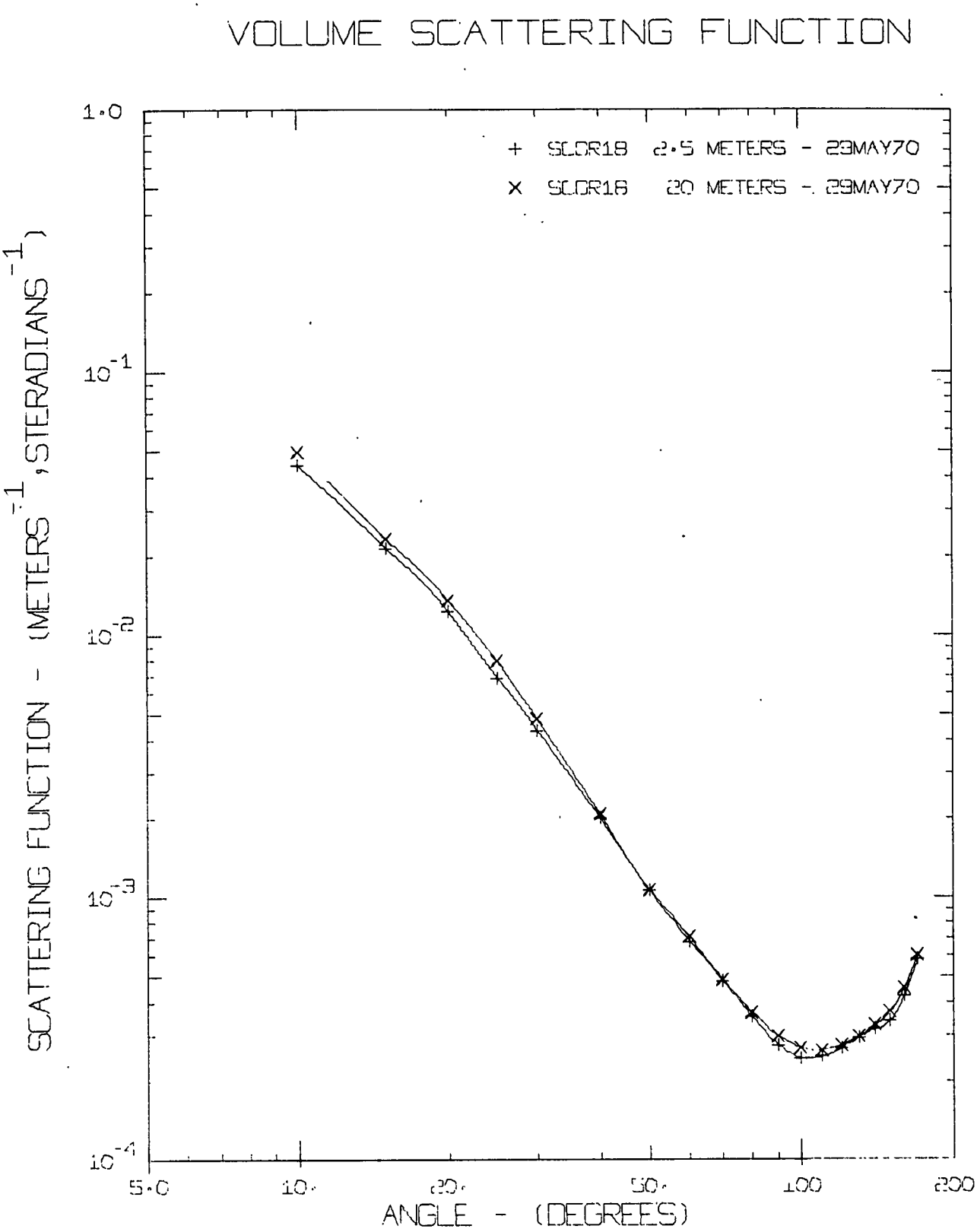
SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	5.6800E-02
2	1.5000E 01	2.5000E-02
3	2.0000E 01	1.1500E-02
4	2.5000E 01	7.0900E-03
5	3.0000E 01	4.4500E-03
6	4.0000E 01	2.0100E-03
7	5.0000E 01	1.0300E-03
8	6.0000E 01	6.1800E-04
9	7.0000E 01	4.1400E-04
10	8.0000E 01	3.1400E-04
11	9.0000E 01	2.4700E-04
12	1.0000E 02	2.2200E-04
13	1.1000E 02	2.1700E-04
14	1.2000E 02	2.1900E-04
15	1.3000E 02	2.4800E-04
16	1.4000E 02	2.6000E-04
17	1.5000E 02	2.8700E-04
18	1.6000E 02	3.2500E-04
19	1.7000E 02	4.4100E-04

SCOR16 70 METERS - 21MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.9200E-02
2	1.5000E 01	1.2200E-02
3	2.0000E 01	6.9500E-03
4	2.5000E 01	3.9900E-03
5	3.0000E 01	2.5600E-03
6	4.0000E 01	1.3000E-03
7	5.0000E 01	6.9900E-04
8	6.0000E 01	4.5800E-04
9	7.0000E 01	3.1400E-04
10	8.0000E 01	2.4300E-04
11	9.0000E 01	2.0000E-04
12	1.0000E 02	1.9300E-04
13	1.1000E 02	1.9800E-04
14	1.2000E 02	2.0000E-04
15	1.3000E 02	2.2100E-04
16	1.4000E 02	2.4200E-04
17	1.5000E 02	2.5600E-04
18	1.6000E 02	3.0300E-04
19	1.7000E 02	3.8400E-04



SIO (VIS LAB) 03 APR 73

SCOR18 2.5 METERS - 29MAY70

SCATTERING FUNCTION

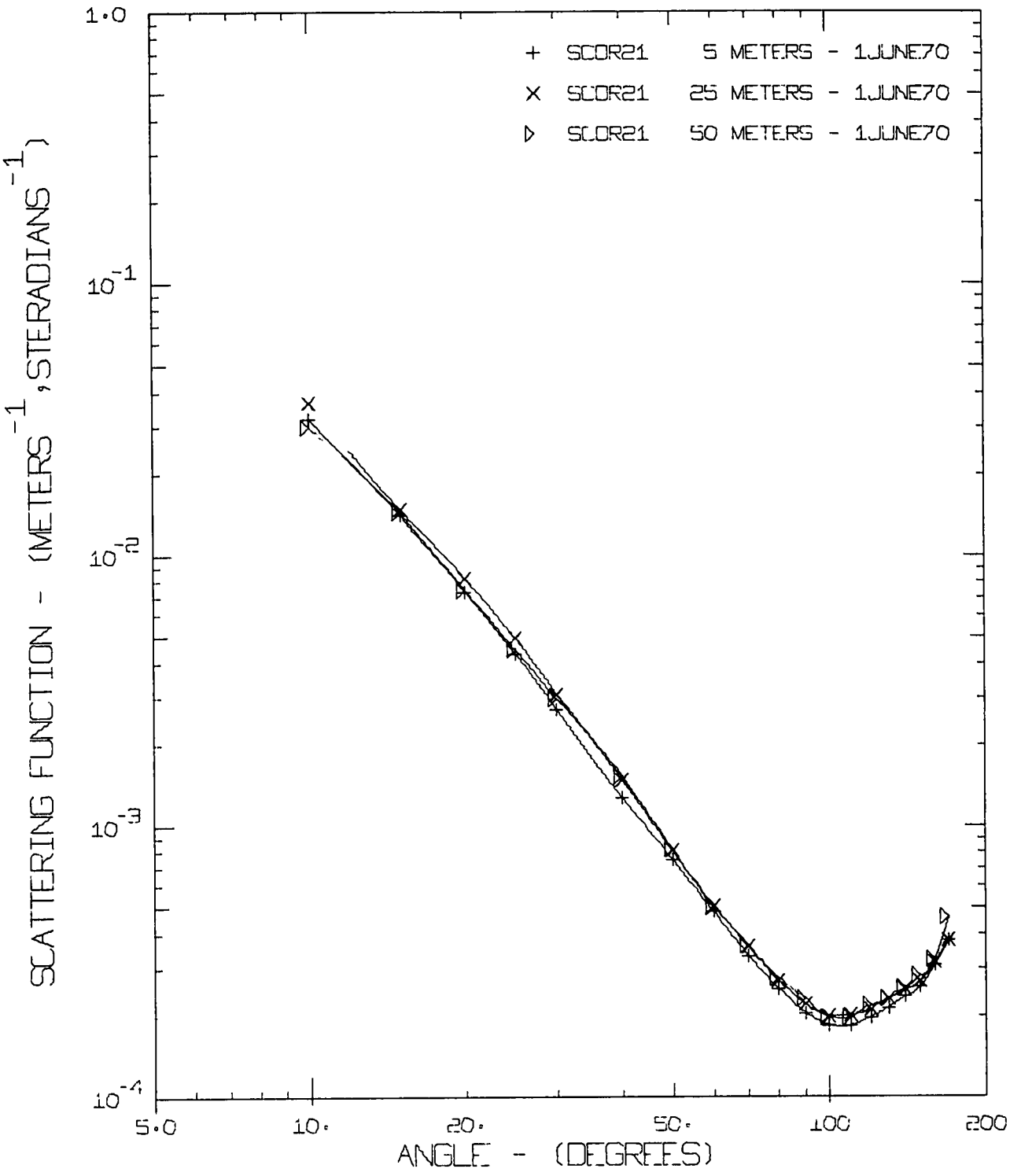
	ANGLE (DEG)	SIGMA
1	1.0000E 01	4.4000E-02
2	1.5000E 01	2.1500E-02
3	2.0000E 01	1.2300E-02
4	2.5000E 01	6.8700E-03
5	3.0000E 01	4.3300E-03
6	4.0000E 01	1.9900E-03
7	5.0000E 01	1.0600E-03
8	6.0000E 01	6.7900E-04
9	7.0000E 01	4.8100E-04
10	8.0000E 01	3.5000E-04
11	9.0000E 01	2.7300E-04
12	1.0000E 02	2.4300E-04
13	1.1000E 02	2.4700E-04
14	1.2000E 02	2.6500E-04
15	1.3000E 02	2.9300E-04
16	1.4000E 02	3.1600E-04
17	1.5000E 02	3.3900E-04
18	1.6000E 02	4.2100E-04
19	1.7000E 02	5.7900E-04

SCOR18 20 METERS - 29MAY70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	4.9400E-02
2	1.5000E 01	2.3300E-02
3	2.0000E 01	1.3500E-02
4	2.5000E 01	7.9300E-03
5	3.0000E 01	4.7600E-03
6	4.0000E 01	2.0600E-03
7	5.0000E 01	1.0600E-03
8	6.0000E 01	7.0500E-04
9	7.0000E 01	4.8400E-04
10	8.0000E 01	3.6400E-04
11	9.0000E 01	2.9500E-04
12	1.0000E 02	2.6700E-04
13	1.1000E 02	2.6100E-04
14	1.2000E 02	2.7300E-04
15	1.3000E 02	2.9500E-04
16	1.4000E 02	3.2600E-04
17	1.5000E 02	3.6700E-04
18	1.6000E 02	4.5000E-04
19	1.7000E 02	6.0000E-04

VOLUME SCATTERING FUNCTION



SIO (VIS LAB) 09 APR 73

SCOR21 5 METERS - 1JUNE70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	3.1900E-02
2	1.5000E 01	1.4100E-02
3	2.0000E 01	7.3600E-03
4	2.5000E 01	4.3400E-03
5	3.0000E 01	2.7000E-03
6	4.0000E 01	1.2700E-03
7	5.0000E 01	7.5200E-04
8	6.0000E 01	4.8200E-04
9	7.0000E 01	3.3100E-04
10	8.0000E 01	2.5100E-04
11	9.0000E 01	2.0500E-04
12	1.0000E 02	1.8500E-04
13	1.1000E 02	1.8400E-04
14	1.2000E 02	1.9800E-04
15	1.3000E 02	2.1500E-04
16	1.4000E 02	2.3600E-04
17	1.5000E 02	2.5800E-04
18	1.6000E 02	3.1000E-04
19	1.7000E 02	3.9000E-04

SCOR21 25 METERS - 1JUNE70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	3.6900E-02
2	1.5000E 01	1.4800E-02
3	2.0000E 01	8.2200E-03
4	2.5000E 01	4.9400E-03
5	3.0000E 01	3.0700E-03
6	4.0000E 01	1.4800E-03
7	5.0000E 01	8.1300E-04
8	6.0000E 01	5.0700E-04
9	7.0000E 01	3.5800E-04
10	8.0000E 01	2.6900E-04
11	9.0000E 01	2.2100E-04
12	1.0000E 02	1.9900E-04
13	1.1000E 02	2.0200E-04
14	1.2000E 02	2.1100E-04
15	1.3000E 02	2.3500E-04
16	1.4000E 02	2.5100E-04
17	1.5000E 02	2.6900E-04
18	1.6000E 02	3.1700E-04
19	1.7000E 02	3.9200E-04

SCOR21 50 METERS - 1JUNE70

SCATTERING FUNCTION

	ANGLE (DEG)	SIGMA
1	1.0000E 01	2.9900E-02
2	1.5000E 01	1.4400E-02
3	2.0000E 01	7.4500E-03
4	2.5000E 01	4.4800E-03
5	3.0000E 01	2.9400E-03
6	4.0000E 01	1.5500E-03
7	5.0000E 01	8.2200E-04
8	6.0000E 01	5.0200E-04
9	7.0000E 01	3.6100E-04
10	8.0000E 01	2.7400E-04
11	9.0000E 01	2.3100E-04
12	1.0000E 02	1.9800E-04
13	1.1000E 02	1.9500E-04
14	1.2000E 02	2.1900E-04
15	1.3000E 02	2.3100E-04
16	1.4000E 02	2.5400E-04
17	1.5000E 02	2.7100E-04
18	1.6000E 02	3.2500E-04
19	1.7000E 02	4.6200E-04

S. C. O. R. DISCOVERER EXPEDITION
MAY 1970

RELATIVE VALUES OF THE TOTAL SCATTERING COEFFICIENT, SCATTERANCE AND NATURAL FLUROESCENCE

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INTRODUCTION

Relative scatterance ($\beta(45)$ and $\beta(90)$) in the red and the green regions of the spectrum through angles of 45° and 90° and relative natural fluorescence in the blue-green were measured in vitro by means of a Tyndall meter. At a few stations the relative total scattering coefficient in the red was measured in situ by means of an integrating meter. Measurements down to 90 meters depth were possible with this instrument.

Standard Nansen bottles (Teflon lined) provided the Tyndall meter with samples from the following depths: 10, 25, 50, 75, 100, 150, 200, 300, and 400 m.

The measuring technique with the Tyndall meter is described by Jerlov (1953) and Højerslev (1971). Explanations of the integrating meter are given by Jerlov (1961) or (1968), Tyler and Howerton (1962) and Højerslev (1971).

Schott and Genossen optical fiters were used as follows:

2 mm RG1 for relative total scattering coefficient measurements

2 mm RG1)
2 mm VG9) for Tyndall measurements

2 mm BG12 + 1 mm UG1 for exciting fluorescence

2 mm VG9 for detecting natural fluorescence

Numerical values in the tables are relative.

Relative values of the total scattering coefficient (b) multiplied by 0.0036 gives the total scattering coefficient per meter.

The Tyndall meter gives values relative to a plexiglass standard. For the red scatterance measurements at 45°, if

$$b = \text{const} \times \beta(45°)$$

the value of the const is $0.057 m^{-1}$.

No conversion constant is available for the remaining scatterance data.

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Højerslev, N. K. (May 1971)
Tyndall and fluorescence measurements in danish and norwegian waters related to dynamical features. Internal report no. 16, Univ. of Copenhagen.

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Particle distribution in the ocean. Rept. Swedish Deep-Sea Expedition 3: 73-97.

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Optical Measurements in eastern North Atlantic. Medd. Oceangr. Inst. Göteborg, Ser. B, 8: 40pp.

Jerlov, N. G. 1968
Optical Oceanography. Elsevier Oceanography Series, Amsterdam.

Tyler, J. E. and R. Howerton (1962)
Instrument for measuring the forward scattering coefficient of sea water. Limnology and Oceanography 7, pp. 393-395.

RELATIVE TOTAL SCATTERING COEFFICIENT IN THE RED

Depth m	Station 13	Station 16	Station 18	Station 21
5	35.4	30.0	17.2	15.4
10	35.6	28.8	16.8	15.3
15	38.0	25.6	17.3	15.4
18		46.4		
20	38.0	44.0	17.6	15.3
25	40.0	35.0	17.6	15.2
30	39.6	25.0	17.6	15.2
35	40.0	22.0	17.6	15.2
38	40.0			
40	25.0	16.8	17.6	15.2
45	22.8	13.8	17.6	15.9
50	20.0	11.7	17.6	16.0
55	17.6	11.4		16.0
60	16.4	10.4		16.0
65	16.3	9.8		16.0
70	15.9	9.9		16.0
75	15.6	10.0		16.2
80	15.8	10.3		16.2
85	15.8	10.6		
90	15.6			

DURATION OF THE MEASUREMENTS (SUN TIME)

1830-2017 1843-1903 1858-1907 1935-1955

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 4
1057-1145 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	0.91	0.89	1.67	0.93	0.34
25	0.64	0.48	1.09	0.48	0.31
50	0.70	0.44	1.14	0.44	0.34
75	0.89	0.88	2.02	1.03	0.28
100	0.55	0.49	0.94	0.58	0.38
125	0.86	1.00	2.14	1.09	0.44
150	0.46	0.51	1.89	0.45	0.34
200	0.51	0.47	0.95	0.39	0.31
250	0.59	0.89	1.09	0.49	0.41
300	0.60	0.73	1.12	0.60	0.56
400	0.61	0.79	1.26	0.63	0.47

Station 8
1100 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
50	1.74	0.82	1.64	0.82	0.50
75	1.97	0.78	1.87	0.78	0.50
100	2.34	1.04	2.19	1.08	0.38
150	1.56	0.96	1.46	0.96	0.38
200	1.45	0.77	1.35	0.85	0.44
250	2.11	0.91	1.86	0.94	0.44
300	1.47	0.91	1.33	0.94	0.50
400	1.17	0.92	1.10	0.91	0.44

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 9
1104-1153 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
25	2.16	1.12	2.15	0.89	0.53
50	1.47	0.59	1.43	0.62	0.41
75	1.19	0.35	1.05	0.40	0.30
100	1.39	0.47	1.24	0.48	0.41
150	1.21	0.47	1.12	0.49	0.29
200	1.22	0.47	1.09	0.48	0.35
250	1.35	0.47	1.16	0.44	0.35
300	0.97	0.41	0.92	0.44	0.41
400	1.55	0.53	1.48	0.53	0.47
500	1.64	0.60	1.79	0.63	0.47

Station 10
1010-1104 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.28	0.67	1.11	0.66	0.31
25	1.13	0.73	1.10	0.66	0.31
50	1.28	0.69	1.17	0.69	0.40
75	0.94	0.70	0.91	0.72	0.50
100	0.91	0.47	0.82	0.45	0.37
150	1.21	0.67	1.01	0.64	0.44
200	0.79	0.66	0.78	0.55	0.40
250	1.19	0.62	0.95	0.56	0.40
300	1.04	0.58	0.89	0.56	0.44
400	1.81	0.73	1.33	0.57	0.54

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 11
1104-1156 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.21	0.50	1.28	0.54	0.31
25	1.58	0.62	1.40	0.60	0.28
50	1.67	0.69	1.54	0.67	0.31
75	1.36	0.62	1.34	0.63	0.50
100	1.22	0.44	1.12	0.43	0.38
150	1.94	0.69	1.50	0.75	0.47
200	0.83	0.44	0.83	0.42	0.43
250	1.12	0.48	0.96	0.50	0.43
300	0.91	0.44	0.86	0.43	0.50
400	1.39	0.50	1.24	0.47	0.50

Station 12
1100-1138 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	0.81	0.58	0.86	0.58	0.41
25	1.15	0.64	1.03	0.60	0.39
50	0.91	0.54	0.84	0.53	0.39
75	1.22	0.60	0.97	0.49	0.52
100	1.71	0.87	1.64	0.88	0.45
150	1.58	0.41	0.97	0.49	0.39
200	1.30	0.58	1.04	0.57	0.48
250	0.85	0.64	0.82	0.60	0.41
300	0.80	0.58	0.73	0.56	0.47
400	0.83	0.58	0.85	0.47	0.47

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 13
1059-1138 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.52	0.78	1.63	0.73	0.46
25	1.52	0.82	1.41	0.63	0.37
50	0.98	0.47	0.94	0.52	0.37
75	1.12	0.55	1.03	0.62	0.28
100	1.39	0.59	1.25	0.55	0.37
150	0.83	0.35	0.78	0.37	0.37
200	1.01	0.46	0.95	0.49	0.44
250	0.69	0.35	0.62	0.37	0.53
300	1.15	0.53	1.03	0.56	0.56
400	0.84	0.47	0.73	0.42	0.46

Station 14
1024-1106 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.47	0.73	1.31	0.59	0.45
25	1.78	0.86	1.58	0.67	0.60
50	1.34	0.57	1.31	0.56	0.56
75	1.08	0.57	1.00	0.59	0.56
100	0.81	0.43	0.73	0.40	0.56
150	0.85	0.31	0.80	0.36	0.47
200	0.90	0.36	0.77	0.37	0.51
250	0.67	0.39	0.70	0.37	0.56
300	0.88	0.39	0.76	0.40	0.67
400	0.76	0.46	0.69	0.45	0.67

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 15
1135-1206 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.09	0.50	0.96	0.44	0.29
25	1.28	0.64	1.12	0.48	0.27
50	1.37	0.61	1.20	0.48	0.37
75	0.85	0.45	0.76	0.46	0.43
100	1.33	0.50	1.12	0.38	0.37
150	0.98	0.29	0.90	0.35	0.37
200	0.93	0.36	0.87	0.35	0.37
250	1.04	0.39	0.91	0.40	0.37
300	0.79	0.36	0.69	0.33	0.38
400	0.90	0.43	0.82	0.42	0.43

Station 16
1253-1329 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.38	0.87	1.41	0.88	0.41
25	1.43	0.89	1.32	0.64	0.32
50	1.06	0.48	0.95	0.43	0.35
75	0.78	0.39	0.68	0.40	0.35
100	0.83	0.40	0.77	0.43	0.38
150	0.68	0.37	0.65	0.36	0.42
200	0.67	0.48	0.63	0.44	0.41
250	0.68	0.48	0.67	0.45	0.39
300	0.88	0.49	0.79	0.44	0.40
400	0.74	0.51	0.64	0.42	0.51

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 17
1037-1121 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.04	0.45	1.05	0.55	0.17
25	1.27	0.67	1.24	0.63	0.15
50	1.51	0.96	1.41	0.84	0.23
75	1.41	0.59	1.24	0.68	0.27
100	1.15	0.57	1.09	0.51	0.24
150	0.81	0.47	0.77	0.47	0.28
200	1.13	0.41	1.07	0.44	0.30
250	1.59	0.54	1.38	0.57	0.33
300	0.91	0.35	0.85	0.39	0.33
400	0.82	0.33	0.81	0.37	0.37

Station 18
1120-1151 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.27	0.55	1.18	0.54	0.17
25	1.12	0.61	1.06	0.68	0.17
50	1.24	0.50	1.18	0.56	0.18
75	0.94	0.42	0.93	0.46	0.19
100	1.14	0.79	0.98	0.67	0.24
150	1.00	0.44	0.93	0.43	0.24
200	1.03	0.35	0.91	0.36	0.28
250	1.29	0.60	1.05	0.64	0.24
300	0.72	0.33	0.67	0.35	0.23
400	0.82	0.37	0.79	0.39	0.27

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 19
0917-0957 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.27	0.37	1.24	0.43	0.17
25	1.19	0.48	1.19	0.49	0.16
50	1.18	0.44	1.17	0.51	0.14
75	1.25	0.40	1.16	0.45	0.24
100	1.03	0.38	0.99	0.38	0.19
150	1.43	0.38	1.33	0.39	0.29
200	1.03	0.49	0.92	0.48	0.27
250	1.49	0.51	1.34	0.45	0.30
300	1.57	0.39	1.39	0.44	0.31
400	1.05	0.35	0.92	0.35	0.36

Station 20
1030-1115 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.28	0.47	1.22	0.55	0.15
25	1.13	0.40	1.07	0.52	0.18
50	1.21	0.41	1.15	0.53	0.15
75	1.34	0.53	1.30	0.58	0.16
100	1.43	0.52	1.26	0.52	0.18
150	1.16	0.55	1.10	0.46	0.26
200	0.96	0.53	0.91	0.52	0.28
250	1.06	0.40	1.00	0.46	0.25
300	0.87	0.53	0.72	0.45	0.32
400	0.97	0.40	0.92	0.48	0.29

TYNDALL AND NATURAL FLUORESCENCE
RELATIVE MEASUREMENTS

Station 21
0931-1013 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	0.97	0.68	0.93	0.66	0.08
25	1.09	0.40	0.96	0.43	0.08
50	1.39	0.40	1.27	0.38	0.13
75	1.47	0.56	1.39	0.63	0.18
100	1.17	0.42	1.10	0.42	0.18
150	1.68	0.42	1.56	0.40	0.21
200	1.08	0.36	0.91	0.39	0.21
250	1.24	0.32	1.12	0.35	0.24
300	1.06	0.38	1.00	0.40	0.24
400	0.97	0.33	0.81	0.35	0.26

Station 22
0928-1008 Sun Time

Depth m	β(45) Red	β(90) Red	β(45) Green	β(90) Green	Fluorescence 90°
10	1.03	0.38	1.02	0.40	0.12
25	1.31	0.35	1.29	0.44	0.12
50	1.31	0.41	1.31	0.49	0.12
75	1.01	0.41	1.00	0.47	0.14
100	1.40	0.37	1.32	0.47	0.16
150	1.36	0.25	1.22	0.44	0.18
200	1.20	0.45	1.09	0.44	0.24
250	1.51	0.50	1.40	0.54	0.24
300	1.03	0.46	0.92	0.41	0.22
400	0.84	0.37	0.65	0.37	0.24

S. C. O. R. DISCOVERER EXPEDITION
MAY 1970

NUTRIENT CHEMISTRY

James Alberts

Methods

Water samples were taken by means of 1.3 L. standard Nansen bottles (Teflon lined) from depths of 50 m., 75 m., 100 m., 150 m., 200 m., 250 m., 300 m., 400 m., and 500 m. In addition, samples were taken from the Niskin bottles, for the purpose of determining the nutrient chemistry of the identical water used for determining primary productivity, chlorophyll concentration, and phytoplankton identification.

