PVST SO-PACE TN444 (May - June 2025) LISST Processing Report V1

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Measurements

Beam attenuation and volume scattering function were measured continuously on board the R/V Kilo Moana during the HOT-PACE and SO-PACE PVST cruises from 2025-05-05, to 2025-06-15, using a Sequoia Scientifics LISST serial number 1183. The LISST was set after a switching system running 0.2 µm filtered sea water through the instrument the first 10 minutes of every hour and total ("normal") seawater was flowing the rest of the time. This setup allows to retrieve particulate beam attenuation (cp) and particulate volume scattering function (VSF) independently from the instrument drift and the biofouling effect (Slade et al., 2010). The data were logged with a home-grown data-logger (Inlinino, http://inlinino.readthedocs.io/). The LISST was cleaned every 4 days, and the filters were changed approximately once a week.

Processing notes

Data was processed using standard procedures described in Boss et al. 2018, Boss et al. (2019), Agrawal and Pottsmith 2000, and Sequoia Processing Manual (2008), using a custom software for in-line optical data processing (https://github.com/OceanOptics/InLineAnalysis/commit/df7246258fcf039a099ffab631ab6218b810cd35).

All in-line instruments were logged on the same computer which was synchronized with the ship's GPS date/time and latitude/longitude over the NMEA. Total and filtered data were first separated according to flow data of the in-line data.

For each minute of the total seawater measurement, the signal between the 2.5th and 97.5th percentiles are averaged, and their standard deviation is kept for reporting. The automatic quality control (QC) and the 2.5th to 97.5th percentiles averaging filters out noisy spikes from bubbles. The entire time series of measurement was automatically QCed to remove artefacts and manually checked and QCed for obviously bad measurements (saturated sensor, low flow rate, bubbles, and bad filtered seawater measurements). cp670, VSF are computed as the difference between total and linearly interpolated dissolved data from the periods before and after the 'total' measurement periods (e.g. Slade et al. (2010)). This procedure allows using the hourly dissolved measurements as "zscat" measurements, therefore "zscat" are not reported here. Particulate size distribution (PSD) was inverted using the manufacturer procedure and matlab function "invert_2014b.m". Finally, all products were inspected by a trained operator and unreasonable data were removed.

The *dcal* provided by the manufacturer was generating an artefact in the VSF at 9.941° (ring 30). To correct the issue the original *dcal*(30) of 5.0166411 was replaced by 2.6 following manufacturer recommendations.

The calibration parameters used are:

VCC = 47447

Spherical Inversion

theta	