The nutrients, phosphorus (PO_4-P), silicon (Si), nitrate nitrogen (NO_3-N), and nitrite nitrogen (NO_2-N), were determined by the methods of Strickland and Parsons (1968). All determinations were carried out on board ship and were completed within 8 hours of sampling. Samples were stored in dark plastic bottles in the refrigerator until analysis could be completed. Optical absorption was measured on the same Unicam spectrophotometer that was used for the determination of chlorophyll concentration. Values for nutrients are given in µg.-at./L. Standard deviations were determined on five duplicates of random samples and are given in per cent: PO_4-P (3.93%), Si (0.94%), NO_3-N (0.68%), and NO_2-N (21.5%). The high error in the nitrite nitrogen determination is due to the extremely small concentrations found in most samples.

Depths were calculated by the method of thermometric depth determination whenever possible. If temperature data was not available, depths were calculated from wire angle. Salinity was measured by means of a Hytech Induction Salinometer.

NOTES:

Station No.-- The daily station number referencing the vessel's position and all other data obtained at the station.

Times--Beginning, end, and duration of hydrocast.

REFERENCES

Strickland, J. D. H. and T. R. Parsons (1968). "A practical handbook of seawater analysis." Fisheries Res. Board Canad., Bulletin 167, pp. 311.

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DISCOVERER EXPEDITION May 1970

NUTRIENT CHEMISTRY

Station No. 2
Time 1042-1130 local solar time
Depth of water 4460 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.14	9.2	0.11	0.07
10	27.88	35.957	0.19	26.8	0.24	0.11
27	27.70	35.942	0.14	11.4	0.15	0.16
51	26.85	35.929	0.49	10.2		
75	26.04	35.950	0.13	18.8	0.00	0.12
101	24.06	36.009	0.18	7.7	0.08	0.07
125	24.82	36.216	0.00	13.3	0.79	0.20
150	23.39	36.733	0.00	8.9	4.63	0.17
200		36.706	0.31	7.8	6.22	0.03

Station No. 3
Time 1047-1129 local solar time
Depth of water 1345 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.04	5.7	0.35	0.00
6			0.06	4.8	0.17	0.00
18			0.10	5.6	0.17	0.00
25		35.834				
41			0.13	4.9	0.24	0.00
50		35.819				
61			0.07	6.5	0.40	0.00
75		35.854				
82			0.05	5.8	0.31	0.00
100	23.97	36.022	0.04	3.9	0.39	0.01

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NUTRIENT CHEMISTRY

Station No. 4
Time 1057-1145 local solar time
Depth of water 3475 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0		35.915	0.06	6.9	0.14	0.03
10	27.56	35.913	0.00	6.2	0.14	0.03
25	27.33	35.895	0.03	6.1	0.14	0.02
50	26.18	35.758	0.05	5.5	0.05	0.03
75	26.73	35.855	0.04	4.7	0.02	0.08
100	26.92	36.073	0.03	4.0	0.10	0.07
125	22.63	36.240	0.05	4.4	0.16	0.11
143	25.82	36.497	0.05	5.7	2.54	0.04
194	22.90	36.813	0.06	4.7	4.19	0.04
210	19.99	36.654	0.05	6.3	7.61	0.04
251	17.86	36.376	0.14	11.3	9.86	0.04
325	14.88	35.863	0.15	18.8	16.06	0.04
437	12.09	35.409	0.29	28.0	22.30	0.00

Station No. 5
Time 1100 local solar time
Depth of water 1520 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.05	12.3	0.00	0.24
10			0.06	9.6	0.00	0.10
25			0.04	8.9	0.00	0.10
50			0.10	4.9	0.00	0.13
75			0.10	6.6	2.36	0.13
100			0.12	7.1	5.73	0.13

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DISCOVERER EXPEDITION May 1970

NUTRIENT CHEMISTRY

Station No. 6
Time 1200 local solar time
Depth of water 440 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.168	10.0	0.115	0.025
4			0.116	11.2	0.014	0.036
9			0.116	8.8	0.162	0.036
16			0.194	9.5	0.295	0.050
22			0.194	9.0	0.145	0.011
30			0.322	9.2	0.568	0.036
50			0.746	43.8	30.3	0.063
100			0.817	45.0	31.9	0.027
125			0.908	37.3	33.6	0.030

Station No. 7
Time 1030 local solar time
Depth of water 2195 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/l
0			0.130	7.0	0.171	0.075
4			0.053	8.4	0.228	0.018
12			0.124	7.5	0.224	0.024
22			0.071	9.5	0.069	0.054
30			0.088	10.8	0.281	0.030
39			0.148	15.8	0.731	0.058
50			0.437	34.3	15.6	0.261
75			0.467	34.3	25.6	0.060
100			0.538	55.4	27.9	0.039
125			0.790	43.1	27.9	0.042

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NUTRIENT CHEMISTRY

Station No. 8
Time 1100 local solar time
Depth of water 3160 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.550	7.3	11.2	0.180
4			0.550	7.3	11.4	0.202
10			0.595	6.4	11.5	0.180
17			0.595	7.0	11.7	0.161
25			0.657	7.0	12.0	0.189
32			0.719	14.4	25.4	0.400
50	16.16	35.05	0.939	17.9	31.2	0.249
75	15.60	35.05	0.939	15.9	29.1	0.088
111	15.29	35.03	1.34	17.8	31.4	0.057
165	14.59	35.05	1.23	20.2	32.2	0.044
203	14.04	34.99	1.05	22.1	37.2	0.050
270	12.77	34.91	1.27	27.2	39.6	0.000
303	11.83	34.86	1.32	31.5	43.6	0.000
421	9.86	34.73	1.42	41.2	45.4	0.000

Station No. 9
Time 1104-1153 local solar time
Depth of water 3290 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.414	6.0	17.0	0.227
4			0.414	6.0	17.8	0.232
10			0.604	6.4	16.6	0.276
18			0.509	7.0	17.5	0.289
24			0.535	6.7	15.1	0.198
29			0.501	6.8	16.7	0.209
50	15.92	35.04	0.837	16.8	32.8	0.026
75	15.82	35.05	0.837	17.4	28.5	0.032
108	15.22	35.03	0.905	18.7	34.3	0.037
146	14.79	35.03	0.777	19.5	35.2	0.000
198	13.95	34.98	0.777	22.7	34.0	0.001
250	13.68	34.94	1.03	24.9	39.8	0.032
292	12.55	34.89	1.26	29.3	42.6	0.002
384	10.11	34.77	1.26	38.3	39.5	0.000
430	9.26	34.74	1.26	40.3	47.8	0.000

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NUTRIENT CHEMISTRY

Station No. 10
Time 1010-1104 local solar time
Depth of water 3840 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.400	12.9	7.0	0.227
5			0.359	13.4	6.8	0.249
11			0.310	13.4	6.8	0.193
23			0.392	13.4	6.8	0.204
33			0.392	13.8	7.2	0.204
45			0.596	16.0	13.5	0.767
50	20.08	34.72	0.653	17.0	13.5	0.831
75	15.35	34.81	0.872	27.2	28.0	0.322
113	14.51	34.89	0.752	29.0	24.6	0.144
141	13.80	34.91	0.929	33.2	32.5	0.114
213	13.03	34.93	0.977	37.4	30.3	0.083
250	12.94	34.97	0.905	38.9	34.6	0.061
288	12.40	35.03	0.937	40.2	28.3	0.061
371	11.11	35.05	0.880	46.9	35.4	0.027
489	9.08	35.23	1.09	55.1	31.6	0.087

Station No. 11
Time 1104-1156 local solar time
Depth of water 4020 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.493	4.1	8.7	0.063
10			0.549	4.8	8.7	0.063
20			0.359	4.8	7.6	0.063
35			0.359	4.8	7.9	0.078
46			0.359	4.8	7.3	0.093
50	25.18	35.168	0.370	4.6	7.5	0.082
60			0.651	5.0	8.7	0.368
75	19.72	35.374	0.661	6.3	11.7	0.546
113	16.47	35.137	1.42	10.1	23.0	0.676
133	13.24	34.928	1.69	25.5	33.4	0.015
183	12.61	34.905	1.20	26.8	37.7	0.108
250	12.26	34.877	1.35	28.3	21.7	0.011
288	11.65	34.847	1.28	31.2	38.5	0.000
369	10.65	34.779	1.38	36.1	39.5	0.000
478	9.43	34.974	1.63	41.4	44.6	0.000

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NUTRIENT CHEMISTRY

Station No. 12
Time 1100-1138 local solar time
Depth of water 3840 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.287	6.6	4.4	0.051
9			0.414	6.7	4.4	0.129
21			0.329	7.0	3.7	0.047
36			0.702	13.3	26.0	0.845
45			1.03	16.2	25.2	1.07
50	18.36	35.141	1.02	13.5	28.1	1.04
57			0.970	19.0	38.4	0.853
75	15.24	35.062	0.785	19.8	28.8	0.214
100	14.49	35.023	0.952	22.6	29.8	0.012
158	13.72	34.974	0.912	26.2	32.8	0.000
175	13.38	34.945	1.06	28.6	35.8	0.073
222	12.87	34.916	1.10	30.9	34.3	0.102
280	12.36	34.888	0.902	31.4	35.6	0.000
353	11.12	34.804	1.05	37.2	17.6	0.000
467	9.20	34.694	1.26	47.0	40.3	0.102

Station No. 13
Time 1059-1138 local solar time
Depth of water 3180 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.570	10.8	11.9	0.308
8			0.412	11.0	13.5	0.377
17			0.456	10.4	13.6	0.377
27			0.684	11.4	16.6	0.569
34			0.728	15.2	19.7	0.662
44			0.781	16.7	24.9	0.662
50	15.77	35.044	0.824	19.7	22.7	0.012
75	15.79	35.034	0.842	20.0	25.2	0.006
87	15.29	35.033	0.798	20.8	35.8	0.016
163	14.52	35.009	0.877	23.9	28.7	0.006
204	13.96	34.981	1.01	25.4	39.6	0.006
250	13.34	34.937	1.28	29.1	31.7	0.000
319	12.12	34.868	0.902	33.3	35.3	0.012
407	9.54	34.729	1.21	44.8	53.3	0.000
500	8.29	34.651	1.30	55.1	43.4	0.000

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NUTRIENT CHEMISTRY

Station No. 14
Time 1024-1106 local solar time
Depth of water 3160 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.394	6.0	12.1	0.175
11			0.514	6.4	12.6	0.147
15			0.412	7.0	15.2	0.166
28			0.412	7.7	13.2	0.166
35			0.412	7.7	16.0	0.166
43			0.467	8.9	14.5	0.161
50	16.79	35.063	0.689	15.2	21.1	0.522
75	16.35	35.060	0.743	15.6	24.7	0.629
100	15.74	35.061	0.706	17.2	26.4	0.109
161	14.89	35.060	0.988	18.2	30.3	0.074
194	14.37	35.024	1.25	21.2	30.4	0.057
229	13.46	34.949	0.924	26.3	34.9	0.027
293	12.44	34.889	1.10	29.2	35.2	0.027
375	10.39	34.768	1.14	39.2	36.6	0.000
430	9.22	34.715	1.14	45.6	43.0	0.000

Station No. 15
Time 1135-1206 local solar time
Depth of water 3020 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.035	4.0	0.037	0.048
11			0.056	4.0	0.127	0.016
22			0.056	3.9	0.069	0.016
34			0.126	7.6	6.37	0.028
44			0.457	10.6	14.1	0.176
50	20.45	34.402	0.394	9.9	12.9	0.196
53			0.646	15.7	25.0	0.176
75	16.42	34.905	0.583	17.4	27.1	0.156
81	14.95	34.956	0.653	18.7	27.3	0.020
142	14.18	34.951	0.682	21.3	30.6	0.028
162	13.80	34.934	0.689	22.6	29.1	0.028
203	13.37	34.902	0.806	25.1	31.1	0.020
260	12.97	34.888	0.806	26.6	33.9	0.000
322	11.31	34.789	0.806	35.7	35.6	0.016

S.C.O.R.

DISCOVERER EXPEDITION May 1970

NUTRIENT CHEMISTRY

Station No. 16
Time 1253-1329 local solar time
Depth of water 3660 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.043	4.3	0.091	0.048
8			0.043	4.1	0.141	0.048
14			0.286	9.5	10.7	0.131
20			0.443	13.4	16.8	0.131
28			0.521	17.3	21.5	0.078
35			0.756	18.4	22.2	0.083
50	16.05	34.911	0.636	19.0	25.5	0.037
75	15.08	34.928	0.806	21.9	28.9	0.037
107	14.86	34.939	0.856	21.9	28.9	0.010
182	14.15	34.938	0.794	23.2	29.2	0.068
200	13.63	34.920	0.798	25.1	30.0	0.048
263	12.88	34.868	0.800	28.2	32.7	0.048
336	11.86	34.821	0.862	34.4	32.7	0.048
434	9.27	34.686	1.01	50.7	36.9	0.000
540	8.40	34.655	1.08	56.1	37.4	0.000

Station No. 17
Time 1037-1121 local solar time
Depth of water 1790 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.080	1.74	0.180	0.000
11			0.035	2.24	0.180	0.035
29			0.035	2.24	0.180	0.000
50	27.52	35.984	0.000	2.24	0.478	0.000
52			0.000	2.24	0.184	0.035
71			0.042	2.24	0.215	0.004
75	27.28	36.054	0.118	2.24	0.180	0.000
86			0.042	2.24	0.242	0.027
100	27.14	36.117	0.070	2.24	0.184	0.035
157	25.96	36.508	0.070	1.63	0.786	0.111
194	22.61	36.825	0.070	2.55	4.36	0.027
247	20.04	36.677	0.181	3.48	7.78	0.053
329	17.88	36.403	0.230	3.98	10.5	0.027
407	15.12	35.922	0.376	7.04	16.4	0.044
533	12.56		0.675	10.5	22.4	0.044

S.C.O.R.

DISCOVERER EXPEDITION May 1970

NUTRIENT CHEMISTRY

Station No. 18
Time 1120-1151 local solar time
Depth of water 585 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.192	2.32	0.184	0.022
12			0.192	2.73	0.060	0.028
28			0.192	2.32	0.118	0.000
49			0.192	2.63	0.098	0.028
50	26.95	36.033	0.104	2.52	0.197	0.009
75	26.54	36.239	0.184	2.52	0.181	0.025
76			0.104	2.83	0.188	0.028
91			0.056	2.22	0.188	0.028
100	24.75	36.484	0.120	2.32	0.264	0.031
154	22.24	36.811	0.120	2.02	1.70	0.031
195	19.49	36.648	0.192	2.42	3.18	0.031
240	18.80	36.596	0.248	2.52	4.18	0.031
314	17.71	36.444	0.304	3.34	6.68	0.059
392	16.11	36.155	0.304	5.06	10.9	0.022
525	13.99	35.810	0.473	7.58	17.0	0.047

Station No. 19
Time 0917-0957 local solar time
Depth of water 3930 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.074	2.20	0.286	0.000
9			0.016	2.30	0.191	0.000
25			0.016	2.60	0.191	0.000
46			0.016	1.9	0.160	0.031
50	25.98	36.230	0.016	1.9	0.160	0.031
68			0.025	1.8	0.160	0.031
75	25.45	36.379	0.033	1.9	0.191	0.000
85			0.025	1.8	0.160	0.031
100	25.27	36.773	0.033	1.8	0.178	0.013
162	22.56	36.997	0.033	1.8	1.18	0.058
207	20.28	36.788	0.066	1.8		0.058
250	18.66	36.584	0.090	2.4	5.06	0.031
331	17.83	36.475	0.205	2.4	6.64	0.027
418	16.09	36.150	0.321	4.4	10.0	0.010
536	13.71	35.756	0.452	7.5	17.7	0.010

S.C.O.R.

DISCOVERER EXPEDITION May 1970

NUTRIENT CHEMISTRY

Station No. 21
Time 0931-1013 local solar time
Depth of water 5270 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0			0.000	1.47	0.095	0.178
11			0.000	1.47	0.150	0.022
33			0.030	1.74	0.140	0.031
50	22.40	36.616	0.000	1.84	0.287	0.031
65			0.000	1.47	0.111	0.071
83			0.066	1.47	0.010	0.075
90	21.88	36.738	0.000	1.01	0.119	0.062
105			0.000	0.64	0.020	0.071
167	20.40	36.719	0.000	1.65	0.284	0.080
190	19.52	36.654	0.000	1.19	1.21	0.115
240	18.68	36.595	0.000	1.28	2.98	0.067
315	18.24	36.548	0.000	1.28	4.30	0.026
398	17.70	36.478	0.038	1.28	4.86	0.067
528	16.95	36.355	0.066	2.94	7.18	0.151

Station No. 22
Time 0928-1008 local solar time
Depth of water 5480 m

Depth m	Temp °C	Salinity o/oo	PO_4-P µg-at/L	Si µg-at/L	NO_3-N µg-at/L	NO_2-N µg-at/L
0		36.539	0.041	1.8	0.181	0.000
10		36.530	0.055	1.8	0.000	0.000
25		36.533	0.000	1.5	0.056	0.000
50	24.66	36.530	0.000	1.5	0.061	0.000
75	24.44	36.552	0.000	1.8	0.056	0.000
95	23.81	36.677	0.048	1.8	0.111	0.000
171	21.57	36.668	0.089	1.2	0.113	0.000
208	20.11	36.657	0.055	1.2	0.212	0.000
245	19.24	36.634	0.000	1.3	1.94	0.000
328	18.62	36.585	0.069	1.4	4.07	0.000
415	17.89	36.489	0.083	2.0	5.71	0.000
543	17.17	36.383	0.083	2.7	7.19	0.000

S. C. O. R. DISCOVERER EXPEDITION

MAY-JUNE 1970

Vertical Temperature Distribution

Robert E. Hopkins

Bathythermograph records and bucket temperatures were obtained at all stations with standard equipment of the type developed by A. Spilhaus. Recordings were obtained at 1000 and 1400 hours and converted to the following tables showing the depth (in meters) at which a specified temperature was found.

Between Stations 7 and 8, 8 and 9, and 12 and 13, XBT recordings were obtained at frequent intervals for the purpose of locating upwelling conditions.

S.C.O.R.
DISCOVERER Expedition May 1970

BT DATA

Station No.	3		4		5	6		7	
Surface Temp.									
B. T.	27.4	27.4	27.4	27.5	27.4	27.2	27.5	27.4	28.1
Bucket	27.5	27.7	27.4	27.7	27.2	27.4	27.5	27.8	28.1
Time →	1000	1400	1000	1420	1000 1400	1000	1400	1000	1400
Temp. ↓ °C	Depth ↓		Depth ↓		Depth ↓	Depth ↓		Depth ↓	
30									
29									
28									16
27	17	32	32	23	27	7	23	28	26
26	135	135	102	112	50	14	32	31	35
25	164	165	134	140	55	16	34	32	36
24	184	182	144	148	68	17	35	41	36
23	198	197	151	160	80	18	36	42	37
22	209	216	163	170	87	19	36	42	38
21	219	227	173	182	100	20	37	43	40
20	233	240	191	196	115	21	40	45	42
19	245	255	205	208	135	22	41	46	45
18	263		225	225	157	24	43	47	49
17			250	245	183	29	45	57	58
16			275	270	214	33	50	66	71
15					235	53	75	83	90
14					260	71	129	156	165
13						97	195	230	255
12						157	247		
11						182			
10						254			
9									
8									
BT No.	S/N12591C		S/N12591C		S/N12591C	S/N 12591C	S/N 08077	S/N08077	

S.C.O.R.
DISCOVERER Expedition May 1970

BT DATA

Station No.	8		9		10		11		12	
Surface Temp.										
B. T.	20.3	20.8	20.5	20.5	25.5		25.5	25.5	25.6	25.8
Bucket	20.3	20.5	20.4	20.5	25.4		25.4	25.3	25.5	25.6
Time →	1000	1400	1000	1400	1000	1400	1000	1400	1000	1400
Temp. ↓ °C	Depth ↓		Depth ↓		Depth ↓		Depth ↓		Depth ↓	
30										
29										
28										
27										
26							49			
25					37	44	50	59	34	34
24					38	45	51	60	35	35
23					39	46	53	61	36	36
22					40	47	57	62	37	37
21					41	48	62	67	39	38
20	15	23	28	25	42	50	65	69	40	40
19	19	26	34	32	44	52	73	71	41	42
18	23	34	38	37	50	55	76	75	49	47
17	25	36	45	41	54	60	81	84	55	50
16	50	65	75	73	59	66	85	89	59	57
15	120	135	135	140	79	80	93	95	71	65
14	185	188	198	197	132	134	113	106	110	105
13	240	237	253	242	207	207	140	140	195	180
12							233	212	275	275
10										
9										
8										
BT NO.	S/N 08077		S/N 08077		S/N 08077		S/N 08077		S/N 08077	

S.C.O.R.
DISCOVERER Expedition May 1970

BT DATA

Station No.	13		14		15		16		17	
Surface Temp.										
B. T.	20.8	21.2	20.2	20.5	27.2	27.3	26.0	26.4	28.0	28.3
Bucket	20.6	21.0	19.9	20.1	27.3	27.3	26.0	26.4	28.0	28.2
Time →	1000	1400	1000	1400	1000	1400	1000	1400	1000	1400
Temp. ↓ °C	Depth ↓		Depth ↓		Depth ↓		Depth ↓		Depth ↓	
30										
29										
28									24	14
27					24	27			116	90,105,119
26					25	32	7	9	145	142
25					26	33	8	17	160	156
24					27	34	9	18	181	167
23					31	35	10	19	195	187
22					33	36	11	19.5	215	209
21		11			35	39	14	20	234	227
20	23	25	30	20	39	46	17	22	259	245
19	30	34	45	31	41	49	18	25		265
18	34	39	49	36	44	51	22	28		
17	38	46	55	41	49	60	40	44		
16	80	80	80	66	58	65	66	66		
15	130	130	145	130	72	83	85	90		
14	205	195	195	179	135	163	175	175		
13	257	241	246	224	205	240	255	247		
12				252	275					
11										
10										
9										
8										
BT No.	S/N 08077		S/N 08077		S/N GG08077-2		S/N GG08077-2		S/N GG08077-2	

S.C.O.R.
DISCOVERER Expedition May 1970

BT DATA

Station No.	18		19		20	21		22	
Surface Temp.									
B. T.	27.9	28.7	27.1		26.5	24.6	24.7	25.0	25.1
Bucket	27.8	28.3	27.0		26.4	24.5	24.6	25.0	24.9
Time →	1000	1400	1000	1400	1000 1400	1000	1400	1000	1400
Temp. ↓ °C	Depth ↓		Depth ↓		Depth ↓	Depth ↓		Depth ↓	
30									
29									
28		8							
27	61	68	5	5					
26	82	79	65	63	33				
25	95	90	115	110	57			67	80
24	117	114	133	137	90	59	54	100	105
23	134	127	149	155	115	72	69	120	115
22	153	151	165	170	145	103	106	159	140
21	166	175	191	190	164	136	145	184	179
20	189	195	212	215	190	185	190	230	223
19	228	230	245	250	232	243	235		
18	275	275							
17									
16									
15									
14									
13									
12									
11									
10									
9									
8									
BT No.	S/N GG08077-2		S/N GG08077-2		S/N GG08077-2	S/N GG08077-2		S/N GG08077-2	

S. C. O. R.
DISCOVERER EXPEDITION
MAY 1970
XBT RECORDS

Time	1810	2300	0400	0700	1100	0200	0600	1315	0010
Day	11	11	12	12	12	13	13	17	18
Between Station	7 & 8	7 & 8	7 & 8	7 & 8	7 & 8	8 & 9	8 & 9	12 & 13	13
Surf. T.	22.8°C	21.1°C	19.7°C	19.3°C	19.4°C	20.2°C	22.3°C	21.2°C	20.8°C
Temp °C	Depth (Meters)								
22°	16						16		
21°	26	9					21	7	
20°	28	20				12	27	28	20
19°	29	25	5	6	20	26	31	30	30
18°	30	29	14	11	28	32	38	34	32
17°	31	42	18	15	30	38	43	43	38
16°	103	60	19	19	38	51	60	60	47
15°	215	110	71	72	73	120	127	112	100
14°	260	173	184	206	155	172	190	200	182
13°	280	232	225	235	200	222	250	259	240
12°	312	267	274	277	237	264	296	292	280
11°	372	290	325	330	285	318	322	316	317
10°	447	338	368	353	345	358	367	341	348
09°		416	425	440	395	413	425	400	407
Temp at 450 m.	9.9°C	8.7°C	8.8°C	8.9°C	8.2°C	8.5°C	8.8°C	8.5°C	8.6°C

S. C. O. R.

DISCOVERER EXPEDITION

SALINITY, TEMPERATURE, AND DENSITY

LTJG L. L. LAKE AND ENS. S. J. MANGIS

USC AND GSS DISCOVERER

Editor's Notes:

The plots of salinity and temperature data vs. depth were obtained with a Model 9006 STD instrument supplied by Plessey Environmental Systems. Σ_T was computed and plotted simultaneously with the lowering of the instrument.

Specificiations on the Plessey instrument give the following:

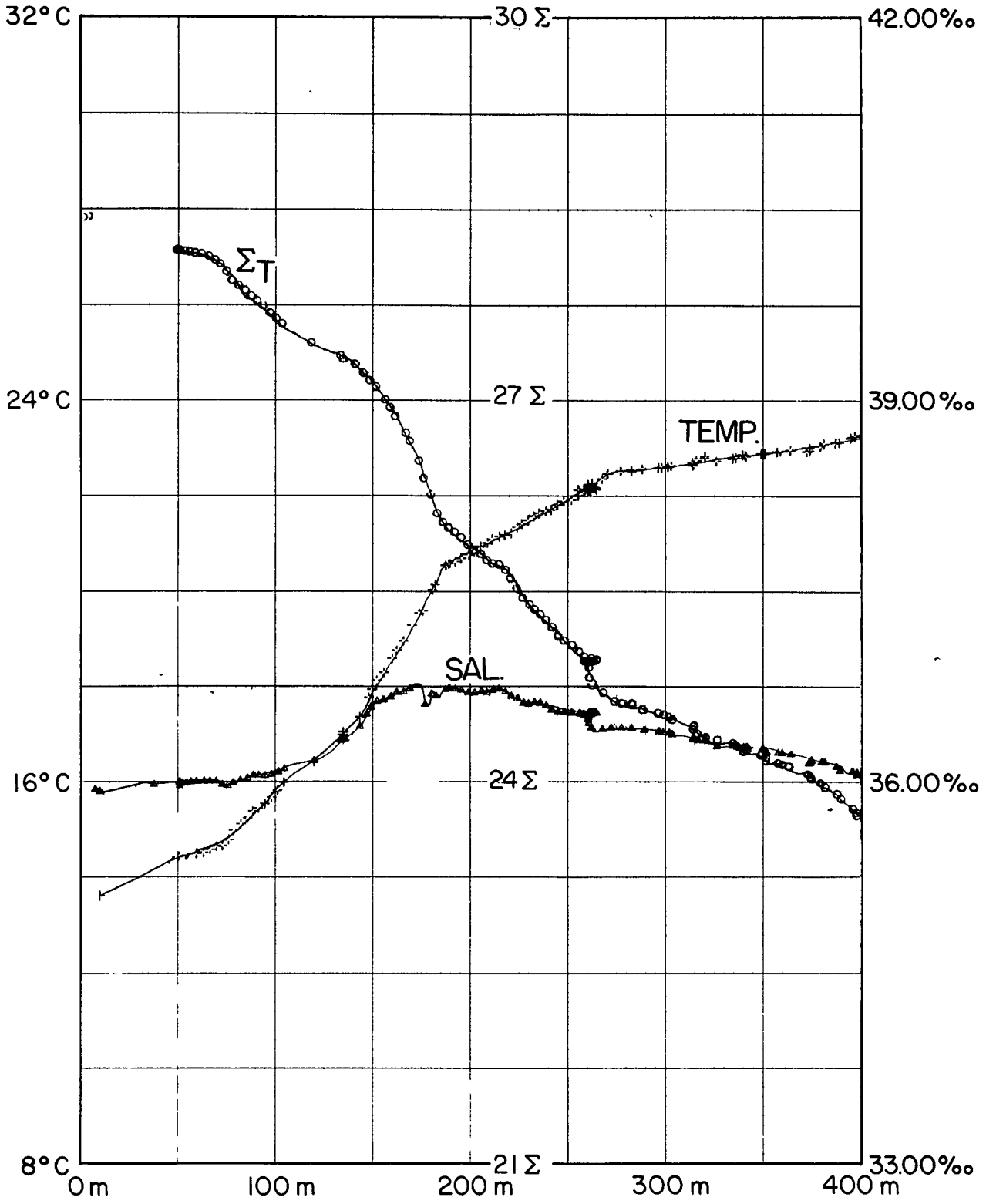
1. For salinity determination the sensor accuracy is ±0.03 o/oo (PPT) including non-linearity, repeatability, and temperature effects over the temperature range 0-30° C and a depth of 0-6000 m.

2. For temperature determination the sensor accuracy is ±0.02° C including non-linearity, repeatability, and temperature effects on electronics.

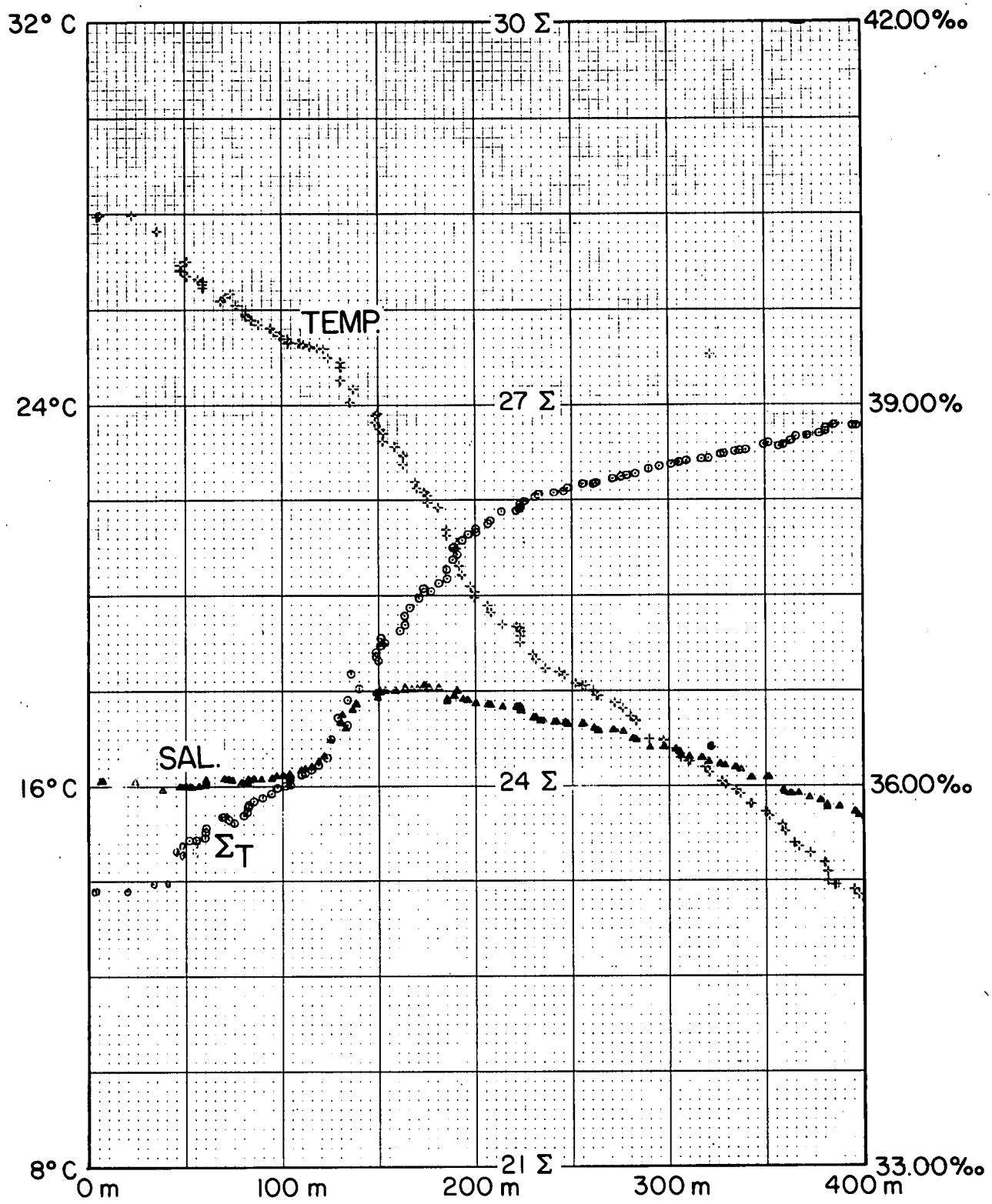
3. Response time is 0.35 seconds.

4. For depth measurement the sensor accuracy is ±0.25% of full scale including non-linearity, repeatability, and temperature effects on electronics.

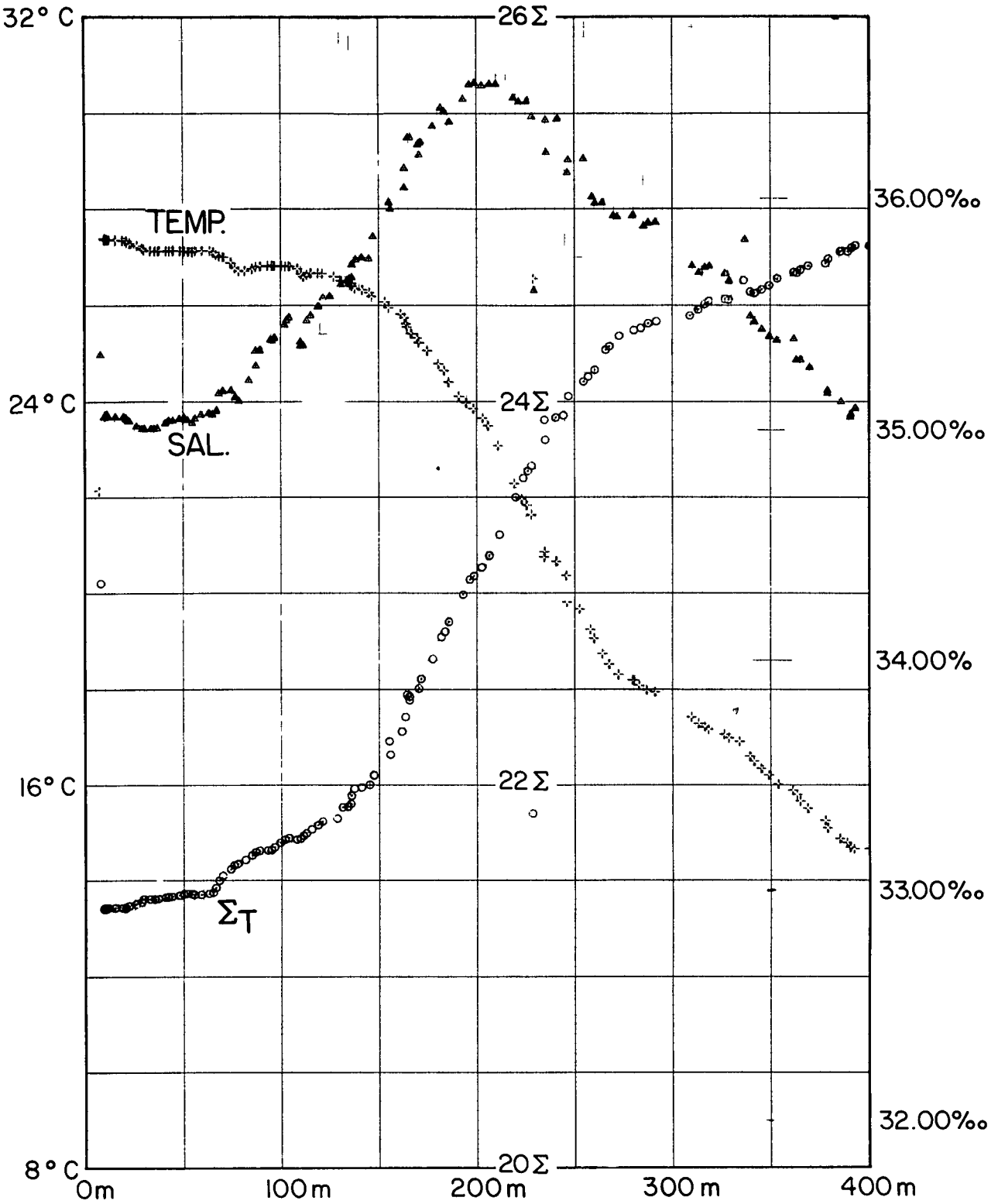
Station 1


32° C
30 Σ
42.00‰
ΣT
24° C
27 Σ
39.00‰
TEMP.
SAL.
16° C
24 Σ
36.00‰
8° C
21 Σ
33.00‰
0 m
100 m
200 m
300 m
400 m

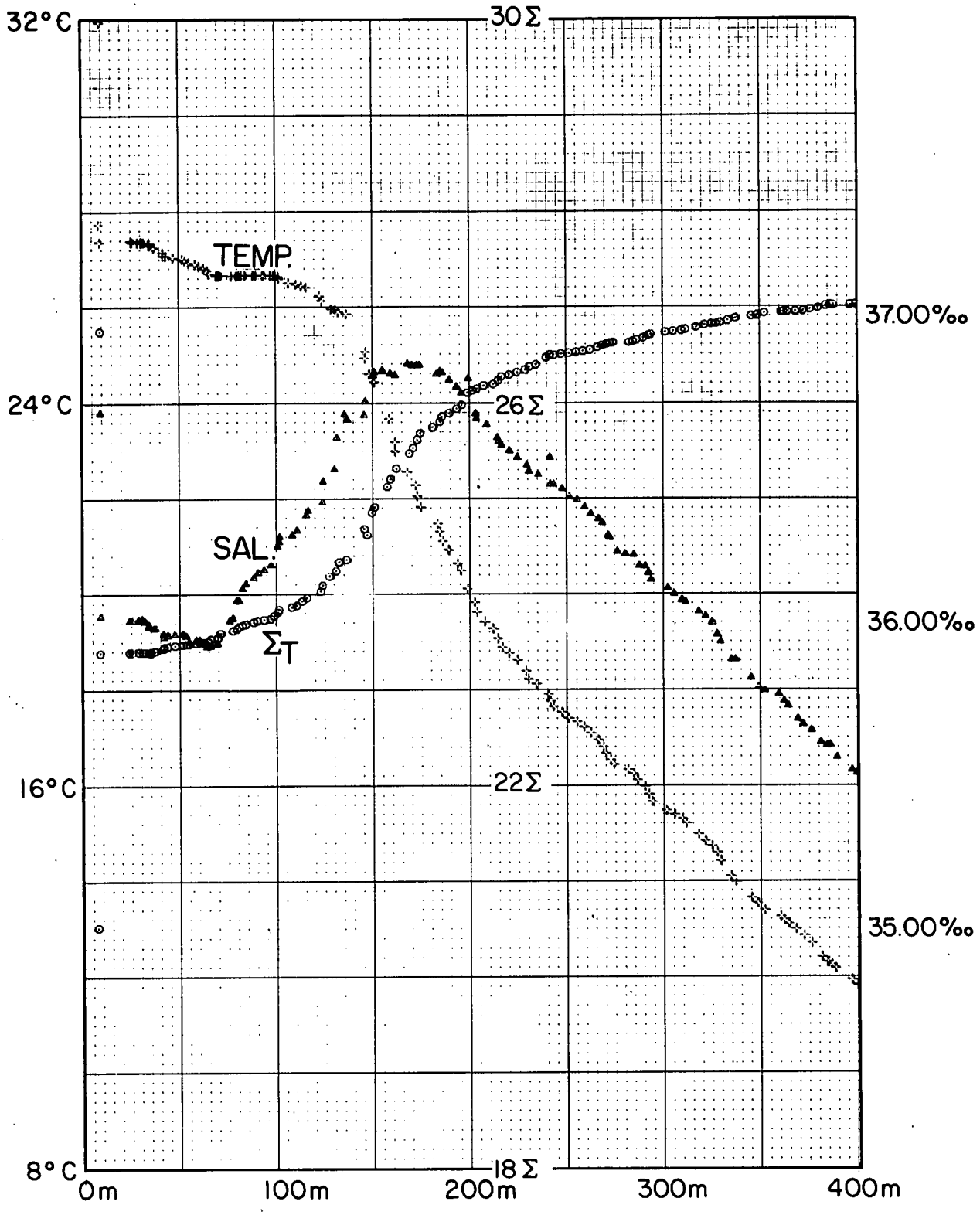
Station 2


32° C
30 Σ
42.00‰
TEMP.
24°C
27 Σ
39.00‰
SAL.
16° C
24 Σ
36.00‰
Σ_T
8° C
21 Σ
33.00‰
0 m
100 m
200 m
300 m
400 m

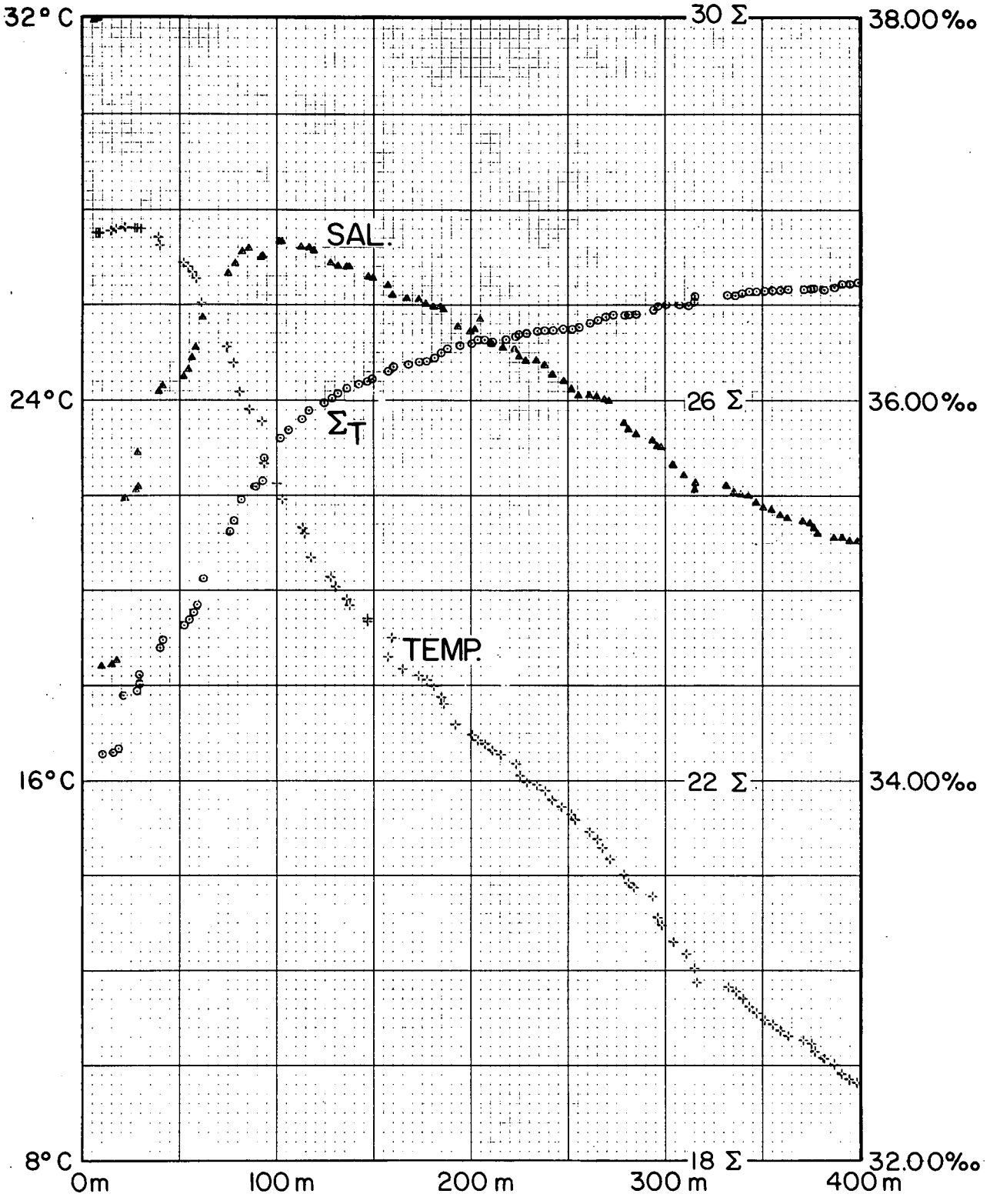
Station 3


32° C
26 Σ
36.00‰
TEMP.
24° C
24 Σ
35.00‰
SAL.
34.00‰
16° C
22 Σ
33.00‰
ΣT
32.00‰
8° C
20 Σ
0m
100m
200m
300 m
400 m

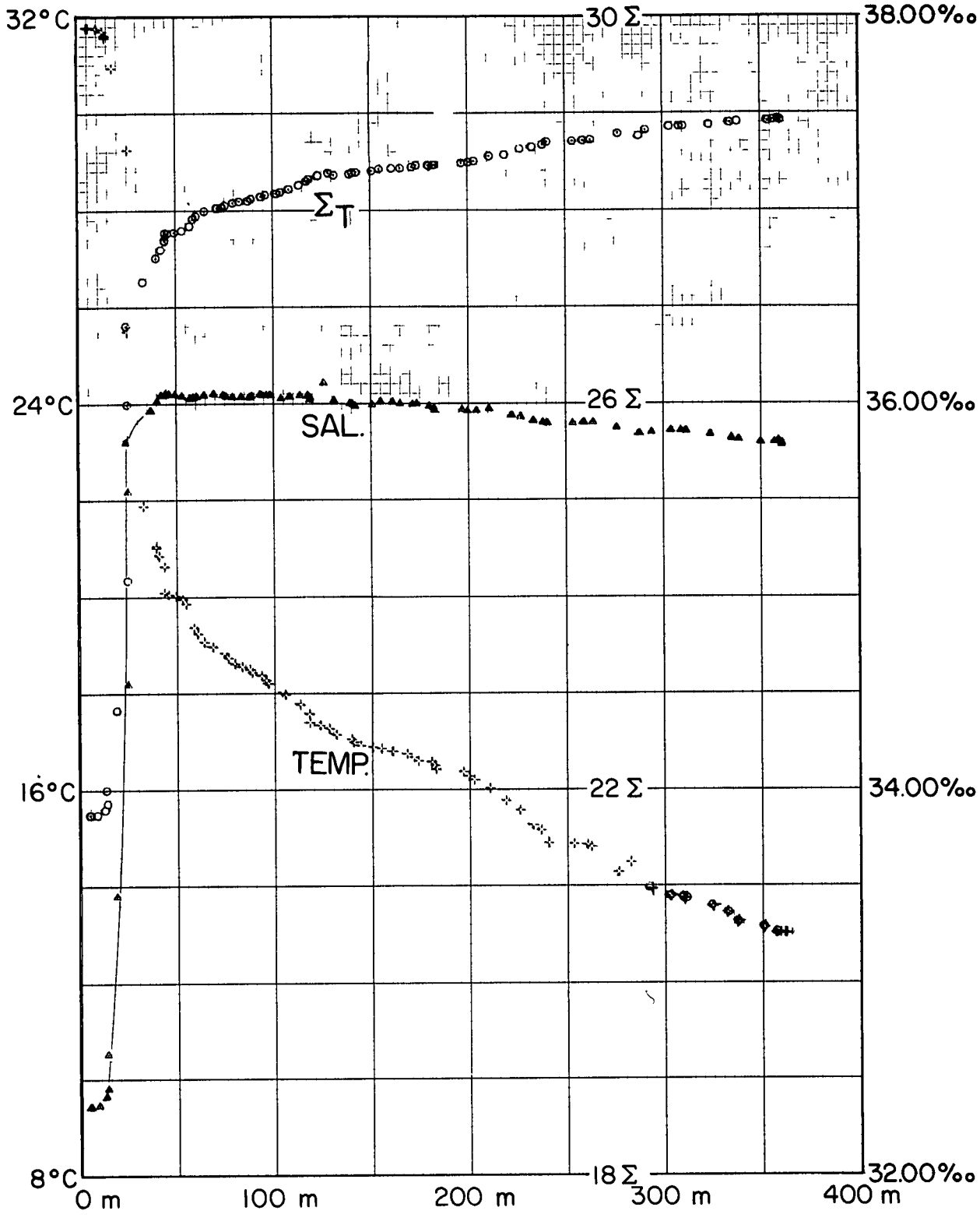
Station 4


32°C
30Σ
TEMP.
37.00‰
24°C
26Σ
SAL.
ΣT
36.00‰
16°C
22Σ
35.00‰
8°C
18Σ
0m
100m
200m
300m
400m

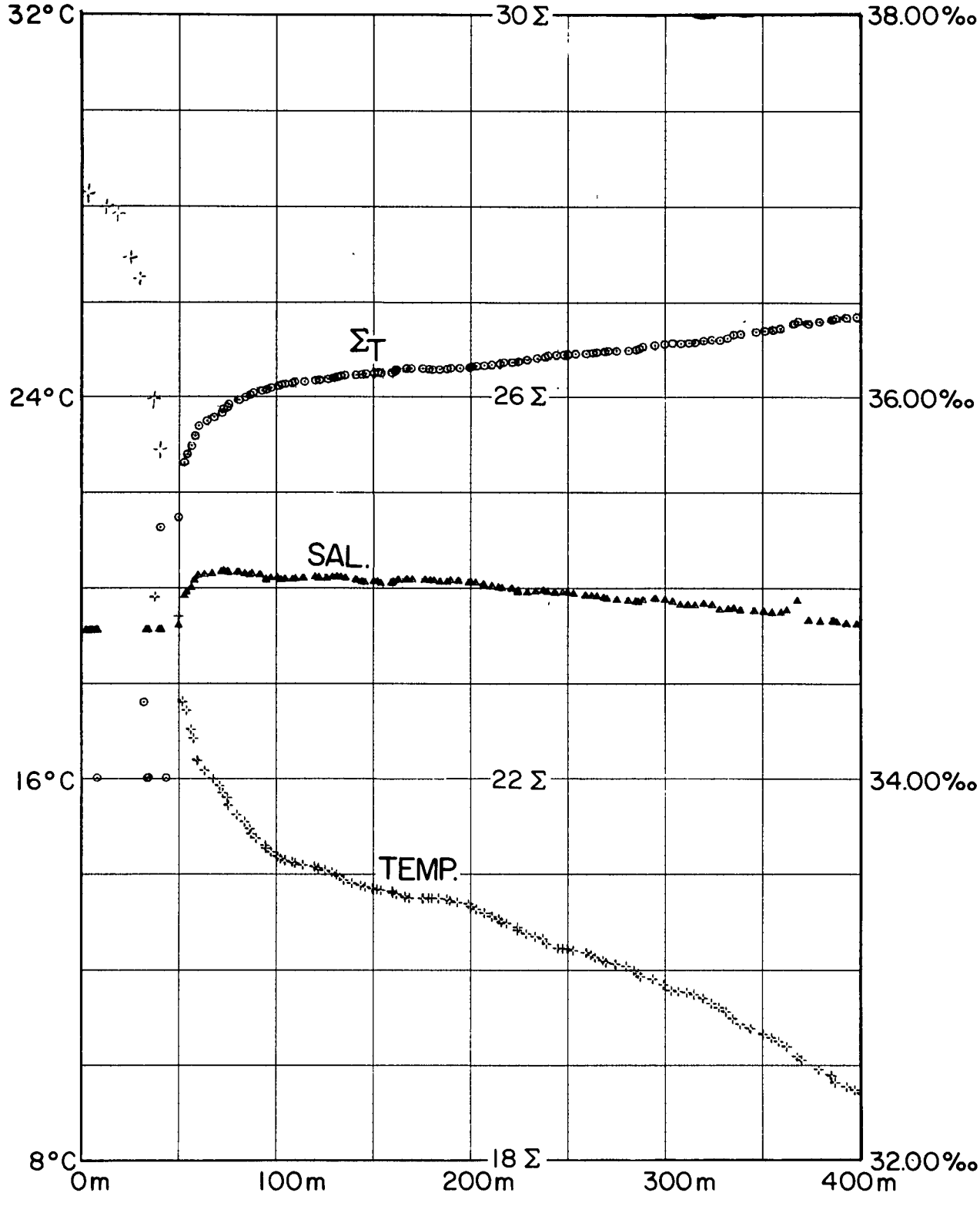
Station 5


32° C
24° C
16° C
8° C
30 Σ
26 Σ
22 Σ
18 Σ
38.00‰
36.00‰
34.00‰
32.00‰
SAL.
ΣT
TEMP.
0m
100 m
200 m
300 m
400 m

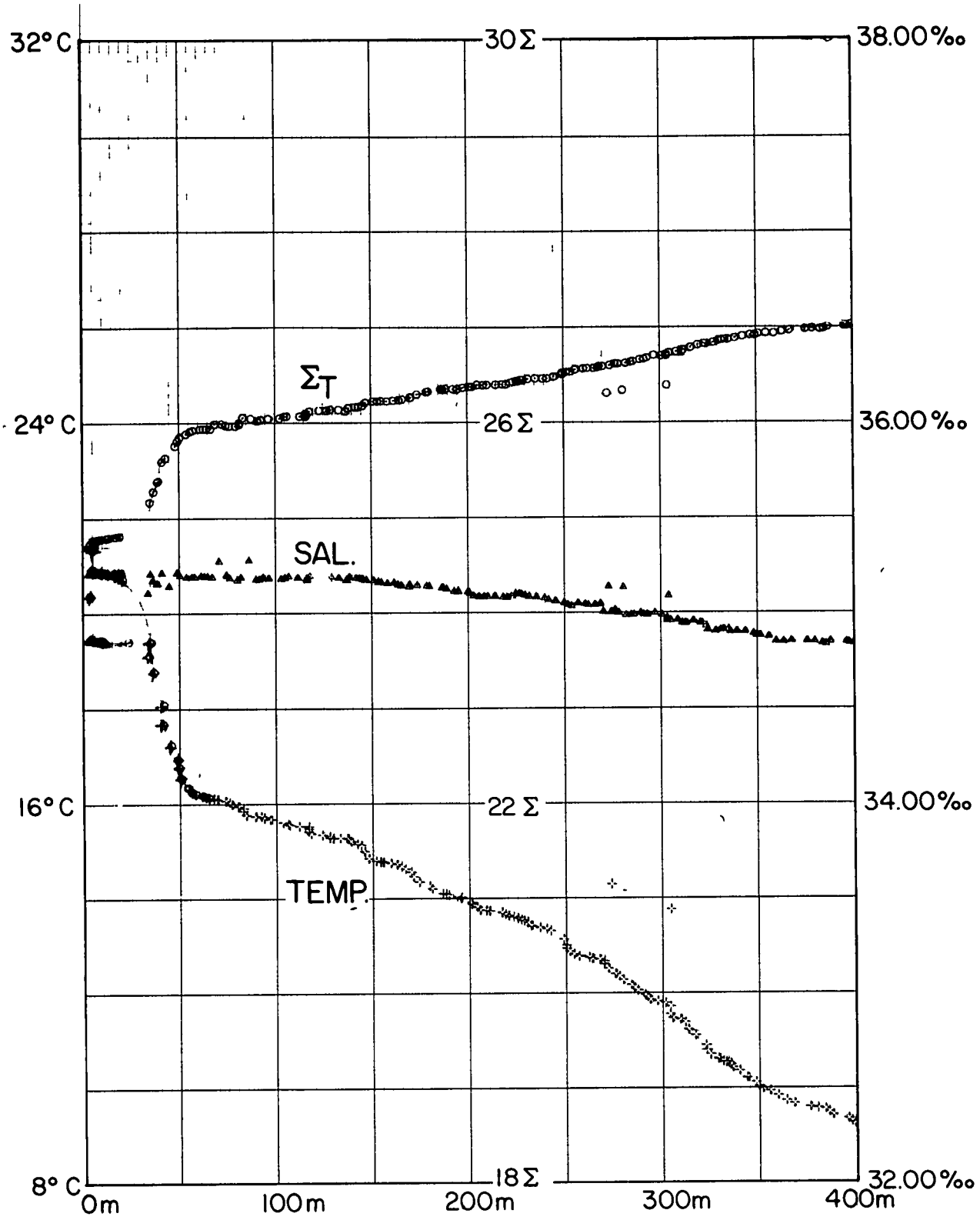
Station 6


32°C
24°C
16°C
8°C
30 Σ
26 Σ
22 Σ
18 Σ
38.00‰
36.00‰
34.00‰
32.00‰
ΣT
SAL.
TEMP.
0 m
100 m
200 m
300 m
400 m

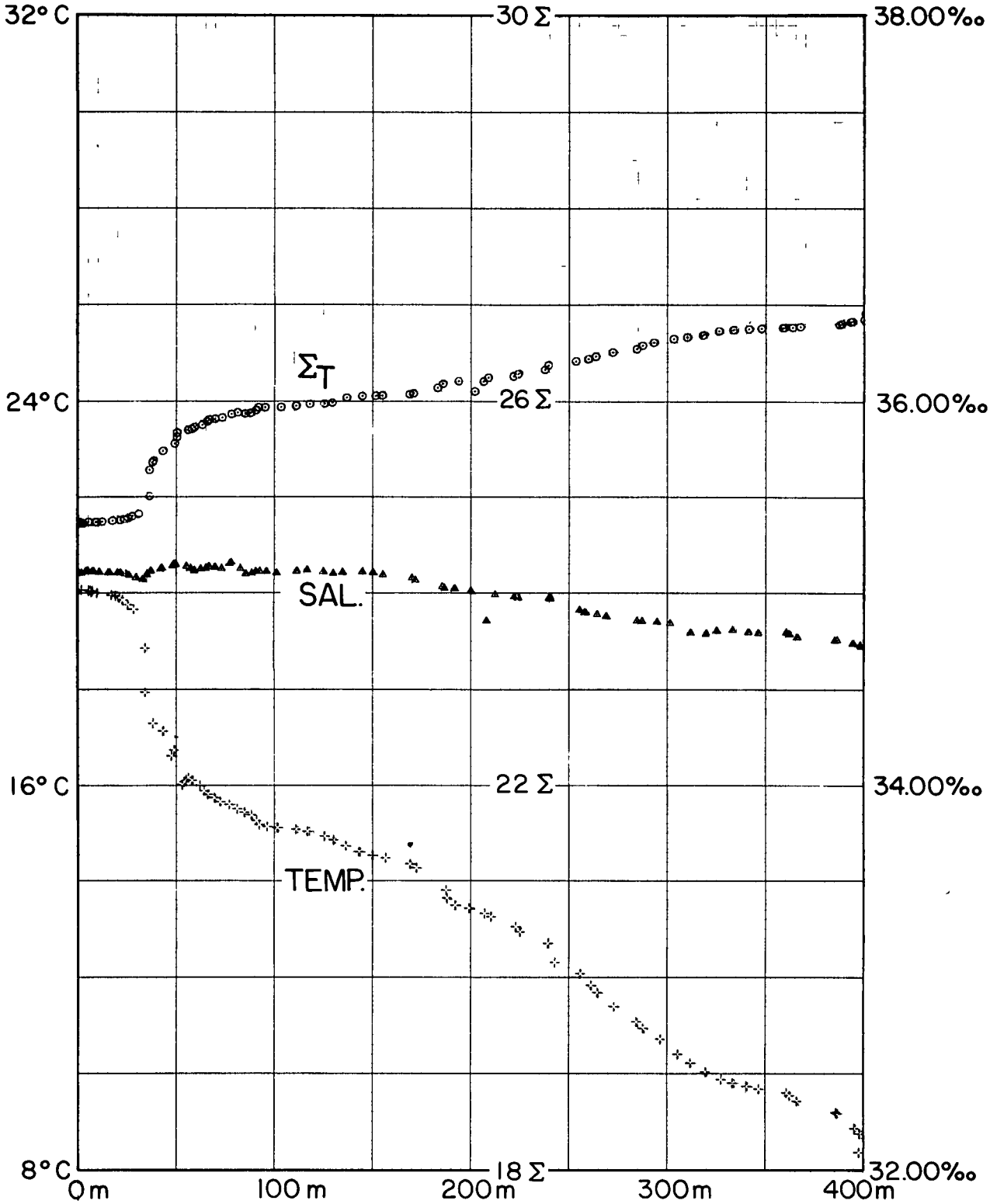
Station 7


32° C
30 Σ
38.00‰
ΣT
24° C
26 Σ
36.00‰
SAL.
16° C
22 Σ
34.00‰
TEMP.
8° C
18 Σ
32.00‰
0m
100m
200m
300m
400m

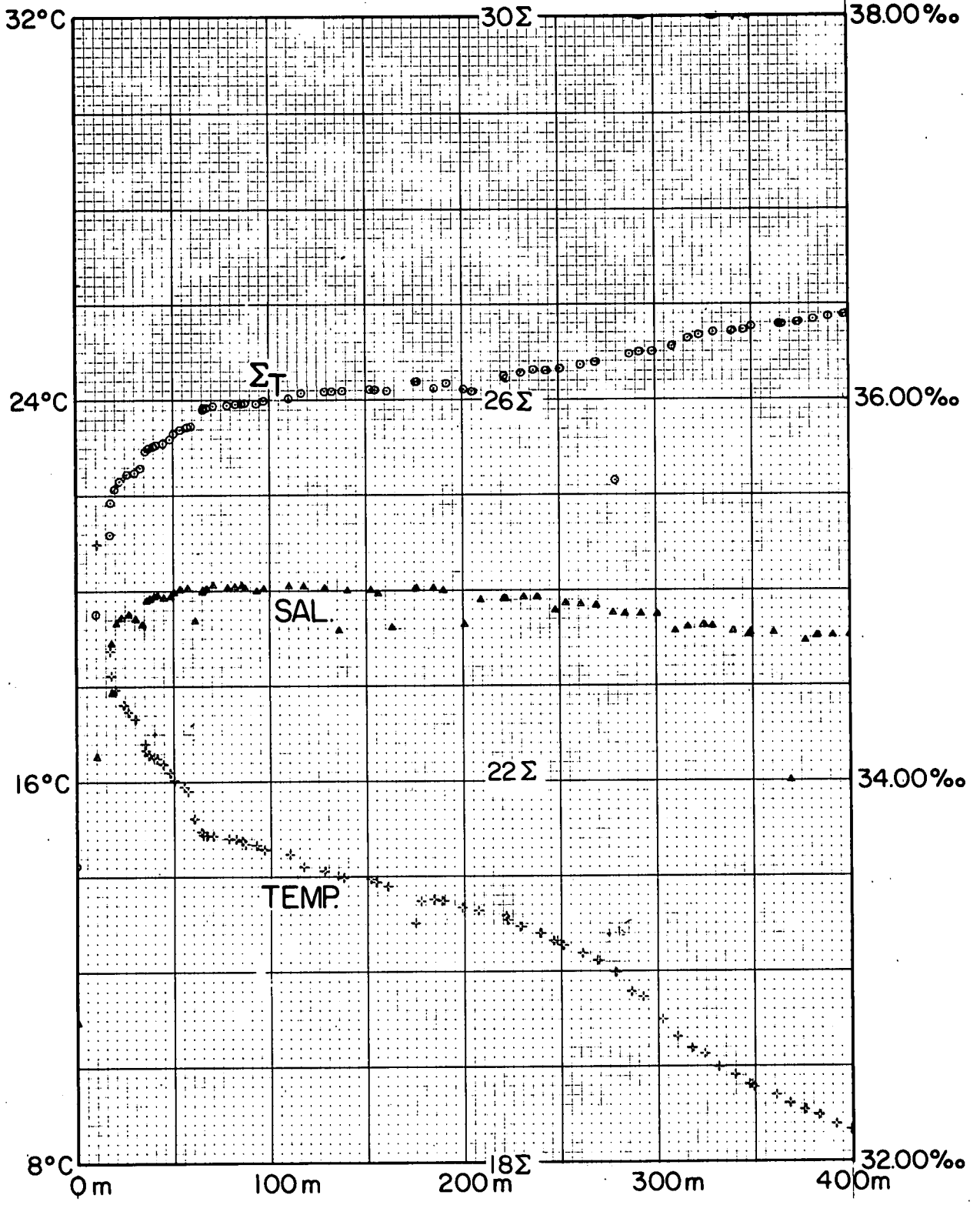
Station 9


32° C
30 Σ
38.00‰
Σ_T
24° C
26 Σ
36.00‰
SAL.
16° C
22 Σ
34.00‰
TEMP.
8° C
18 Σ
32.00‰
0m
100m
200m
300m
400m

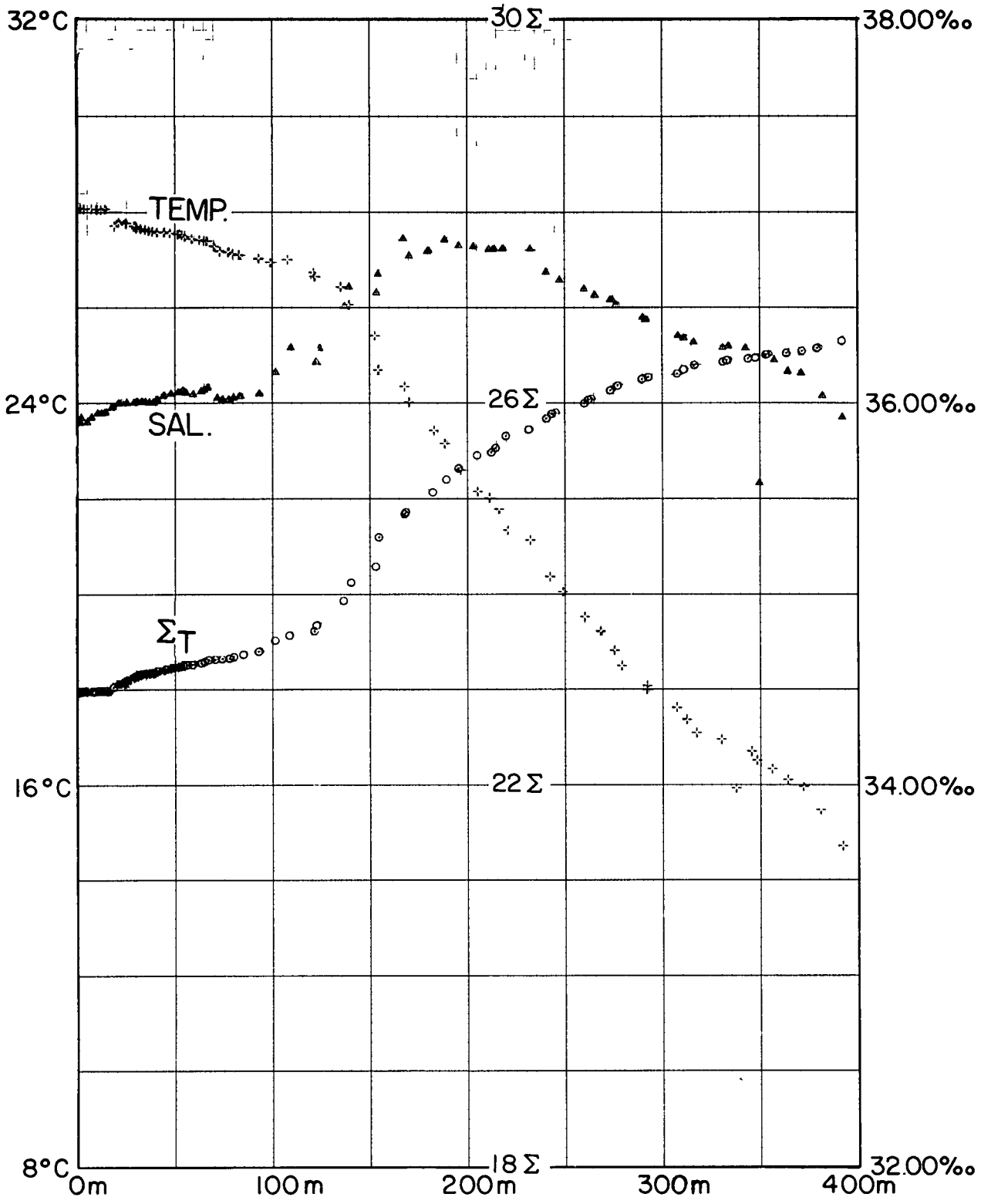
Station 14


32° C
30 Σ
38.00‰
24° C
26 Σ
36.00‰
16° C
22 Σ
34.00‰
8° C
18 Σ
32.00‰
Σ_T
SAL.
TEMP.
0 m
100 m
200 m
300 m
400 m

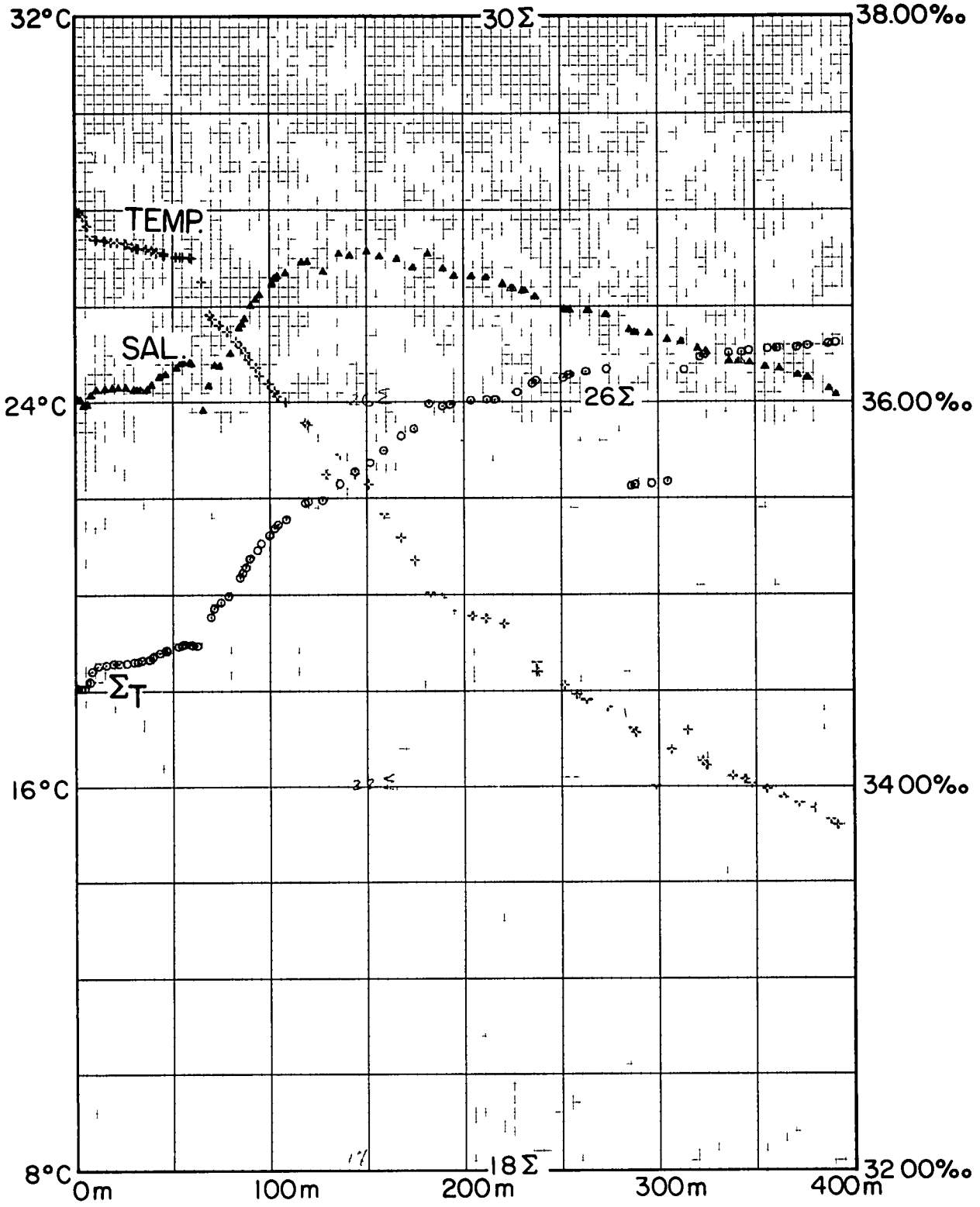
Station 16


32°C
30Σ
38.00‰
ΣT
24°C
26Σ
36.00‰
SAL.
16°C
22Σ
34.00‰
TEMP.
8°C
18Σ
32.00‰
0 m
100 m
200 m
300 m
400 m

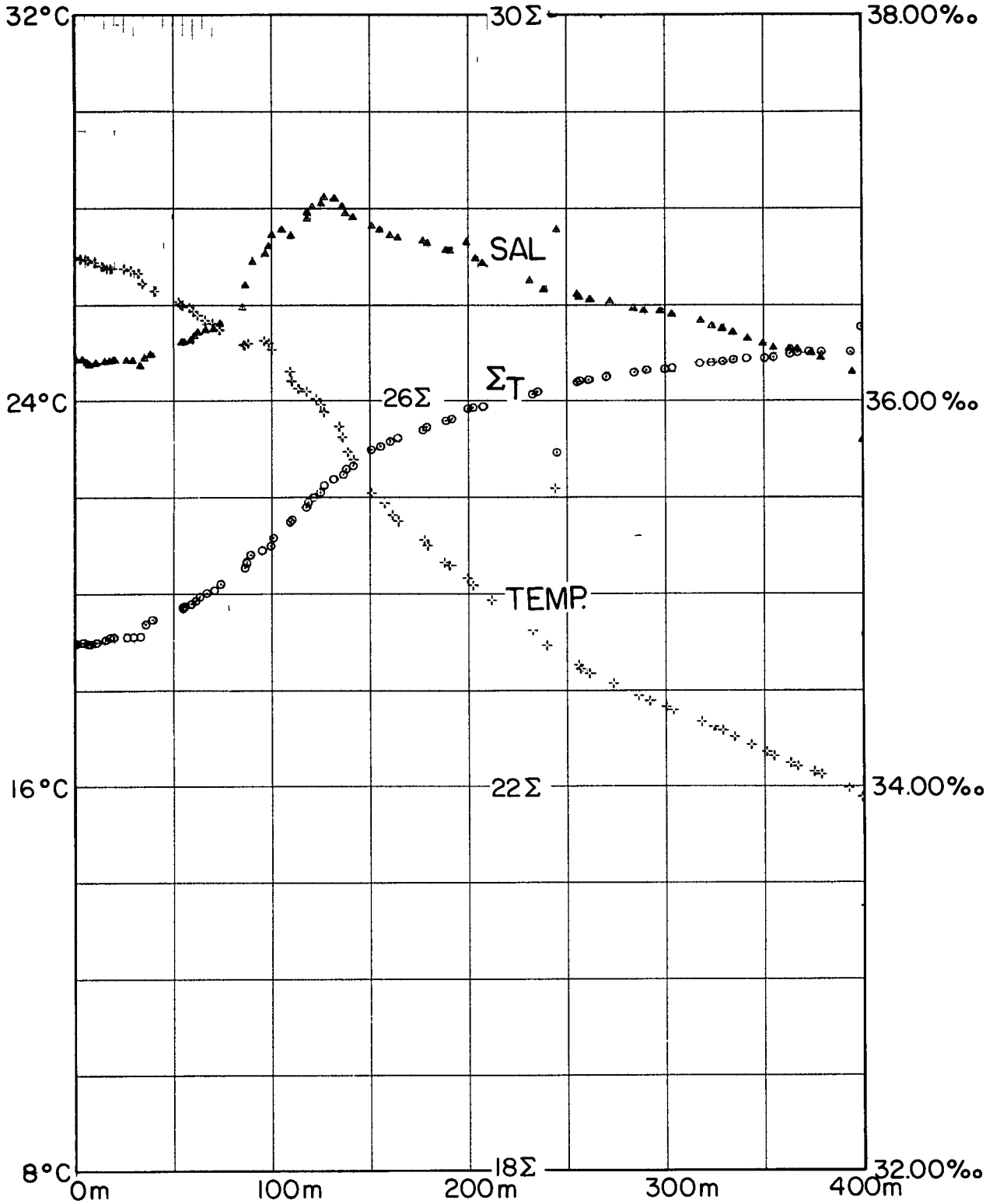
Station 17


32°C
30 Σ
38.00‰
TEMP.
24°C
SAL.
26 Σ
36.00‰
Σ_T
16°C
22 Σ
34.00‰
8°C
18 Σ
32.00‰
0m
100m
200m
300m
400m

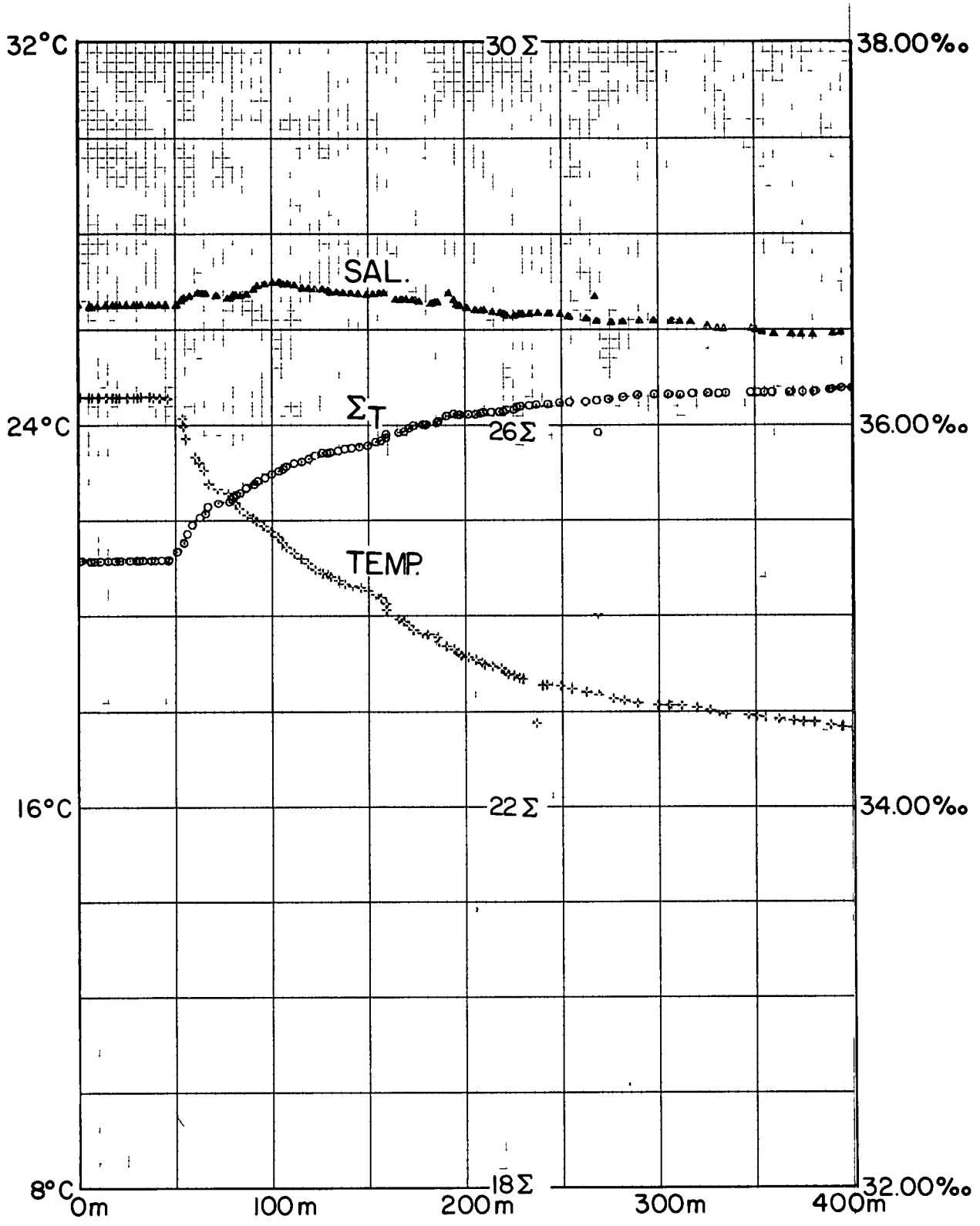
Station 18


32°C
30Σ
38.00‰
TEMP.
SAL.
24°C
26Σ
36.00‰
ΣT
16°C
34.00‰
8°C
18Σ
32.00‰
0m
100m
200m
300m
400m

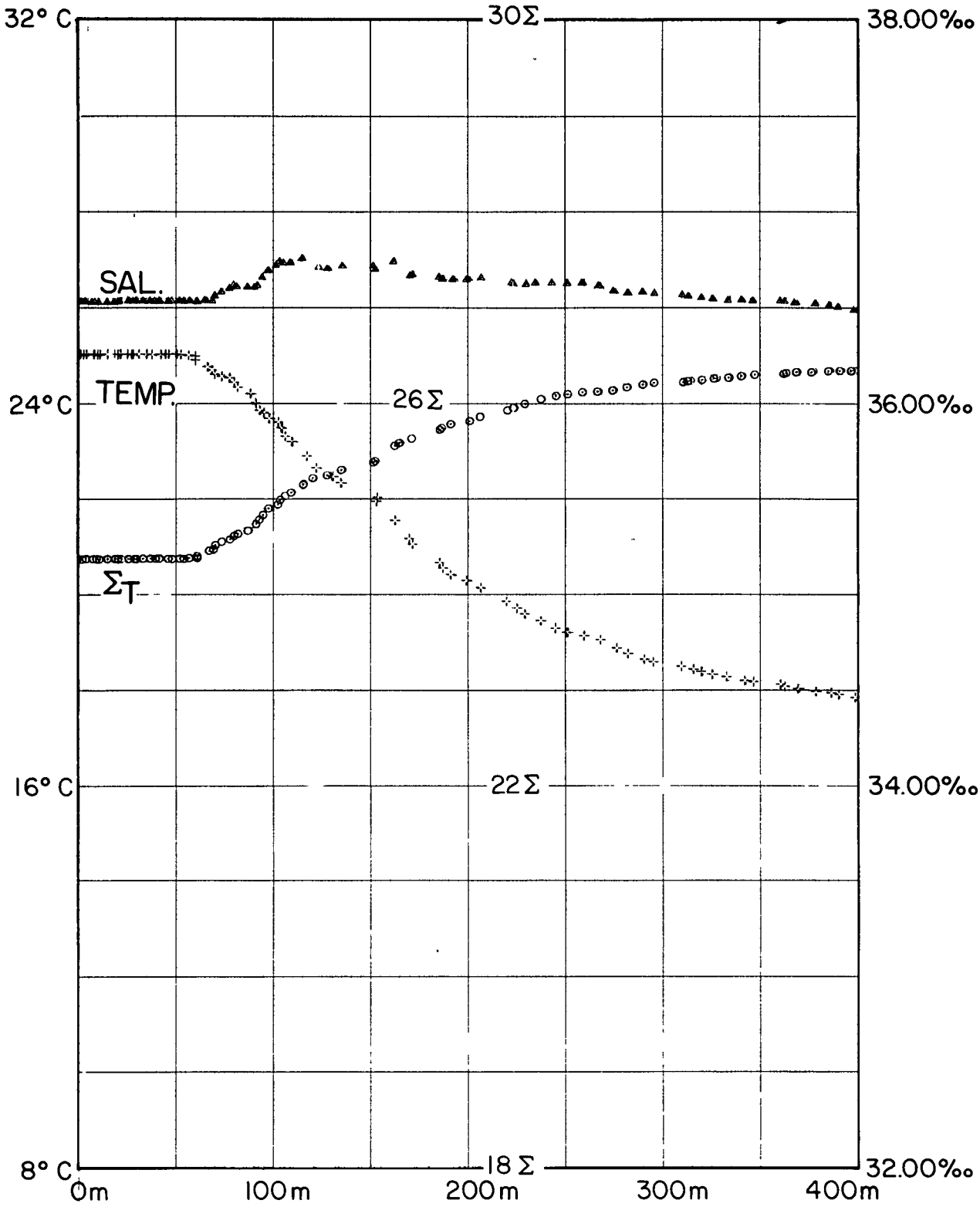
Station 19


32°C
30Σ
38.00‰
SAL
ΣT
24°C
26Σ
36.00‰
TEMP.
16°C
22Σ
34.00‰
8°C
18Σ
32.00‰
0m
100m
200m
300m
400m

Station 21


32°C
30 Σ
38.00‰
SAL.
ΣT
24°C
26Σ
36.00‰
TEMP.
16°C
22 Σ
34.00‰
8°C
18Σ
32.00‰
0m
100m
200m
300m
400m

Station 22


32° C
30Σ
38.00‰
SAL.
TEMP.
24° C
26Σ
36.00‰
ΣT
16° C
22Σ
34.00‰
8° C
18 Σ
32.00‰
0m
100m
200m
300m
400m

S. C. O. R. DISCOVERER EXPEDITION

INTERCOMPARISON OF RADIOMETRIC INSTRUMENTS AT STATION 23

JOHN E. TYLER

An intercomparison of the radiometric instrumentation in use during the DISCOVERER expedition was conducted at Stations 22 and 23 (June 2 and 3, 1970).

An intercomparison of this kind, performed in ocean water under natural sun and skylight, cannot be interpreted in terms of the performance of the instruments involved unless the natural lighting and the optical properties of the water body both remain constant or unless the known variations can somehow be removed from the measurements.

Sky conditions at Station 22 were unfavorable for intercalibration and the data obtained at this station are not analyzed in this report.

Sky and water conditions at Station 23 were very nearly ideal for comparison purposes and the results of the comparisons made at this station are the subject of this section.

STABILITY OF THE AMBIENT DAYLIGHT

During the period from 0905 to 1152 hours the total radiant flux at the deck of the ship was monitored and recorded by Dr. Ochakovsky with a thermopile irradiance meter and by Dr. Smith with a "sunball" which employed a photomultiplier tube behind 2 mm of BG18 infrared absorbing glass. Between 0900 to 1200 hours the zenith angle of the sun varied from 41.04° to 3.45°. For irradiance collection of direct sunlight only, the irradiance reading obtained on deck during this period would vary in accordance with the cosine of the angle of incidence (that is, the sun's zenith angle).

In Fig. 1 Ochakovsky's data have been compared with the cosine of the sun's zenith angle, normalized to Ochakovsky's data. The departure of Dr. Ochakovsky's measurements from cosine collection is approximately ±6%. This variation is attributed to changes in atmospheric conditions.

The sunball used by Dr. Smith collects in a manner independent of the zenith angle of the sun for zenith angles between 0° and approximately 45° (Tyler and Smith, 1970). Dr. Smith obtained digital sunball readings at Station 23 on the average of every 2-1/2 minutes between 0904 and 1152 hours.

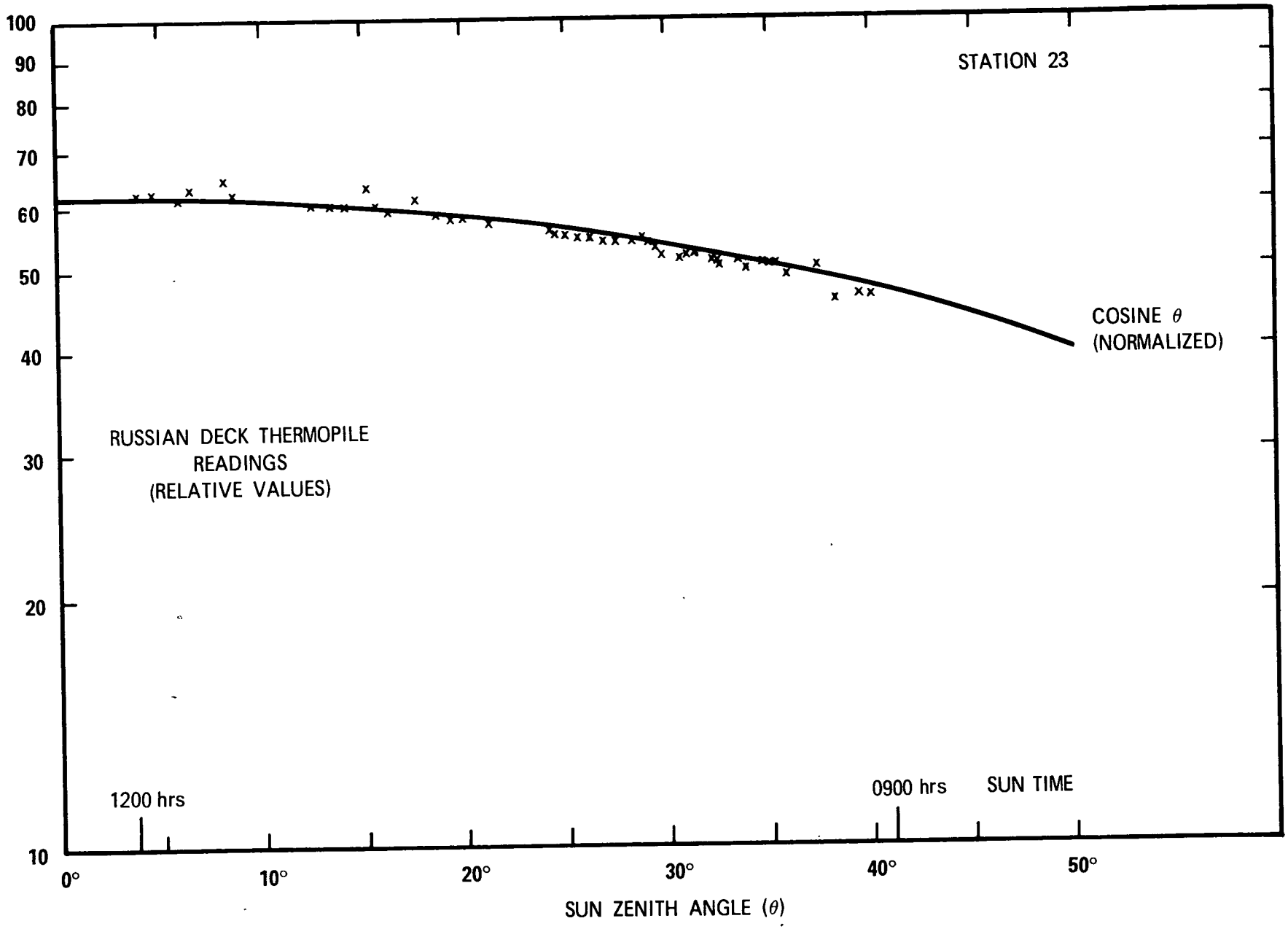

100
90
80
70
60
50
40
30
20
10
STATION 23
COSINE θ
(NORMALIZED)
RUSSIAN DECK THERMOPILE
READINGS
(RELATIVE VALUES)
1200 hrs
0900 hrs
SUN TIME
0°
10°
20°
30°
40°
50°
SUN ZENITH ANGLE (θ)

FIGURE 1

These readings have been numerically averaged and show a maximum variation of approximately 9% above the average value and 24% below the average value. Much of this variability was due to transient changes of short duration in atmospheric conditions. Dr. Smith annotated these periods on his recording and his data taking was discontinued during these periods. If the sunball readings which he has marked with the words, "cloudy" or "unsteady sun," are excluded from the averaging of his sunball data, the variability is reduced to ±5% of the average value which is a more realistic estimate of conditions affecting his data.

During the afternoon Dr. Morel monitored the radiant flux at deck level with a pyranometer. These values are given in his tables of quanta meter and thermopile data (pages 0-84,0-85) in the column marked "Ref. Pont." Dr. Morel also avoided taking data during periods of changing atmospheric conditions. His pyranometer readings, for the two sets of data combined, show a variation in ambient daylight of approximately ±2% around the average of his 32 entries.

Additional evidence of the stability of the ambient radiant flux during the periods of data taking is found in the deck readings obtained by Eng. Nygård and in the underwater thermopile and quanta meter measurements obtained by Dr. Morel at Station 23. These latter data would not yield smooth curves if the ambient flux had been rapidly changing with time.

UNIFORMITY AND STABILITY OF THE WATER MASS

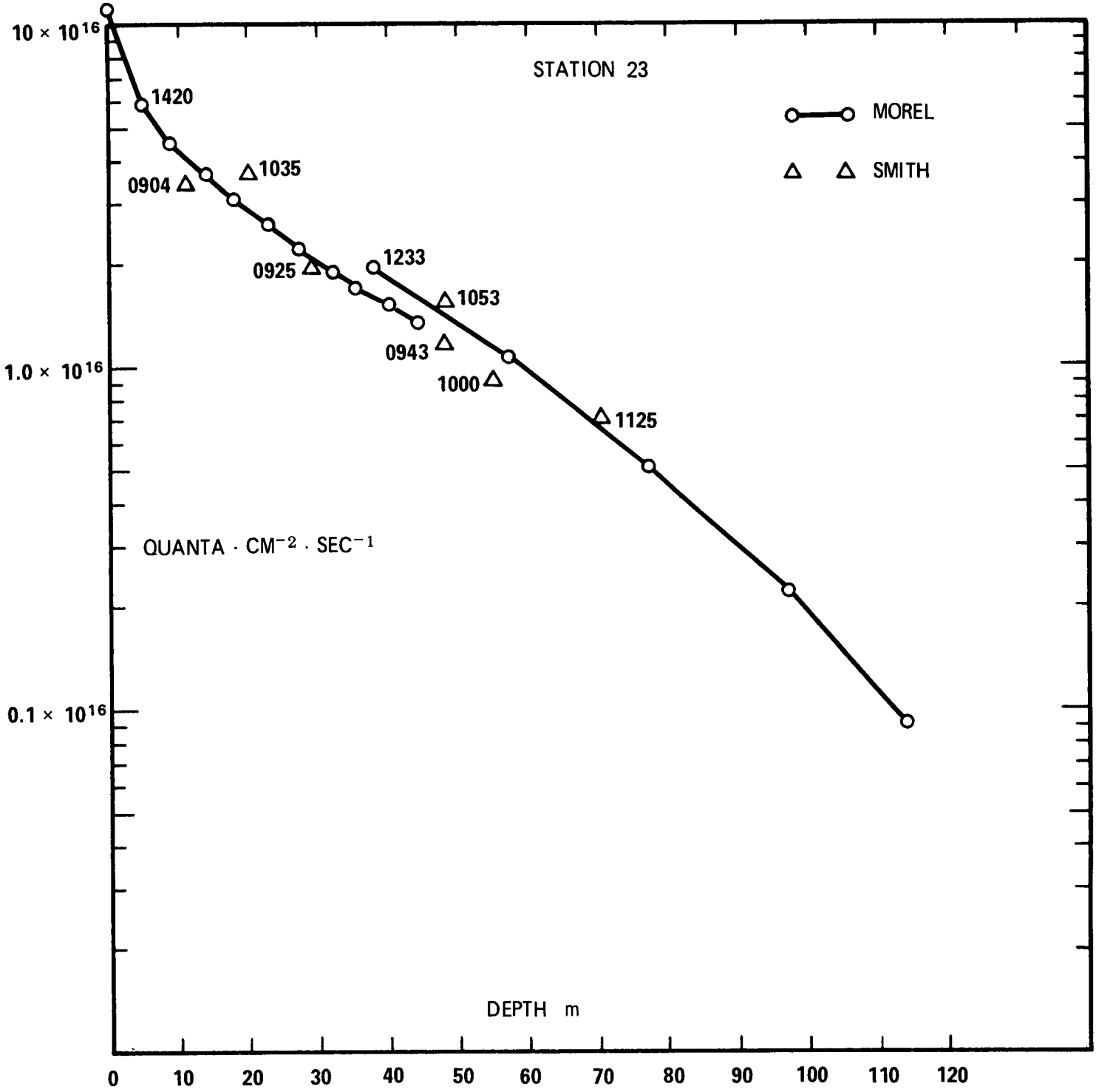
The transmittance measurements obtained by Mr. Austin, which are independent of the natural radiant flux, demonstrate a uniform water mass having high transmittance to 50 meters (about 92% per meter at a wavelength of 473 nm) with slowly decreasing transmittance at greater depths to 100 meters.

Morel's thermopile and quanta meter plots (curves marked 1 and 2 pg 0-108) are substantially parallel and consequently also indicate a stable water mass over the period from 1212 to 1420 hours. They also indicate a relatively uniform water mass, having a slightly clearer layer between 14 and 48 meters (average value of $K = 0.0284\ m^{-1}$), becoming slowly less clear with increasing depth below 48 m.

INTERCOMPARISON OF SPECTRAL IRRADIANCE DATA

Figure 2 is a plot of total quanta $\cdot\ cm^{-2} \cdot sec^{-1}$ as a function of depth obtained by integration of the spectral data taken by Dr. Smith and Dr. Morel. Dr. Smith made two lowerings, the first from 0904 to 1015 (sun zenith angles of 39.9° and 24.2°, respectively) and the second from 1035 to 1152 (sun zenith angles of 19.7° and 4.3°, respectively). Dr. Morel also made two lowerings

FIGURE 2


STATION 23
MOREL
SMITH
1420
1035
0904
1233
0925
1053
0943
1000
1125
10 × 10^16
1.0 × 10^16
0.1 × 10^16
QUANTA · CM^-2 · SEC^-1
DEPTH m
0
10
20
30
40
50
60
70
80
90
100
110
120

at 1233 and 1420 (sun zenith angles of 8.7° and 32.0°). Figure 2 is strong evidence that the two spectroradiometers were giving the same result.

A numerical comparison of these data can be made for the data taken by the two instruments at the same sun zenith angle, as follows:

Morel's data at 1233 hours are normalized to the sun zenith angle at that time (about 8.7°). Smith's data at 70.8 meters were taken between 1125 and 1152 hours (sun zenith angles of 8.7° and 4.3°, respectively). Thus, Smith's data were taken at very nearly the same sun zenith angle as Morel's data, and Smith's datum point for that period should, therefore, fall on the smooth curve connecting Morel's data points, at the depth of 70.8 m. It can be seen in Fig. 2 that Smith's data at 70.8 m are a little above the line joining Morel's points. To obtain total quanta, Smith's data in FIg. 2 have been integrated over the wavelength range 350 to 700 nm, whereas Morel's data were integrated over the wavelength range 400 to 700 nm. If Smith's data for 70.8 meters are reintegrated between 400 and 700 nm, the total quanta computed from his data is found to be 6.6×10^{15} quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1}. A linear interpolation of Morel's data between 67 and 77 meters gives 6.6×10^{15} quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1} at 70.8 meters.

A comparison can also be made between Morel's total quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1} obtained at 57 meters with Smith's result at 55.3 meters. The conditions influencing these two results were not the same. There was a small difference in the depth location of the instruments, a difference in the sun zenith angle for the two determinations, and a difference in the wavelength range over which the two integrals have been computed.

The depth difference can be accurately corrected by means of the quantum irradiance attenuation coefficient, using the average value of K = 0.0351 per meter, at this depth. The sun zenith angle difference can be partially corrected by means of the cosine of the angle of incidence of sunlight in the two cases. This corrects for the change in irradiance at the ocean surface due to sun alone but does not correct for the change in the attenuation of flux by the water path, which would not be the same in the two situations. Thus, Smith's data will not be brought to a true measurement for 1233 hours and 57 meters by this cosine correction.

A first order correction for the difference in the path length of the water through which the radiant flux must travel before reaching the detector can be made by dividing these results by the cosine of the refracted sun zenith angle that prevailed in the two experiments.

The effect of these several corrections are illustrated in the table following.

	Morel (57 m)	Smith (55.3 m)
Original measured values of total quanta • cm^{-2} • sec	104.88	90.53
Smith's result computed to 57 m	104.88	80.32
Smith's result computed to 1233 (by cosine Θ)	104.88	88.67
Smith's result integrated 400-596	104.88	85.00
First order correction for differences in water path	105.17	89.80

The corrected values thus vary from their average by about ±7.9% which is consistent with the variability of the ambient daylight recorded by Ochakovsky and Smith.

Figure 3 is a semi-log plot of the uncorrected spectral irradiance data obtained by Smith at 55.3 meters depth (sun zenith angle 27° to 24°) and by Morel at 57 meters depth (sun zenith angle about 5.7°).

In interpreting Fig. 3, it is necessary to take into account the fact that the zenith angle of the sun was greater and changed during Smith's spectral measurements at 55.3 meters, whereas Morel's data for 57 m and a smaller sun zenith angle did not experience a significant change in sun zenith angle.

INTERCOMPARISON WITH INTEGRATING METERS

During the intercomparisons at Station 23, quanta meters and instruments for measuring total deck irradiance in watts • cm^{-2} were attached to the frame of the Scripps spectroradiometer (before 1200 hours) and to the frame of the French spectroradiometer (after 1200 hours). The instruments thus attached were lowered together to a series of depths and data was taken for intercomparison purposes. The depths recorded in the tables by the several groups are not always exactly the same, but the attached instruments were, nevertheless, always physically at the same depth and the sun zenith angle was substantially the same for all instruments at any one depth. The only significant differences affecting the results of these intercomparisons arise from the fact that the French spectral data for any one depth were obtained in a very short time and that the data for each lowering have been normalized to the surface irradiance measured at the end of the lowering. The Scripps instrument, on the other hand, averaged the radiant flux at each wavelength over a 10-second interval which generally meant that a single spectral scan required 10 to 20 minutes and that a series of spectral scans at several depths required 2 to 3 hours. During this time the sun zenith angle may have changed appreciably.

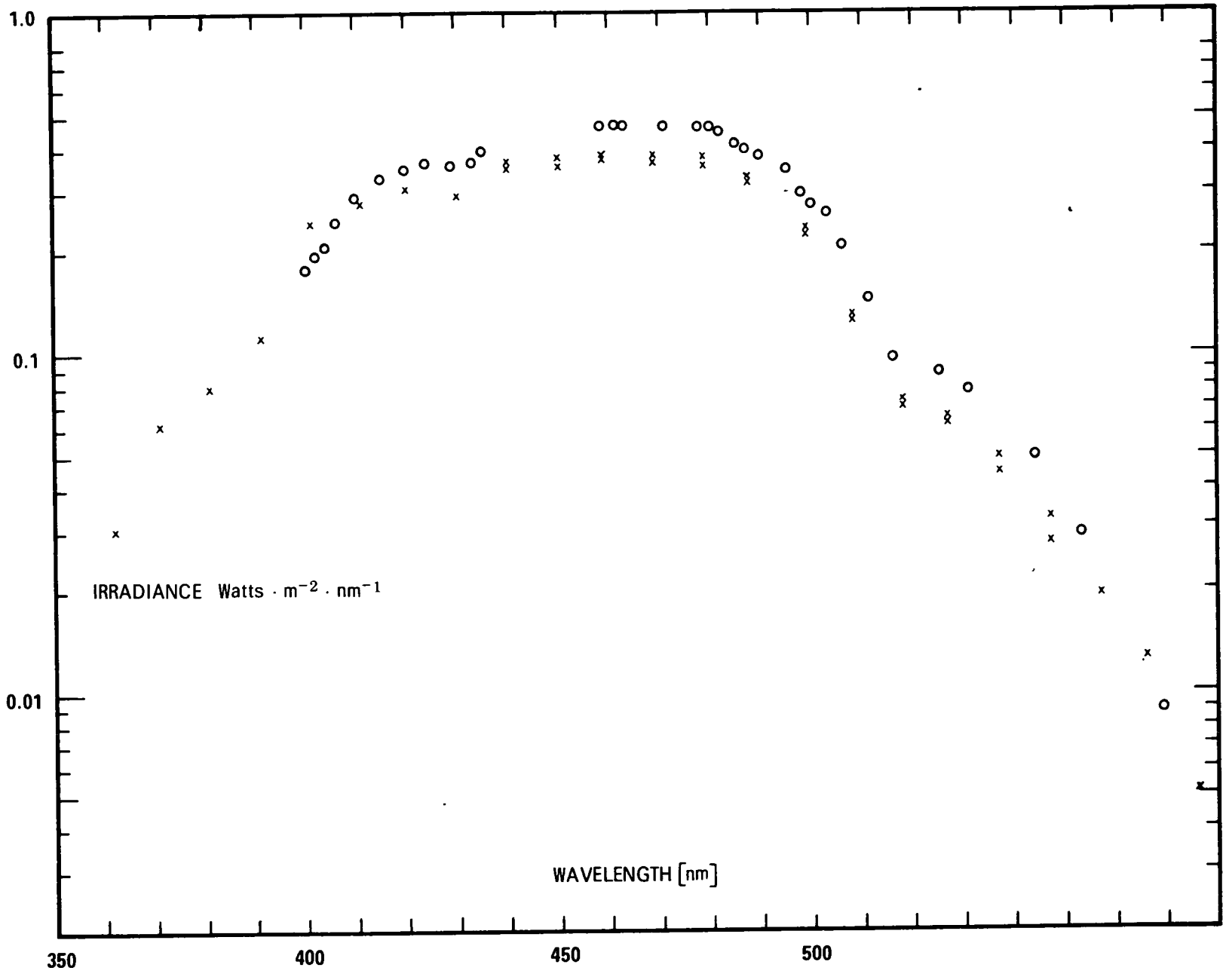

1.0
0.1
0.01
IRRADIANCE Watts · m^{-2} · nm^{-1}
WAVELENGTH [nm]
350
400
450
500

FIGURE 3

When stable lighting conditions prevailed, the Scripps data give the measured irradiances for the times indicated. When lighting conditions were considered to be unfavorable, the Scripps data were normalized to the maximum sunball reading obtained during the lowering. The graphical presentations in Section G are labeled to show the treatment of the data.

Following are intercomparisons of the absolute quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1} (or watts $\cdot$ cm^{-2}) obtained at Station 23 by various instruments relative to the Scripps spectroradiometer and to the French spectroradiometer. These intercomparisons make direct use of the data submitted for this Data Report. No adjustments or corrections that might be necessary as a result of time averaging or normalization of the original data have been made.

The Scripps data was taken in real time and should be comparable to the data taken simultaneously with the integrating irradiance meters. However, as previously stated, there was a significant change in sun zenith angle during this comparison (19.7° at 1037 to 4.8° at 1145). The Scripps data required 10 to 20 minutes at each depth. During part of the time at each depth a recording was obtained with the integrating meters. The recordings from these meters followed the rapid amplitude changes in radiant flux underwater (see, for example, pages A26 to A42, inc.) and had to be averaged by eye in the data processing, whereas the Scripps instrument automatically recorded an average value over a 10-second period. A comparison of the two results therefore depends somewhat on the times selected for averaging and the difference in the methods for averaging.

The French spectral data have been normalized to the measured value of irradiance at 0 depth, whereas data with the integrating instruments were taken in real time. Since the time used for normalization of the French data at Station 23 was the time for which the sun was at its greatest zenith angle during the experiment, the normalized values will have been reduced relative to the real-time values. The French data and the real-time data will consequently exhibit different slopes in a semi-log plot of quanta vs. depth.

The quanta meters used for in-situ (FC21) and for simulated-in-situ (FC17) carbon fixation were consistently exposed to 28%, or less, of the surface radiant flux, the FC21 in the ocean and the FC17 beneath a filter in the deck incubator. An intercomparison of these instruments should, therefore, give preference to results which were obtained at depths where the radiant flux is consistent with this limitation.

REFERENCES

Tyler, J. E. and R. C. Smith. Measurements of Spectral Irradiance Underwater. Gordon and Breach Science Publishers, New York, 1970.

S. C. O. R. DISCOVERER EXPEDITION
STATION 23

Intercomparison of quanta meter #FC21 - used to determine total quanta available for in-situ photosynthesis. Calibration factor used for FC21 = 9.2×10^{15} quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1} $\cdot$ mv^{-1}.*

Time	Depth m	Scripps Spectroradiometer	FC21 Quanta	FC21 mv Measured
1037	20.3	3.68×10^{16}	2.85×10^{16}	3.1
1055	48.4	1.53×10^{16}	1.29×10^{16}	1.4
1130	70.8	6.95×10^{15}	6.62×10^{15}	0.72
1145	70.8	6.96×10^{15}	6.44×10^{15}	0.70

quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1}

Time	Depth m	French Spectroradiometer	FC21 Quanta	FC21 mv Measured
1358	44	1.32×10^{16}	1.47×10^{16}	1.6
	35	1.67×10^{16}	1.84×10^{16}	2.0
	32	1.90×10^{16}	2.12×10^{16}	2.3
	27	2.25×10^{16}	2.39×10^{16}	2.6
	18	3.12×10^{16}	3.22×10^{16}	3.5
	14	3.68×10^{16}	3.59×10^{16}	3.9
	9	4.49×10^{16}	4.23×10^{16}	4.6
	5	5.89×10^{16}	5.15×10^{16}	5.6
1420	0	10.30×10^{16}	9.11×10^{16}	9.9

quanta $\cdot$ cm^{-2} $\cdot$ sec^{-1}

* A constant calibration factor assumes linear response of the FC21 and circuit. For maximum accuracy the instruments' response function should be determined and used.

S. C. O. R. DISCOVERER EXPEDITION

STATION 23

Intercomparison of quanta meter #FC17 - used in deck incubator for measurements of total quanta available for simulated-in-situ photosynthesis. Calibration factor used for FC17 = 1.13×10^{15} quanta $\cdot$ $cm^{-2} \cdot sec^{-1} \cdot \mu A$.*

Time	Depth m	Scripps Spectroradiometer	FC17 Quanta	FC17 μA Measured
0923-0931	28.8	1.93×10^{16}	1.84×10^{16}	16.3
0946-0948	48.3	1.16×10^{16}	1.22×10^{16}	10.8
1037-1048	20.3	3.68×10^{16}	2.77×10^{16}	24.5
1055-1106	48.3	1.52×10^{16}	1.54×10^{16}	13.6

quanta $\cdot$ $cm^{-2} \cdot sec^{-1}$

Time	Depth m	French Spectroradiometer	FC17 Quanta	FC17 μA Measured
1359	44	1.33×10^{16}	1.70×10^{16}	15.0
1402	40	1.52×10^{16}	1.92×10^{16}	17.0
	35.5	1.67×10^{16}	2.05×10^{16}	18.1
1405	32	1.90×10^{16}	2.23×10^{16}	19.7
1406	27	2.25×10^{16}	2.47×10^{16}	21.9
1407	23	2.65×10^{16}	2.68×10^{16}	23.7
1409	18	3.12×10^{16}	2.99×10^{16}	26.5
1411	14	3.68×10^{16}	3.22×10^{16}	28.5
1414	9.5	4.49×10^{16}	3.50×10^{16}	31.0
1415	4.5	5.89×10^{16}	3.91×10^{16}	34.6
1419	0	10.3×10^{16}	6.51×10^{16}	57.6

quanta $\cdot$ $cm^{-2} \cdot sec^{-1}$

* The recorder used during the intercomparison was not the same recorder used for the deck incubator recordings illustrated on page B24 - B39 inclusive. A constant calibration factor assumes linear response of the FC17 and circuit. For maximum accuracy the instruments' response function should be determined and used.

S. C. O. R. DISCOVERER EXPEDITION

STATION 23

Intercomparison of Russian amici-prism instrument used for recording deck irradiance.

Time	Depth m	Scripps Spectroradiometer	Russian* Amici-Prism	Russian* Deck Monitor
0905-0922	10.8	148.9 $\frac{watts}{m^2}$	143.9 $\frac{watts}{m^2}$	47.4
0925-0939	28.8	83.8 "	71.4 "	50.7
0943-0956	48.3	50.7 "	41.4 "	52.9
1000-1014	55.3	39.5 "	35.3 "	54.6
1028	0		382.2 "	57.0
1034-1050	20.3	157.9 "	139.8 "	58.6
1053-1107	48.4	66.6 "	56.6 "	60.6
1125-1152	70.8	30.2 "	29.6 "	62.6

Time	Depth m	French Spectroradiometer	Russian* Amici-Prism	Russian* Deck Monitor
1353	44.0	57.4 $\frac{watts}{m^2}$	58.3 $\frac{watts}{m^2}$	58.0
	40.0	69.3 "	66.8 "	57.5
	35.5	74.0 "	72.0 "	57.0
	32.0	86.7 "	79.4 "	57.0
	27.0	104.6 "	94.5 "	57.0
	23.0	121.6 "	110.2 "	57.0
	18.0	146.2 "	132.3 "	56.5
	14.0	175.1 "	169.5 "	56.0
	9.5	212.5 "	201.0 "	56.0
	4.5	268.6 "	254.0 "	56.0
	0		340.0 "	58.0

* Average values computed from Russian data for Station 23. See following pages.

S. C. O. R. DISCOVERER EXPEDITION
INTERCOMPARISON DATA
for Stations 22 & 23
Y. Ochakovsky

St N 22
2.06.70
Set-I

Amici prism instrument

λ_1= 400 nm; λ_2= 700 nm.

I	2	3	4	5	6	7
09-54	Cu 0/4 $\odot^2$	I27	5,34	63,0	4,92	I,39
	Sea 3-4	II7	7,40	60,5	7,I5	2,02
	h⊙ = 6I,5° x)	I06	9,95	59,5	9,80	2,75
		97	I2,50	59,0	I2,40	3,50
		9I	I8,50	56,0	I9,30	5,45
		83	20,50	56,5	2I,20	6,00
		76	26,40	57,5	26,90	7,60
		65	33,70	57,5	34,40	9,70
		54	43,60	57,0	44,70	I2,60
		45	55,40	57,0	56,80	I6,00
		36	72,00	57,5	73,30	20,70
		28,5	94,50	57,0	97,00	27,40
		24	II4,00	58,0	II5,00	32,50
		I9	I28,50	58,0	I29,50	36,60
		I0	I58,5	58,0	I6I,50	45,60
	Cu 0/5 $\odot^2$	4,5	2I6,0	58,0	2I8,00	6I,50
I0-I5	Sea 3-4, h⊙ =66°	0	354,0	58,5	354,00	I00,00

I - Time
2 - Weather conditions; Sun altitude hø(measured)
3 - Depth (Z m)
4 - Total energy W/m^2
5 - Deck thermopile checking of radiation input (relative units)
6 - Data normalized relative to energy at Z = 0
7 - Per cent relative to energy at Z = 0.

x) Sun altitude (h ⊙) measurements may differ by I - 2° from the computed values, since the measurements were made with the navigational and not astronomical sexstant and no correctiens were introduced to the measured altitudes.

S. C. O. R. DISCOVERER EXPEDITION
INTERCOMPARISON DATA
for Stations 22 & 23
Y. Ochakovsky

St N 22
Set-2

I	2	3	4	5
I2-30	Cu 0/5 $\odot^2$ Sea 3-4 h$\odot$=79°	32,I	I07,0	64,0
I3-00	h$\odot$ = 74°	II,0	270,0	62,5
I3-39	$\odot^0$	49,I	28,4	30,0
I3-4I	-"-	49,I	35,3	33,5
I3-47	-"-	49,I	2I,I	2I,0
I3-49	-"-	49,I	25,0	24,0
I3-54	$\odot^2$	46,45	80,8	76,0
I3-59	$\odot^0$	46,45	4I,2	40,5
I4-02	-"-	48,90	26,0	26,0
I4-08	-"-	48,90	24,5	23,0
I4-I2	$\odot'$	48,0	74,5	65,0
I4-I4	-"-	48,0	74,5	65,0
I4-20	$\odot^0$	38,6	I7,2	I2,0
I4-24	$\odot^2$ h$\odot$ =56°	4I,0	76,9	60,0
I4-27	-"-	32,2	99,5	60,5
I4-29	-"-	32,2	95,6	58,0
I4-33	$\odot^0$	32,5	3I,7	I9,0
I4-35	$\odot^2$	2I,2	I43,0	58,0
I4-36	-"-	2I,2	I43,0	56,0
I4-39	h$\odot$ =50,5°	22,0	I27,0	53,0

S. C. O. R. DISCOVERER EXPEDITION
INTERCOMPARISON DATA
for Stations 22 & 23
Y. Ochakovsky

St N 23

3.06.70

Set-I

I	2	3	4	5
09-05	Cu o/4	I2,0	I32,3	46,0
09-07	$Sea\odot^{2}_{2-3}$	II,7	I43,I	46,0
09-I2	h ⊙ = 48,5°	II,8	I37,7	46,0
09-I6		II,8	I58,8	50,0
09-22		II,8	I48,0	49,0
09-25		30,0	68,I	50,5
09-26		29,7	68,I	50,5
09-28		29,2	69,6	5I,0
09-3I		29,7	69,6	50,0
09-33		29,7	72,8	5I,0
09-37		29,7	74,0	50,5
09-38		29,8	76,0	5I,0
09-39		29,8	72,8	5I,0
09-43		50,0	39,7	52,0
09-45		49,7	39,7	52,0
09-46		48,5	39,7	5I,5
09-50		49,4	4I,0	52,0
09-5I		49,0	4I,6	53,0
09-53		49,0	43,6	54,0
09-54		48,7	43,0	54,5
09-56		48,5	43,0	54,0

S. C. O. R. DISCOVERER EXPEDITION
INTERCOMPARISON DATA
for Stations 22 & 23
Y. Ochakovsky

I	2	3	4	5
I0-00	Cu 0/4 $\odot^2$	5I,0	33,7	54,0
I0-03	h $\odot$ = 60,5°	56,0	35,7	54,0
I0-06		56,0	35,7	54,5
I0-08		56,5	34,4	54,5
I0-II		55,5	35,7	55,0
I0-I3		56,4	35,7	55,0
I0-I4		56,I	36,4	55,5
I0-28		0	382,2	57,0
I0-34		2I,3	I37,7	57,5
I0-36		2I,4	I37,7	57,5
I0-39		2I,4	I48,0	58,5
I0-44		2I,3	I37,7	60,5
I0-50		2I,3	I37,7	59,0
I0-53		49,9	54,4	60,0
I0-55	h $\odot$ = 74°	49,I	55,4	63,0
II-00		49,0	56,4	60,0
II-03		49,0	58,3	60,0
II-07		48,5	58,3	60,0
II-25		72,4	29,8	62,0
II-27		7I,4	29,8	64,5
II-35	Cu 0/4 $\odot^2$	7I,5	29,8	63,0
II-38	Sea 2-3 h $\odot$ =87,5°	7I,6	28,4	6I,0
II-46		7I,2	29,8	62,5
II-52		7I,4	29,8	62,5

S. C. O. R. DISCOVERER EXPEDITION
INTERCOMPARISON DATA
for Stations 22 & 23
Y. Ochakovsky

St N 23
Set-2

1	2	3	4	5	6	7
I3-53	Cu 0/5 $\odot^2$ Sea 2-3 $h\odot = 67^\circ$	44,0	58,3	58,0	58,3	I7,I
		40,0	66,8	57,5	67,5	I9,8
		35,5	72,0	57,0	73,3	2I,6
		32,0	79,4	57,0	80,8	23,8
		27,0	94,5	57,0	96,2	28,3
		23,0	II0,2	57,0	II2,I	33,0
		I8,0	I32,3	56,5	I36,0	40,0
		I4,0	169,5	56,0	I75,5	5I,7
		9,5	20I,0	56,0	208,0	6I,2
		4,5	254,0	56,0	256,3	75,3
I4-I5	$h\odot = 6I^\circ$	0	340,0	58,0	340,0	I00,0

Station No. 22 DISCOVERER EXPEDITON MAY 1970

Direct Measurement of Quanta

Intercomparison Data for Stations 22 & 23

K. Nygård

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} · s^{-1}

Time		Depth		Quanta		(Q)	Sun monitor
h	min.	Danish FC5	Scripps radiometer	FC5	FC 31	Scripps (calc.)	(relative units)
12	30	27.2	30.6	299		370.0	63.0
	33			311			64.0
	36			301			62.0
	38				297		61.5
	40				87		20.0
	42				321		66.0
	45				306		63.0
	48				300		61.0
	50			281			60.0
	52			299			61.0
	54	(26.0)		304			60.0
	56	27.2		292			60.0
	58		30.3	281			59.5
13	02	(8.1)	10.1	565		732.3	61.0
	04			565			60.0
	06			570			59.5
	08				612		59.5
	10				174		15.8
	12				612		60.5
	14				600		60.5
	16				612		63.0
	18				630		67.5
	20				660		69.0

Station No. 22

DISCOVERER EXPEDITION MAY 1970
Direct Measurement of Quanta
Intercomparison Data for Stations 22 & 23
K. Nygård

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} . s^{-1}

Time		Depth		Quanta		(Q)	Sun monitor
h	min.	Danish FC5	Scripps radiometer	FC5	FC 31	Scripps (calc.)	(relative units)
13	40		47.0		81	161.6	30.5
	42				84		30.5
	44				75		28.2
	46				62		23.0
	48	(42.7)	(46.6)	58			21.0
13	50			69			25.0
	52			138			66.0
	54			207			78.0
	56			191			63.0
	58			104			39.0
14	00			110			41.0
	02			68			25.0
	04			71			26.5
	06			143			48.0
	08			61			22.0
	10			78			27.0
	12			115			38.0
	14	(44.4)	(47.8)	173			66.5
	17	(35.4)	38.1	212			65.0
	19			48.3			11.1
	21		38.1		46.2		9.2
	23		41.1		192		59.0
	25		41.1		72		18.0
	27		31.2		255		63.0
	29				246		58.0
	31		31.5	138			28.0
	33		31.5	83			17.5
	35		20.2	336			59.0
	37			304			56.0
	39		21.0		315		53.5

Station No. 23

DISCOVERER EXPEDITION MAY 1970
Direct Measurement of Quanta
Intercomparison Data for Stations 22 & 23
K. Nygard

Downwelling irradiance, Q
Multiply Q by 10^{18} to obtain Quanta · m^{-2} . s^{-1}

Time		Depth		Quanta		(Q)	Sun monitor
h	min.	Danish FC5	Scripps radiometer	FC5	FC 31	Scripps (calc.)	(relative units)
09	05	10.3	10.7	345		351.8	48.0
	07	10.3		345			
	09	10.5	10.8				50.0
	11			368			51.0
	13	10.5		382			53.5
	16	10.1	10.8	396			54.0
	17			382			
	20		10.8		363		52.0
					375		
	25		28.8		191		53.5
	29				197	192.5	
	30	27.6	28.8	200			52.5
	32			202			53.5
	35	27.6		212			54.0
	40			221			55.0
	43	46.8	48.3	122.4		115.5	56.0
	45			122.4			56.5
	48				120.6		57.5
	50				117.0		57.0
	55	46.4	(47.9)	136.0			59.5
	57			132.5			58.5
10	00			96.6		90.5	59.0
	02	53.4	55.3	100.3			58.5
	04				93.0		59.0
	06				89.4		59.0
	08	54.2	(54.7)	97.5			59.0
	10			104.0			59.5
	12				96.6		59.0
	14				96.0		59.5

Station No. 23

DISCOVERER EXPEDITON MAY 1970
Direct Measurement of Quanta
Intercomparison Data for Stations 22 & 23
K. Nygård

Downwelling irradiance, Q

Multiply Q by 10^{18} to obtain Quanta · m^{-2} . s^{-1}

Time		Depth		Quanta		(Q)	Sun Monitor
h	min.	Danish FC5	Scripps radiometer	FC5	FC 31	Scripps · (calc.)	(relative units)
10	35	19.4	20.3	345		366.7	62.0
				359			
	37			359			62.5
	39				369		63.0
	41				375		64.0
	43	19.0	20.3	368			64.5
	45			363			65.0
	47				375		64.0
	49				363		63.8
10	56		48.5		153		66.5
	58				152		64.5
11	00	46.6	48.2	151.8			64.5
	02	46.8		156.4			64.5
	03		48.0		157.5		65.0
	05				162.0		65.0
	06	46.8	48.1	158.7			65.0
	07			154.1			
11	25	70.1	70.8	69.0		69.5	66.0
	27	69.5		74.5			69.0
	29				74.4		68.0
	32				12.0	CLOUD	8.2
	33				72.6		71.0
	35				72.0		68.0
11	38	69.9	70.8	71.8		69.5	70.0
	43	69.1		72.2			70.0
	47		70.6		72.0		66.5
	49				72.0		66.5

DISCOVERER Expedition

Daily and Hourly Log of Sun Altitude

The enclosed tables give both the altitude and zenith angle of the sun in degrees for the times indicated. The time 1200 is local apparent noon, i.e., the instant at which the sun crossed the ship's local meridian and also 1200 on the laboratory clock. These computations are based on the ship's noon position as recorded in the ship's log and transcribed for us by Hopkins. On some days no noon sighting was obtained; in fact, on a few days no sighting was obtained at all and dead reckoning was used to determine the position of the ship. Station 9 appears to be particularly bad, since it indicates a morning drift of about 36 nautical miles.

The average latitude drift was about 5 minutes during the morning (not counting Station 9) and about the same in the afternoon--sometimes in the same direction and sometimes in the opposite direction.

In spite of these navigational problems, I believe the sun altitudes given in these tables to be in error with respect to the ship's zenith by less than ± 0.5°.

Sun altitudes before 1200 can be found to within 0.25° by extrapolation to the same number of hours after 1200.

DATE 5/ 4 STATION NUMBER 1 LATITUDE 20.81 DEGREES
SUN DECLINATION 16.00 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	4.81	85.18	1610	59.14	30.85
1205	4.96	85.03	1615	60.30	29.69
1210	5.36	84.63	1620	61.46	28.53
1215	5.98	84.01	1625	62.62	27.37
1220	6.75	83.24	1630	63.78	26.21
1225	7.63	82.36	1635	64.93	25.06
1230	8.59	81.40	1640	66.09	23.90
1235	9.59	80.40	1645	67.24	22.75
1240	10.63	79.36	1650	68.39	21.60
1245	11.70	78.29	1655	69.55	20.44
1250	12.79	77.20	1700	70.70	19.29
1255	13.89	76.10	1705	71.84	18.15
1300	15.01	74.98	1710	72.99	17.00
1305	16.14	73.85	1715	74.14	15.85
1310	17.27	72.72	1720	75.28	14.71
1315	18.41	71.58	1725	76.42	13.57
1320	19.56	70.43	1730	77.57	12.42
1325	20.71	69.28	1735	78.70	11.29
1330	21.86	68.13	1740	79.84	10.15
1335	23.01	66.98	1745	80.98	9.01
1340	24.17	65.82	1750	82.11	7.88
1345	25.33	64.66	1755	83.24	6.75
1350	26.49	63.50	1800	84.37	5.62
1355	27.66	62.33	1805	85.50	4.49
1400	28.82	61.17	1810	86.63	3.36
1405	29.99	60.00	1815	87.75	2.24
1410	31.15	58.84	1820	88.87	1.12
1415	32.32	57.67	1825	89.99	0.00
1420	33.49	56.50	1830	91.10	-1.10
1425	34.65	55.34	1835	92.21	-2.21
1430	35.82	54.17	1840	93.32	-3.32
1435	36.99	53.00	1845	94.43	-4.43
1440	38.16	51.83	1850	95.53	-5.53
1445	39.33	50.66	1855	96.63	-6.63
1450	40.49	49.50			
1455	41.66	48.33			
1500	42.83	47.16			
1505	44.00	45.99			
1510	45.17	44.82			
1515	46.33	43.66			
1520	47.50	42.49			
1525	48.67	41.32			
1530	49.83	40.16			
1535	51.00	38.99			
1540	52.16	37.83			
1545	53.33	36.66			
1550	54.49	35.50			
1555	55.66	34.33			
1600	56.82	33.17			
1605	57.98	32.01			

DATE 5/ 5 STATION NUMBER 2 LATITUDE 18.31 DEGREES
SUN DECLINATION 16.28 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	2.03	87.96	1610	59.41	30.58
1205	2.35	87.64	1615	60.58	29.41
1210	3.13	86.86	1620	61.75	28.24
1215	4.11	85.88	1625	62.92	27.07
1220	5.18	84.81	1630	64.09	25.90
1225	6.30	83.69	1635	65.26	24.73
1230	7.44	82.55	1640	66.43	23.56
1235	8.59	81.40	1645	67.60	22.39
1240	9.76	80.23	1650	68.76	21.23
1245	10.92	79.07	1655	69.93	20.06
1250	12.10	77.89	1700	71.09	18.90
1255	13.28	76.71	1705	72.25	17.74
1300	14.46	75.53	1710	73.42	16.57
1305	15.64	74.35	1715	74.57	15.42
1310	16.82	73.17	1720	75.73	14.26
1315	18.00	71.99	1725	76.89	13.10
1320	19.19	70.80	1730	78.04	11.95
1325	20.37	69.62	1735	79.20	10.79
1330	21.56	68.43	1740	80.35	9.64
1335	22.75	67.24	1745	81.50	8.49
1340	23.93	66.06	1750	82.65	7.34
1345	25.12	64.87	1755	83.80	6.19
1350	26.31	63.68	1800	84.94	5.05
1355	27.49	62.50	1805	86.08	3.91
1400	28.68	61.31	1810	87.22	2.77
1405	29.86	60.13	1815	88.36	1.63
1410	31.05	58.94	1820	89.50	0.49
1415	32.24	57.75	1825	90.63	-0.63
1420	33.42	56.57	1830	91.76	-1.76
1425	34.61	55.38	1835	92.89	-2.89
1430	35.80	54.19	1840	94.02	-4.02
1435	36.98	53.01	1845	95.14	-5.14
1440	38.17	51.82	1850	96.26	-6.26
1445	39.35	50.64	1855	97.38	-7.38
1450	40.53	49.46			
1455	41.72	48.27			
1500	42.90	47.09			
1505	44.08	45.91			
1510	45.27	44.72			
1515	46.45	43.54			
1520	47.63	42.36			
1525	48.81	41.18			
1530	49.99	40.00			
1535	51.17	38.82			
1540	52.35	37.64			
1545	53.53	36.46			
1550	54.70	35.29			
1555	55.88	34.11			
1600	57.06	32.93			
1605	58.23	31.76			

DATE 5/ 6 STATION NUMBER 3 LATITUDE 16.38 DEGREES
SUN DECLINATION 16.56 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	0.18	89.81	1610	59.66	30.33
1205	1.21	88.78	1615	60.84	29.15
1210	2.40	87.59	1620	62.02	27.97
1215	3.60	86.39	1625	63.20	26.79
1220	4.79	85.20	1630	64.38	25.61
1225	5.99	84.00	1635	65.56	24.43
1230	7.19	82.80	1640	66.73	23.26
1235	8.39	81.60	1645	67.91	22.08
1240	9.59	80.40	1650	69.08	20.91
1245	10.78	79.21	1655	70.26	19.73
1250	11.98	78.01	1700	71.43	18.56
1255	13.18	76.81	1705	72.60	17.39
1300	14.38	75.61	1710	73.77	16.22
1305	15.57	74.42	1715	74.94	15.05
1310	16.77	73.22	1720	76.10	13.89
1315	17.97	72.02	1725	77.27	12.72
1320	19.17	70.82	1730	78.43	11.56
1325	20.36	69.63	1735	79.59	10.40
1330	21.56	68.43	1740	80.75	9.24
1335	22.76	67.23	1745	81.91	8.08
1340	23.95	66.04	1750	83.07	6.92
1345	25.15	64.84	1755	84.23	5.76
1350	26.35	63.64	1800	85.38	4.61
1355	27.54	62.45	1805	86.53	3.46
1400	28.74	61.25	1810	87.68	2.31
1405	29.93	60.06	1815	88.83	1.16
1410	31.13	58.86	1820	89.98	0.01
1415	32.32	57.67	1825	91.12	-1.12
1420	33.52	56.47	1830	92.26	-2.26
1425	34.71	55.28	1835	93.40	-3.40
1430	35.90	54.09	1840	94.54	-4.54
1435	37.10	52.89	1845	95.67	-5.67
1440	38.29	51.70	1850	96.81	-6.81
1445	39.48	50.51	1855	97.94	-7.94
1450	40.67	49.32			
1455	41.86	48.13			
1500	43.05	46.94			
1505	44.24	45.75			
1510	45.43	44.56			
1515	46.62	43.37			
1520	47.81	42.18			
1525	49.00	40.99			
1530	50.19	39.80			
1535	51.37	38.62			
1540	52.56	37.43			
1545	53.74	36.25			
1550	54.93	35.06			
1555	56.11	33.88			
1600	57.30	32.69			
1605	58.48	31.51			

DATE 5/ 7 STATION NUMBER 4 LATITUDE 13.16 DEGREES
SUN DECLINATION 16.85 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	3.68	86.31	1610	60.24	29.75
1205	3.87	86.12	1615	61.43	28.56
1210	4.40	85.59	1620	62.62	27.37
1215	5.16	84.83	1625	63.80	26.19
1220	6.07	83.92	1630	64.99	25.00
1225	7.07	82.92	1635	66.18	23.81
1230	8.12	81.87	1640	67.37	22.62
1235	9.21	80.78	1645	68.55	21.44
1240	10.33	79.66	1650	69.74	20.25
1245	11.47	78.52	1655	70.92	19.07
1250	12.61	77.38	1700	72.10	17.89
1255	13.77	76.22	1705	73.28	16.71
1300	14.94	75.05	1710	74.47	15.52
1305	16.11	73.88	1715	75.65	14.34
1310	17.29	72.70	1720	76.82	13.17
1315	18.47	71.52	1725	78.00	11.99
1320	19.65	70.34	1730	79.18	10.81
1325	20.84	69.15	1735	80.35	9.64
1330	22.02	67.97	1740	81.53	8.46
1335	23.21	66.78	1745	82.70	7.29
1340	24.40	65.59	1750	83.87	6.12
1345	25.60	64.39	1755	85.04	4.95
1350	26.79	63.20	1800	86.21	3.78
1355	27.98	62.01	1805	87.38	2.61
1400	29.18	60.81	1810	88.54	1.45
1405	30.37	59.62	1815	89.70	0.29
1410	31.57	58.42	1820	90.87	-0.87
1415	32.76	57.23	1825	92.02	-2.03
1420	33.96	56.03	1830	93.18	-3.18
1425	35.15	54.84	1835	94.34	-4.34
1430	36.35	53.64	1840	95.49	-5.49
1435	37.55	52.44	1845	96.64	-6.64
1440	38.74	51.25	1850	97.79	-7.79
1445	39.94	50.05	1855	98.94	-8.94
1450	41.14	48.85			
1455	42.33	47.66			
1500	43.53	46.46			
1505	44.72	45.27			
1510	45.92	44.07			
1515	47.11	42.88			
1520	48.31	41.68			
1525	49.50	40.49			
1530	50.70	39.29			
1535	51.89	38.10			
1540	53.09	36.90			
1545	54.28	35.71			
1550	55.47	34.52			
1555	56.66	33.33			
1600	57.86	32.13			
1605	59.05	30.94			

DATE 5/ 8 STATION NUMBER 5 LATITUDE 9.85 DEGREES
SUN DECLINATION 17.11 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	7.26	82.73	1610	60.97	29.02
1205	7.36	82.63	1615	62.17	27.82
1210	7.66	82.33	1620	63.36	26.63
1215	8.12	81.87	1625	64.55	25.44
1220	8.74	81.25	1630	65.75	24.24
1225	9.47	80.52	1635	66.94	23.05
1230	10.29	79.70	1640	68.13	21.86
1235	11.18	78.81	1645	69.32	20.67
1240	12.13	77.86	1650	70.51	19.48
1245	13.12	76.87	1655	71.70	18.29
1250	14.15	75.84	1700	72.89	17.10
1255	15.20	74.79	1705	74.08	15.91
1300	16.28	73.71	1710	75.27	14.72
1305	17.37	72.62	1715	76.46	13.53
1310	18.48	71.51	1720	77.65	12.34
1315	19.61	70.38	1725	78.83	11.16
1320	20.74	69.25	1730	80.02	9.97
1325	21.88	68.11	1735	81.20	8.79
1330	23.03	66.96	1740	82.39	7.60
1335	24.18	65.81	1745	83.57	6.42
1340	25.34	64.65	1750	84.75	5.24
1345	26.50	63.49	1755	85.93	4.06
1350	27.67	62.32	1800	87.11	2.88
1355	28.84	61.15	1805	88.29	1.70
1400	30.02	59.97	1810	89.46	0.53
1405	31.20	58.79	1815	90.64	-0.64
1410	32.38	57.61	1820	91.81	-1.81
1415	33.56	56.43	1825	92.98	-2.98
1420	34.74	55.25	1830	94.16	-4.16
1425	35.93	54.06	1835	95.32	-5.32
1430	37.11	52.88	1840	96.49	-6.49
1435	38.30	51.69	1845	97.66	-7.66
1440	39.49	50.50	1850	98.82	-8.82
1445	40.68	49.31	1855	99.98	-9.98
1450	41.87	48.12			
1455	43.06	46.93			
1500	44.26	45.73			
1505	45.45	44.54			
1510	46.64	43.35			
1515	47.84	42.15			
1520	49.03	40.96			
1525	50.22	39.77			
1530	51.42	38.57			
1535	52.61	37.38			
1540	53.81	36.18			
1545	55.00	34.99			
1550	56.20	33.79			
1555	57.39	32.60			
1600	58.58	31.41			
1605	59.78	30.21			

DATE 5/ 9 STATION NUMBER 6 LATITUDE 7.45 DEGREES
SUN DECLINATION 17.38 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	9.93	80.06	1610	61.59	28.40
1205	10.00	79.99	1615	62.78	27.21
1210	10.22	79.77	1620	63.98	26.01
1215	10.58	79.41	1625	65.17	24.82
1220	11.06	78.93	1630	66.36	23.63
1225	11.65	78.34	1635	67.56	22.43
1230	12.33	77.66	1640	68.75	21.24
1235	13.09	76.90	1645	69.94	20.05
1240	13.91	76.08	1650	71.13	18.86
1245	14.79	75.20	1655	72.33	17.66
1250	15.72	74.27	1700	73.52	16.47
1255	16.68	73.31	1705	74.71	15.28
1300	17.68	72.31	1710	75.90	14.09
1305	18.70	71.29	1715	77.09	12.90
1310	19.74	70.25	1720	78.28	11.71
1315	20.80	69.19	1725	79.47	10.52
1320	21.88	68.11	1730	80.66	9.33
1325	22.97	67.02	1735	81.85	8.14
1330	24.07	65.92	1740	83.03	6.96
1335	25.19	64.80	1745	84.22	5.77
1340	26.31	63.68	1750	85.41	4.58
1345	27.44	62.55	1755	86.59	3.40
1350	28.58	61.41	1800	87.77	2.22
1355	29.73	60.26	1805	88.96	1.03
1400	30.88	59.11	1810	90.14	-0.14
1405	32.03	57.96	1815	91.32	-1.32
1410	33.19	56.80	1820	92.50	-2.50
1415	34.35	55.64	1825	93.68	-3.68
1420	35.52	54.47	1830	94.86	-4.86
1425	36.69	53.30	1835	96.03	-6.03
1430	37.86	52.13	1840	97.21	-7.21
1435	39.03	50.96	1845	98.38	-8.38
1440	40.21	49.78	1850	99.55	-9.55
1445	41.39	48.60	1855	*****	*****
1450	42.57	47.42			
1455	43.75	46.24			
1500	44.93	45.06			
1505	46.12	43.87			
1510	47.31	42.68			
1515	48.49	41.50			
1520	49.68	40.31			
1525	50.87	39.12			
1530	52.06	37.93			
1535	53.25	36.74			
1540	54.44	35.55			
1545	55.63	34.36			
1550	56.82	33.17			
1555	58.01	31.98			
1600	59.21	30.78			
1605	60.40	29.59			

DATE 5/10 STATION NUMBER 7 LATITUDE 4.80 DEGREES
SUN DECLINATION 17.65 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	12.85	77.14	1610	62.36	27.63
1205	12.90	77.09	1615	63.55	26.44
1210	13.08	76.91	1620	64.74	25.25
1215	13.36	76.63	1625	65.93	24.06
1220	13.75	76.24	1630	67.12	22.87
1225	14.23	75.76	1635	68.31	21.68
1230	14.79	75.20	1640	69.50	20.49
1235	15.44	74.55	1645	70.69	19.30
1240	16.15	73.84	1650	71.88	18.11
1245	16.92	73.07	1655	73.07	16.92
1250	17.74	72.25	1700	74.26	15.73
1255	18.60	71.39	1705	75.45	14.54
1300	19.50	70.49	1710	76.64	13.35
1305	20.44	69.55	1715	77.84	12.15
1310	21.40	68.59	1720	79.03	10.96
1315	22.39	67.60	1725	80.22	9.77
1320	23.40	66.59	1730	81.41	8.58
1325	24.44	65.55	1735	82.60	7.39
1330	25.48	64.51	1740	83.79	6.20
1335	26.55	63.44	1745	84.98	5.01
1340	27.62	62.37	1750	86.17	3.82
1345	28.71	61.28	1755	87.35	2.64
1350	29.81	60.18	1800	88.54	1.45
1355	30.91	59.08	1805	89.73	0.26
1400	32.03	57.96	1810	90.91	-0.91
1405	33.15	56.84	1815	92.10	-2.10
1410	34.28	55.71	1820	93.28	-3.28
1415	35.42	54.57	1825	94.47	-4.47
1420	36.56	53.43	1830	95.65	-5.65
1425	37.70	52.29	1835	96.83	-6.83
1430	38.85	51.14	1840	98.01	-8.01
1435	40.00	49.99	1845	99.19	-9.19
1440	41.16	48.83	1850	*****	*****
1445	42.32	47.67	1855	*****	*****
1450	43.49	46.50			
1455	44.65	45.34			
1500	45.82	44.17			
1505	46.99	43.00			
1510	48.17	41.82			
1515	49.34	40.65			
1520	50.52	39.47			
1525	51.70	38.29			
1530	52.88	37.11			
1535	54.06	35.93			
1540	55.24	34.75			
1545	56.43	33.56			
1550	57.61	32.38			
1555	58.80	31.19			
1600	59.98	30.01			
1605	61.17	28.82			

DATE 5/12 STATION NUMBER 8 LATITUDE -2.96 DEGREES
SUN DECLINATION 18.16 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	21.13	68.86	1610	65.03	24.96
1205	21.16	68.83	1615	66.20	23.79
1210	21.27	68.72	1620	67.36	22.63
1215	21.45	68.54	1625	68.52	21.47
1220	21.69	68.30	1630	69.69	20.30
1225	22.01	67.98	1635	70.86	19.13
1230	22.38	67.61	1640	72.03	17.96
1235	22.82	67.17	1645	73.20	16.79
1240	23.31	66.68	1650	74.38	15.61
1245	23.86	66.13	1655	75.55	14.44
1250	24.45	65.54	1700	76.73	13.26
1255	25.10	64.89	1705	77.91	12.08
1300	25.78	64.21	1710	79.09	10.90
1305	26.51	63.48	1715	80.27	9.72
1310	27.27	62.72	1720	81.45	8.54
1315	28.06	61.93	1725	82.63	7.36
1320	28.89	61.10	1730	83.81	6.18
1325	29.74	60.25	1735	84.99	5.00
1330	30.62	59.37	1740	86.18	3.81
1335	31.52	58.47	1745	87.36	2.63
1340	32.45	57.54	1750	88.55	1.44
1345	33.39	56.60	1755	89.73	0.26
1350	34.35	55.64	1800	90.92	-0.92
1355	35.33	54.66	1805	92.11	-2.11
1400	36.33	53.66	1810	93.29	-3.29
1405	37.33	52.66	1815	94.48	-4.48
1410	38.35	51.64	1820	95.67	-5.67
1415	39.39	50.60	1825	96.85	-6.85
1420	40.43	49.56	1830	98.04	-8.04
1425	41.48	48.51	1835	99.23	-9.23
1430	42.55	47.44	1840	*****	*****
1435	43.62	46.37	1845	*****	*****
1440	44.70	45.29	1850	*****	*****
1445	45.79	44.20	1855	*****	*****
1450	46.88	43.11			
1455	47.98	42.01			
1500	49.09	40.90			
1505	50.20	39.79			
1510	51.32	38.67			
1515	52.44	37.55			
1520	53.57	36.42			
1525	54.70	35.29			
1530	55.84	34.15			
1535	56.97	33.02			
1540	58.12	31.87			
1545	59.26	30.73			
1550	60.41	29.58			
1555	61.56	28.43			
1600	62.72	27.27			
1605	63.87	26.12			

DATE 5/13 STATION NUMBER 9 LATITUDE -3.31 DEGREES
SUN DECLINATION 18.41 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE
1200	21.73	68.26
1205	21.76	68.23
1210	21.87	68.12
1215	22.04	67.95
1220	22.28	67.71
1225	22.58	67.41
1230	22.95	67.04
1235	23.38	66.61
1240	23.86	66.13
1245	24.39	65.60
1250	24.97	65.02
1255	25.60	64.39
1300	26.27	63.72
1305	26.99	63.00
1310	27.73	62.26
1315	28.52	61.47
1320	29.33	60.66
1325	30.17	59.82
1330	31.03	58.96
1335	31.92	58.07
1340	32.84	57.15
1345	33.77	56.22
1350	34.72	55.27
1355	35.69	54.30
1400	36.67	53.32
1405	37.67	52.32
1410	38.68	51.31
1415	39.71	50.28
1420	40.74	49.25
1425	41.79	48.20
1430	42.84	47.15
1435	43.91	46.08
1440	44.98	45.01
1445	46.06	43.93
1450	47.15	42.84
1455	48.24	41.75
1500	49.34	40.65
1505	50.45	39.54
1510	51.56	38.43
1515	52.68	37.31
1520	53.80	36.19
1525	54.92	35.07
1530	56.05	33.94
1535	57.19	32.80
1540	58.33	31.66
1545	59.47	30.52
1550	60.61	29.38
1555	61.76	28.23
1600	62.91	27.08
1605	64.06	25.93
1610	65.22	24.77
1615	66.38	23.61
1620	67.54	22.45
1625	68.70	21.29
1630	69.86	20.13
1635	71.03	18.96
1640	72.20	17.79
1645	73.37	16.62
1650	74.54	15.45
1655	75.71	14.28
1700	76.88	13.11
1705	78.06	11.93
1710	79.23	10.76
1715	80.41	9.58
1720	81.59	8.40
1725	82.77	7.22
1730	83.95	6.04
1735	85.13	4.86
1740	86.31	3.68
1745	87.49	2.50
1750	88.67	1.32
1755	89.86	0.13
1800	91.04	-1.04
1805	92.23	-2.23
1810	93.41	-3.41
1815	94.60	-4.60
1820	95.78	-5.78
1825	96.97	-6.97
1830	98.15	-8.15
1835	99.34	-9.34
1840	*****	*****
1845	*****	*****
1850	*****	*****
1855	*****	*****

DATE 5/14 STATION NUMBER 10 LATITUDE -5.55 DEGREES
SUN DECLINATION 18.65 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	24.20	65.79	1610	66.13	23.86
1205	24.23	65.76	1615	67.28	22.71
1210	24.32	65.67	1620	68.43	21.56
1215	24.48	65.51	1625	69.58	20.41
1220	24.69	65.30	1630	70.73	19.26
1225	24.97	65.02	1635	71.88	18.11
1230	25.30	64.69	1640	73.04	16.95
1235	25.69	64.30	1645	74.20	15.79
1240	26.13	63.86	1650	75.36	14.63
1245	26.61	63.38	1655	76.52	13.47
1250	27.15	62.84	1700	77.69	12.30
1255	27.73	62.26	1705	78.85	11.14
1300	28.35	61.64	1710	80.02	9.97
1305	29.02	60.97	1715	81.19	8.80
1310	29.71	60.28	1720	82.36	7.63
1315	30.44	59.55	1725	83.53	6.46
1320	31.21	58.78	1730	84.71	5.28
1325	32.00	57.99	1735	85.88	4.11
1330	32.82	57.17	1740	87.06	2.93
1335	33.66	56.33	1745	88.23	1.76
1340	34.53	55.46	1750	89.41	0.58
1345	35.42	54.57	1755	90.59	-0.59
1350	36.33	53.66	1800	91.77	-1.77
1355	37.26	52.73	1805	92.95	-2.95
1400	38.20	51.79	1810	94.13	-4.13
1405	39.16	50.83	1815	95.31	-5.31
1410	40.14	49.85	1820	96.49	-6.49
1415	41.13	48.86	1825	97.67	-7.67
1420	42.13	47.86	1830	98.85	-8.85
1425	43.14	46.85	1835	*****	*****
1430	44.17	45.82	1840	*****	*****
1435	45.20	44.79	1845	*****	*****
1440	46.25	43.74	1850	*****	*****
1445	47.30	42.69	1855	*****	*****
1450	48.36	41.63			
1455	49.43	40.56			
1500	50.51	39.48			
1505	51.59	38.40			
1510	52.68	37.31			
1515	53.78	36.21			
1520	54.88	35.11			
1525	55.98	34.01			
1530	57.10	32.89			
1535	58.21	31.78			
1540	59.33	30.66			
1545	60.46	29.53			
1550	61.59	28.40			
1555	62.72	27.27			
1600	63.85	26.14			
1605	64.99	25.00			

DATE 5/15 STATION NUMBER 11 LATITUDE -7.91 DEGREES
SUN DECLINATION 18.90 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	26.81	63.18	1610	67.16	22.83
1205	26.84	63.15	1615	68.29	21.70
1210	26.92	63.07	1620	69.42	20.57
1215	27.07	62.92	1625	70.56	19.43
1220	27.26	62.73	1630	71.70	18.29
1225	27.51	62.48	1635	72.84	17.15
1230	27.81	62.18	1640	73.98	16.01
1235	28.17	61.82	1645	75.13	14.86
1240	28.57	61.42	1650	76.28	13.71
1245	29.02	60.97	1655	77.43	12.56
1250	29.51	60.48	1700	78.58	11.41
1255	30.04	59.95	1705	79.73	10.26
1300	30.62	59.37	1710	80.89	9.10
1305	31.23	58.76	1715	82.05	7.94
1310	31.88	58.11	1720	83.21	6.78
1315	32.57	57.42	1725	84.37	5.62
1320	33.28	56.71	1730	85.54	4.45
1325	34.03	55.96	1735	86.70	3.29
1330	34.80	55.19	1740	87.87	2.12
1335	35.60	54.39	1745	89.04	0.95
1340	36.42	53.57	1750	90.21	-0.21
1345	37.26	52.73	1755	91.38	-1.38
1350	38.13	51.86	1800	92.55	-2.55
1355	39.01	50.98	1805	93.72	-3.72
1400	39.92	50.07	1810	94.90	-4.90
1405	40.84	49.15	1815	96.07	-6.07
1410	41.78	48.21	1820	97.25	-7.25
1415	42.73	47.26	1825	98.43	-8.43
1420	43.69	46.30	1830	99.60	-9.60
1425	44.67	45.32	1835	*****	*****
1430	45.66	44.33	1840	*****	*****
1435	46.67	43.32	1845	*****	*****
1440	47.68	42.31	1850	*****	*****
1445	48.70	41.29	1855	*****	*****
1450	49.73	40.26			
1455	50.78	39.21			
1500	51.83	38.16			
1505	52.88	37.11			
1510	53.95	36.04			
1515	55.02	34.97			
1520	56.10	33.89			
1525	57.18	32.81			
1530	58.27	31.72			
1535	59.37	30.62			
1540	60.47	29.52			
1545	61.57	28.42			
1550	62.68	27.31			
1555	63.79	26.20			
1600	64.91	25.08			
1605	66.03	23.96			

DATE 5/16 STATION NUMBER 12 LATITUDE -5.53 DEGREES
SUN DECLINATION 19.13 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	24.66	65.33	1610	66.25	23.74
1205	24.69	65.30	1615	67.39	22.60
1210	24.78	65.21	1620	68.54	21.45
1215	24.94	65.05	1625	69.68	20.31
1220	25.15	64.84	1630	70.83	19.16
1225	25.42	64.57	1635	71.98	18.01
1230	25.74	64.25	1640	73.14	16.85
1235	26.12	63.87	1645	74.29	15.70
1240	26.56	63.43	1650	75.45	14.54
1245	27.04	62.95	1655	76.61	13.38
1250	27.56	62.43	1700	77.77	12.22
1255	28.13	61.86	1705	78.93	11.06
1300	28.75	61.24	1710	80.10	9.89
1305	29.40	60.59	1715	81.26	8.73
1310	30.09	59.90	1720	82.43	7.56
1315	30.81	59.18	1725	83.60	6.39
1320	31.56	58.43	1730	84.77	5.22
1325	32.34	57.65	1735	85.94	4.05
1330	33.15	56.84	1740	87.11	2.88
1335	33.99	56.00	1745	88.28	1.71
1340	34.85	55.14	1750	89.46	0.53
1345	35.73	54.26	1755	90.63	-0.63
1350	36.63	53.36	1800	91.81	-1.81
1355	37.54	52.45	1805	92.98	-2.98
1400	38.48	51.51	1810	94.16	-4.16
1405	39.43	50.56	1815	95.34	-5.34
1410	40.40	49.59	1820	96.52	-6.52
1415	41.38	48.61	1825	97.69	-7.69
1420	42.38	47.61	1830	98.87	-8.87
1425	43.38	46.61	1835	*****	*****
1430	44.40	45.59	1840	*****	*****
1435	45.43	44.56	1845	*****	*****
1440	46.46	43.53	1850	*****	*****
1445	47.51	42.48	1855	*****	*****
1450	48.57	41.42			
1455	49.63	40.36			
1500	50.70	39.29			
1505	51.78	38.21			
1510	52.86	37.13			
1515	53.95	36.04			
1520	55.05	34.94			
1525	56.15	33.84			
1530	57.25	32.74			
1535	58.36	31.63			
1540	59.48	30.51			
1545	60.60	29.39			
1550	61.72	28.27			
1555	62.85	27.14			
1600	63.98	26.01			
1605	65.12	24.87			

DATE 5/17 STATION NUMBER 13 LATITUDE -3.06 DEGREES
SUN DECLINATION 19.35 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	22.41	67.58	1610	65.33	24.66
1205	22.45	67.54	1615	66.48	23.51
1210	22.55	67.44	1620	67.63	22.36
1215	22.71	67.28	1625	68.79	21.20
1220	22.94	67.05	1630	69.95	20.04
1225	23.24	66.75	1635	71.11	18.88
1230	23.59	66.40	1640	72.27	17.72
1235	24.01	65.98	1645	73.43	16.56
1240	24.47	65.52	1650	74.59	15.40
1245	24.99	65.00	1655	75.76	14.23
1250	25.56	64.43	1700	76.93	13.06
1255	26.17	63.82	1705	78.09	11.90
1300	26.83	63.16	1710	79.26	10.73
1305	27.52	62.47	1715	80.43	9.56
1310	28.25	61.74	1720	81.61	8.38
1315	29.02	60.97	1725	82.78	7.21
1320	29.81	60.18	1730	83.95	6.04
1325	30.64	59.35	1735	85.13	4.86
1330	31.49	58.50	1740	86.30	3.69
1335	32.36	57.63	1745	87.48	2.51
1340	33.26	56.73	1750	88.66	1.33
1345	34.18	55.81	1755	89.83	0.16
1350	35.11	54.88	1800	91.01	-1.01
1355	36.07	53.92	1805	92.19	-2.19
1400	37.04	52.95	1810	93.37	-3.37
1405	38.02	51.97	1815	94.55	-4.55
1410	39.02	50.97	1820	95.72	-5.72
1415	40.03	49.96	1825	96.90	-6.90
1420	41.05	48.94	1830	98.08	-8.08
1425	42.09	47.90	1835	99.26	-9.26
1430	43.13	46.86	1840	*****	*****
1435	44.18	45.81	1845	*****	*****
1440	45.25	44.74	1850	*****	*****
1445	46.32	43.67	1855	*****	*****
1450	47.39	42.60			
1455	48.48	41.51			
1500	49.57	40.42			
1505	50.66	39.33			
1510	51.77	38.22			
1515	52.88	37.11			
1520	53.99	36.00			
1525	55.11	34.88			
1530	56.23	33.76			
1535	57.35	32.64			
1540	58.48	31.51			
1545	59.62	30.37			
1550	60.75	29.24			
1555	61.89	28.10			
1600	63.04	26.95			
1605	64.18	25.81			

DATE 5/18 STATION NUMBER 14 LATITUDE -2.93 DEGREES
SUN DECLINATION 19.58 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	22.51	67.48	1610	65.33	24.66
1205	22.55	67.44	1615	66.48	23.51
1210	22.65	67.34	1620	67.63	22.36
1215	22.81	67.18	1625	68.78	21.21
1220	23.04	66.95	1630	69.94	20.05
1225	23.33	66.66	1635	71.10	18.89
1230	23.69	66.30	1640	72.26	17.73
1235	24.10	65.89	1645	73.42	16.57
1240	24.56	65.43	1650	74.58	15.41
1245	25.08	64.91	1655	75.75	14.24
1250	25.64	64.35	1700	76.91	13.08
1255	26.25	63.74	1705	78.08	11.91
1300	26.91	63.08	1710	79.25	10.74
1305	27.60	62.39	1715	80.42	9.57
1310	28.33	61.66	1720	81.59	8.40
1315	29.09	60.90	1725	82.76	7.23
1320	29.88	60.11	1730	83.93	6.06
1325	30.70	59.29	1735	85.10	4.89
1330	31.55	58.44	1740	86.28	3.71
1335	32.42	57.57	1745	87.45	2.54
1340	33.32	56.67	1750	88.63	1.36
1345	34.23	55.76	1755	89.80	0.19
1350	35.16	54.83	1800	90.98	-0.98
1355	36.12	53.87	1805	92.15	-2.15
1400	37.08	52.91	1810	93.33	-3.33
1405	38.07	51.92	1815	94.51	-4.51
1410	39.06	50.93	1820	95.69	-5.69
1415	40.07	49.92	1825	96.86	-6.86
1420	41.09	48.90	1830	98.04	-8.04
1425	42.12	47.87	1835	99.22	-9.22
1430	43.16	46.83	1840	*****	*****
1435	44.22	45.77	1845	*****	*****
1440	45.28	44.71	1850	*****	*****
1445	46.34	43.65	1855	*****	*****
1450	47.42	42.57			
1455	48.50	41.49			
1500	49.59	40.40			
1505	50.69	39.30			
1510	51.79	38.20			
1515	52.89	37.10			
1520	54.00	35.99			
1525	55.12	34.87			
1530	56.24	33.75			
1535	57.36	32.63			
1540	58.49	31.50			
1545	59.62	30.37			
1550	60.76	29.23			
1555	61.90	28.09			
1600	63.04	26.95			
1605	64.18	25.81			

DATE 5/20 STATION NUMBER 15 LATITUDE 4.55 DEGREES
SUN DECLINATION 20.00 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	15.45	74.54	1610	62.63	27.36
1205	15.49	74.50	1615	63.80	26.19
1210	15.64	74.35	1620	64.97	25.02
1215	15.87	74.12	1625	66.14	23.85
1220	16.19	73.80	1630	67.31	22.68
1225	16.60	73.39	1635	68.49	21.50
1230	17.08	72.91	1640	69.66	20.33
1235	17.64	72.35	1645	70.83	19.16
1240	18.26	71.73	1650	72.01	17.98
1245	18.93	71.06	1655	73.18	16.81
1250	19.66	70.33	1700	74.36	15.63
1255	20.44	69.55	1705	75.53	14.46
1300	21.25	68.74	1710	76.71	13.28
1305	22.11	67.88	1715	77.88	12.11
1310	22.99	67.00	1720	79.05	10.94
1315	23.91	66.08	1725	80.23	9.76
1320	24.85	65.14	1730	81.40	8.59
1325	25.81	64.18	1735	82.58	7.41
1330	26.80	63.19	1740	83.75	6.24
1335	27.80	62.19	1745	84.92	5.07
1340	28.82	61.17	1750	86.10	3.89
1345	29.85	60.14	1755	87.27	2.72
1350	30.90	59.09	1800	88.44	1.55
1355	31.96	58.03	1805	89.61	0.38
1400	33.03	56.96	1810	90.78	-0.78
1405	34.11	55.88	1815	91.95	-1.95
1410	35.19	54.80	1820	93.12	-3.12
1415	36.29	53.70	1825	94.29	-4.29
1420	37.39	52.60	1830	95.45	-5.45
1425	38.50	51.49	1835	96.62	-6.62
1430	39.61	50.38	1840	97.78	-7.78
1435	40.74	49.25	1845	98.95	-8.95
1440	41.86	48.13	1850	*****	*****
1445	42.99	47.00	1855	*****	*****
1450	44.12	45.87			
1455	45.26	44.73			
1500	46.40	43.59			
1505	47.55	42.44			
1510	48.70	41.29			
1515	49.85	40.14			
1520	51.00	38.99			
1525	52.16	37.83			
1530	53.31	36.68			
1535	54.47	35.52			
1540	55.63	34.36			
1545	56.80	33.19			
1550	57.96	32.03			
1555	59.13	30.86			
1600	60.29	29.70			
1605	61.46	28.53			

DATE 5/21 STATION NUMBER 16 LATITUDE 6.45 DEGREES
SUN DECLINATION 20.21 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	13.76	76.23	1610	62.00	27.99
1205	13.82	76.17	1615	63.17	26.82
1210	13.97	76.02	1620	64.34	25.65
1215	14.23	75.76	1625	65.52	24.47
1220	14.59	75.40	1630	66.69	23.30
1225	15.04	74.95	1635	67.86	22.13
1230	15.57	74.42	1640	69.03	20.96
1235	16.17	73.82	1645	70.21	19.78
1240	16.84	73.15	1650	71.38	18.61
1245	17.56	72.43	1655	72.55	17.44
1250	18.34	71.65	1700	73.73	16.26
1255	19.16	70.83	1705	74.90	15.09
1300	20.03	69.96	1710	76.07	13.92
1305	20.92	69.07	1715	77.24	12.75
1310	21.85	68.14	1720	78.41	11.58
1315	22.81	67.18	1725	79.59	10.40
1320	23.78	66.21	1730	80.76	9.23
1325	24.78	65.21	1735	81.93	8.06
1330	25.80	64.19	1740	83.10	6.89
1335	26.83	63.16	1745	84.27	5.72
1340	27.88	62.11	1750	85.44	4.55
1345	28.94	61.05	1755	86.60	3.39
1350	30.01	59.98	1800	87.77	2.22
1355	31.09	58.90	1805	88.94	1.05
1400	32.18	57.81	1810	90.10	-0.10
1405	33.28	56.71	1815	91.26	-1.26
1410	34.38	55.61	1820	92.43	-2.43
1415	35.49	54.50	1825	93.59	-3.59
1420	36.61	53.38	1830	94.75	-4.75
1425	37.74	52.25	1835	95.91	-5.91
1430	38.86	51.13	1840	97.07	-7.07
1435	40.00	49.99	1845	98.22	-8.22
1440	41.13	48.86	1850	99.38	-9.38
1445	42.27	47.72	1855	*****	*****
1450	43.42	46.57			
1455	44.57	45.42			
1500	45.72	44.27			
1505	46.87	43.12			
1510	48.02	41.97			
1515	49.18	40.81			
1520	50.34	39.65			
1525	51.50	38.49			
1530	52.66	37.33			
1535	53.82	36.17			
1540	54.99	35.00			
1545	56.16	33.83			
1550	57.32	32.67			
1555	58.49	31.50			
1600	59.66	30.33			
1605	60.83	29.16			

DATE 5/28 STATION NUMBER 17 LATITUDE 16.90 DEGREES
SUN DECLINATION 21.48 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	4.58	85.41	1610	58.83	31.16
1205	4.73	85.26	1615	59.98	30.01
1210	5.15	84.84	1620	61.13	28.86
1215	5.79	84.20	1625	62.28	27.71
1220	6.57	83.42	1630	63.43	26.56
1225	7.47	82.52	1635	64.58	25.41
1230	8.43	81.56	1640	65.73	24.26
1235	9.44	80.55	1645	66.88	23.11
1240	10.49	79.50	1650	68.02	21.97
1245	11.56	78.43	1655	69.16	20.83
1250	12.65	77.34	1700	70.31	19.68
1255	13.76	76.23	1705	71.45	18.54
1300	14.88	75.11	1710	72.59	17.40
1305	16.00	73.99	1715	73.73	16.26
1310	17.13	72.86	1720	74.86	15.13
1315	18.27	71.72	1725	76.00	13.99
1320	19.41	70.58	1730	77.13	12.86
1325	20.56	69.43	1735	78.26	11.73
1330	21.71	68.28	1740	79.39	10.60
1335	22.86	67.13	1745	80.52	9.47
1340	24.02	65.97	1750	81.64	8.35
1345	25.17	64.82	1755	82.76	7.23
1350	26.33	63.66	1800	83.88	6.11
1355	27.49	62.50	1805	85.00	4.99
1400	28.65	61.34	1810	86.12	3.87
1405	29.81	60.18	1815	87.23	2.76
1410	30.97	59.02	1820	88.34	1.65
1415	32.13	57.86	1825	89.45	0.54
1420	33.30	56.69	1830	90.55	-0.55
1425	34.46	55.53	1835	91.66	-1.66
1430	35.62	54.37	1840	92.75	-2.75
1435	36.79	53.20	1845	93.85	-3.85
1440	37.95	52.04	1850	94.94	-4.94
1445	39.11	50.88	1855	96.03	-6.03
1450	40.28	49.71			
1455	41.44	48.55			
1500	42.60	47.39			
1505	43.76	46.23			
1510	44.93	45.06			
1515	46.09	43.90			
1520	47.25	42.74			
1525	48.41	41.58			
1530	49.57	40.42			
1535	50.73	39.26			
1540	51.89	38.10			
1545	53.05	36.94			
1550	54.20	35.79			
1555	55.36	34.63			
1600	56.52	33.47			
1605	57.67	32.32			

DATE 5/29 STATION NUMBER 18 LATITUDE 19.40 DEGREES
SUN DECLINATION 21.63 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	2.23	87.76	1610	58.17	31.82
1205	2.52	87.47	1615	59.31	30.68
1210	3.23	86.76	1620	60.46	29.53
1215	4.16	85.83	1625	61.60	28.39
1220	5.18	84.81	1630	62.74	27.25
1225	6.26	83.73	1635	63.88	26.11
1230	7.36	82.63	1640	65.01	24.98
1235	8.49	81.50	1645	66.15	23.84
1240	9.62	80.37	1650	67.28	22.71
1245	10.76	79.23	1655	68.41	21.58
1250	11.91	78.08	1700	69.55	20.44
1255	13.06	76.93	1705	70.67	19.32
1300	14.21	75.78	1710	71.80	18.19
1305	15.37	74.62	1715	72.93	17.06
1310	16.53	73.46	1720	74.05	15.94
1315	17.69	72.30	1725	75.17	14.82
1320	18.85	71.14	1730	76.29	13.70
1325	20.01	69.98	1735	77.41	12.58
1330	21.17	68.82	1740	78.52	11.47
1335	22.33	67.66	1745	79.64	10.35
1340	23.49	66.50	1750	80.75	9.24
1345	24.65	65.34	1755	81.86	8.13
1350	25.81	64.18	1800	82.96	7.03
1355	26.98	63.01	1805	84.06	5.93
1400	28.14	61.85	1810	85.16	4.83
1405	29.30	60.69	1815	86.26	3.73
1410	30.46	59.53	1820	87.36	2.63
1415	31.62	58.37	1825	88.45	1.54
1420	32.78	57.21	1830	89.54	0.45
1425	33.94	56.05	1835	90.62	-0.62
1430	35.10	54.89	1840	91.70	-1.70
1435	36.26	53.73	1845	92.78	-2.78
1440	37.42	52.57	1850	93.85	-3.85
1445	38.58	51.41	1855	94.93	-4.93
1450	39.74	50.25			
1455	40.90	49.09			
1500	42.06	47.93			
1505	43.21	46.78			
1510	44.37	45.62			
1515	45.52	44.47			
1520	46.68	43.31			
1525	47.83	42.16			
1530	48.98	41.01			
1535	50.14	39.85			
1540	51.29	38.70			
1545	52.44	37.55			
1550	53.59	36.40			
1555	54.73	35.26			
1600	55.88	34.11			
1605	57.03	32.96			

DATE 5/30 STATION NUMBER 19 LATITUDE 20.33 DEGREES
SUN DECLINATION 21.78 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	1.45	88.54	1610	57.92	32.07
1205	1.86	88.13	1615	59.06	30.93
1210	2.74	87.25	1620	60.20	29.79
1215	3.78	86.21	1625	61.33	28.66
1220	4.88	85.11	1630	62.47	27.52
1225	6.00	83.99	1635	63.60	26.39
1230	7.14	82.85	1640	64.73	25.26
1235	8.29	81.70	1645	65.86	24.13
1240	9.44	80.55	1650	66.99	23.00
1245	10.59	79.40	1655	68.12	21.87
1250	11.75	78.24	1700	69.24	20.75
1255	12.90	77.09	1705	70.37	19.62
1300	14.06	75.93	1710	71.49	18.50
1305	15.22	74.77	1715	72.61	17.38
1310	16.38	73.61	1720	73.73	16.26
1315	17.54	72.45	1725	74.84	15.15
1320	18.70	71.29	1730	75.95	14.04
1325	19.86	70.13	1735	77.07	12.92
1330	21.02	68.97	1740	78.17	11.82
1335	22.18	67.81	1745	79.28	10.71
1340	23.35	66.64	1750	80.39	9.60
1345	24.51	65.48	1755	81.49	8.50
1350	25.67	64.32	1800	82.59	7.40
1355	26.83	63.16	1805	83.68	6.31
1400	27.99	62.00	1810	84.78	5.21
1405	29.15	60.84	1815	85.87	4.12
1410	30.30	59.69	1820	86.95	3.04
1415	31.46	58.53	1825	88.04	1.95
1420	32.62	57.37	1830	89.12	0.87
1425	33.78	56.21	1835	90.20	-0.20
1430	34.94	55.05	1840	91.27	-1.27
1435	36.09	53.90	1845	92.34	-2.34
1440	37.25	52.74	1850	93.41	-3.41
1445	38.40	51.59	1855	94.47	-4.47
1450	39.56	50.43			
1455	40.71	49.28			
1500	41.87	48.12			
1505	43.02	46.97			
1510	44.17	45.82			
1515	45.32	44.67			
1520	46.47	43.52			
1525	47.62	42.37			
1530	48.77	41.22			
1535	49.92	40.07			
1540	51.06	38.93			
1545	52.21	37.78			
1550	53.35	36.64			
1555	54.50	35.49			
1600	55.64	34.35			
1605	56.78	33.21			

DATE 5/31 STATION NUMBER 20 LATITUDE 22.48 DEGREES
SUN DECLINATION 21.93 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE
1200	0.55	89.44
1205	1.28	88.71
1210	2.37	87.62
1215	3.51	86.48
1220	4.66	85.33
1225	5.81	84.18
1230	6.96	83.03
1235	8.11	81.88
1240	9.27	80.72
1245	10.42	79.57
1250	11.58	78.41
1255	12.73	77.26
1300	13.89	76.10
1305	15.04	74.95
1310	16.20	73.79
1315	17.35	72.64
1320	18.51	71.48
1325	19.66	70.33
1330	20.81	69.18
1335	21.97	68.02
1340	23.12	66.87
1345	24.27	65.72
1350	25.43	64.56
1355	26.58	63.41
1400	27.73	62.26
1405	28.88	61.11
1410	30.03	59.96
1415	31.18	58.81
1420	32.33	57.66
1425	33.48	56.51
1430	34.63	55.36
1435	35.77	54.22
1440	36.92	53.07
1445	38.07	51.92
1450	39.21	50.78
1455	40.36	49.63
1500	41.50	48.49
1505	42.64	47.35
1510	43.78	46.21
1515	44.92	45.07
1520	46.06	43.93
1525	47.20	42.79
1530	48.34	41.65
1535	49.48	40.51
1540	50.61	39.38
1545	51.75	38.24
1550	52.88	37.11
1555	54.02	35.97
1600	55.15	34.84
1605	56.28	33.71
1610	57.41	32.58
1615	58.53	31.46
1620	59.66	30.33
1625	60.78	29.21
1630	61.91	28.08
1635	63.03	26.96
1640	64.15	25.84
1645	65.26	24.73
1650	66.38	23.61
1655	67.49	22.50
1700	68.61	21.38
1705	69.72	20.27
1710	70.83	19.16
1715	71.93	18.06
1720	73.04	16.95
1725	74.14	15.85
1730	75.24	14.75
1735	76.34	13.65
1740	77.43	12.56
1745	78.52	11.47
1750	79.61	10.38
1755	80.70	9.29
1800	81.78	8.21
1805	82.86	7.13
1810	83.94	6.05
1815	85.02	4.97
1820	86.09	3.90
1825	87.16	2.83
1830	88.22	1.77
1835	89.28	0.71
1840	90.34	-0.34
1845	91.39	-1.39
1850	92.44	-2.44
1855	93.49	-3.49

DATE 6/ 1 STATION NUMBER 21 LATITUDE 25.71 DEGREES
SUN DECLINATION 22.06 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	3.65	86.34	1610	56.73	33.26
1205	3.82	86.17	1615	57.83	32.16
1210	4.30	85.69	1620	58.94	31.05
1215	5.00	84.99	1625	60.04	29.95
1220	5.84	84.15	1630	61.14	28.85
1225	6.77	83.22	1635	62.24	27.75
1230	7.76	82.23	1640	63.34	26.65
1235	8.79	81.20	1645	64.44	25.55
1240	9.84	80.15	1650	65.53	24.46
1245	10.90	79.09	1655	66.63	23.36
1250	11.99	78.00	1700	67.72	22.27
1255	13.08	76.91	1705	68.80	21.19
1300	14.18	75.81	1710	69.89	20.10
1305	15.28	74.71	1715	70.97	19.02
1310	16.39	73.60	1720	72.06	17.93
1315	17.51	72.48	1725	73.13	16.86
1320	18.62	71.37	1730	74.21	15.78
1325	19.74	70.25	1735	75.29	14.70
1330	20.86	69.13	1740	76.36	13.63
1335	21.98	68.01	1745	77.43	12.56
1340	23.11	66.88	1750	78.49	11.50
1345	24.23	65.76	1755	79.55	10.44
1350	25.36	64.63	1800	80.61	9.38
1355	26.48	63.51	1805	81.67	8.32
1400	27.61	62.38	1810	82.72	7.27
1405	28.73	61.26	1815	83.77	6.22
1410	29.86	60.13	1820	84.82	5.17
1415	30.99	59.00	1825	85.86	4.13
1420	32.11	57.88	1830	86.90	3.09
1425	33.24	56.75	1835	87.93	2.06
1430	34.36	55.63	1840	88.96	1.03
1435	35.49	54.50	1845	89.99	0.00
1440	36.61	53.38	1850	91.01	-1.01
1445	37.74	52.25	1855	92.03	-2.03
1450	38.86	51.13			
1455	39.98	50.01			
1500	41.11	48.88			
1505	42.23	47.76			
1510	43.35	46.64			
1515	44.47	45.52			
1520	45.59	44.40			
1525	46.71	43.28			
1530	47.83	42.16			
1535	48.94	41.05			
1540	50.06	39.93			
1545	51.17	38.82			
1550	52.29	37.70			
1555	53.40	36.59			
1600	54.51	35.48			
1605	55.62	34.37			

DATE 6/ 2 STATION NUMBER 22 LATITUDE 25.63 DEGREES
SUN DECLINATION 22.20 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	3.43	86.56	1610	56.70	33.29
1205	3.61	86.38	1615	57.81	32.18
1210	4.12	85.87	1620	58.91	31.08
1215	4.85	85.14	1625	60.02	29.97
1220	5.71	84.28	1630	61.12	28.87
1225	6.66	83.33	1635	62.22	27.77
1230	7.66	82.33	1640	63.32	26.67
1235	8.70	81.29	1645	64.41	25.58
1240	9.76	80.23	1650	65.51	24.48
1245	10.83	79.16	1655	66.60	23.39
1250	11.92	78.07	1700	67.69	22.30
1255	13.02	76.97	1705	68.78	21.21
1300	14.12	75.87	1710	69.87	20.12
1305	15.23	74.76	1715	70.95	19.04
1310	16.34	73.65	1720	72.03	17.96
1315	17.46	72.53	1725	73.11	16.88
1320	18.58	71.41	1730	74.19	15.80
1325	19.70	70.29	1735	75.26	14.73
1330	20.82	69.17	1740	76.33	13.66
1335	21.94	68.05	1745	77.40	12.59
1340	23.07	66.92	1750	78.47	11.52
1345	24.20	65.79	1755	79.53	10.46
1350	25.32	64.67	1800	80.59	9.40
1355	26.45	63.54	1805	81.64	8.35
1400	27.57	62.42	1810	82.70	7.29
1405	28.70	61.29	1815	83.75	6.24
1410	29.83	60.16	1820	84.79	5.20
1415	30.96	59.03	1825	85.83	4.16
1420	32.08	57.91	1830	86.87	3.12
1425	33.21	56.78	1835	87.90	2.09
1430	34.33	55.66	1840	88.93	1.06
1435	35.46	54.53	1845	89.96	0.03
1440	36.59	53.40	1850	90.98	-0.98
1445	37.71	52.28	1855	92.00	-2.00
1450	38.84	51.15			
1455	39.96	50.03			
1500	41.08	48.91			
1505	42.20	47.79			
1510	43.33	46.66			
1515	44.45	45.54			
1520	45.57	44.42			
1525	46.68	43.31			
1530	47.80	42.19			
1535	48.92	41.07			
1540	50.04	39.95			
1545	51.15	38.84			
1550	52.26	37.73			
1555	53.38	36.61			
1600	54.49	35.50			
1605	55.60	34.39			

DATE 6/ 3 STATION NUMBER 23 LATITUDE 25.78 DEGREES
SUN DECLINATION 22.33 DEGREES

TIME	SUN ZENITH	SUN ALTITUDE	TIME	SUN ZENITH	SUN ALTITUDE
1200	3.45	86.54	1610	56.64	33.35
1205	3.63	86.36	1615	57.74	32.25
1210	4.13	85.86	1620	58.84	31.15
1215	4.86	85.13	1625	59.95	30.04
1220	5.72	84.27	1630	61.05	28.94
1225	6.66	83.33	1635	62.14	27.85
1230	7.66	82.33	1640	63.24	26.75
1235	8.70	81.29	1645	64.34	25.65
1240	9.75	80.24	1650	65.43	24.56
1245	10.83	79.16	1655	66.52	23.47
1250	11.91	78.08	1700	67.61	22.38
1255	13.01	76.98	1705	68.69	21.30
1300	14.11	75.88	1710	69.78	20.21
1305	15.22	74.77	1715	70.86	19.13
1310	16.33	73.66	1720	71.94	18.05
1315	17.44	72.55	1725	73.02	16.97
1320	18.56	71.43	1730	74.09	15.90
1325	19.68	70.31	1735	75.16	14.83
1330	20.80	69.19	1740	76.23	13.76
1335	21.92	68.07	1745	77.30	12.69
1340	23.05	66.94	1750	78.36	11.63
1345	24.17	65.82	1755	79.42	10.57
1350	25.30	64.69	1800	80.48	9.51
1355	26.42	63.57	1805	81.53	8.46
1400	27.55	62.44	1810	82.59	7.40
1405	28.67	61.32	1815	83.63	6.36
1410	29.80	60.19	1820	84.68	5.31
1415	30.92	59.07	1825	85.72	4.27
1420	32.05	57.94	1830	86.75	3.24
1425	33.17	56.82	1835	87.78	2.21
1430	34.30	55.69	1840	88.81	1.18
1435	35.42	54.57	1845	89.83	0.16
1440	36.55	53.44	1850	90.85	-0.85
1445	37.67	52.32	1855	91.87	-1.87
1450	38.79	51.20			
1455	39.91	50.08			
1500	41.04	48.95			
1505	42.16	47.83			
1510	43.28	46.71			
1515	44.40	45.59			
1520	45.51	44.48			
1525	46.63	43.36			
1530	47.75	42.24			
1535	48.86	41.13			
1540	49.98	40.01			
1545	51.09	38.90			
1550	52.20	37.79			
1555	53.31	36.68			
1600	54.42	35.57			
1605	55.53	34.46			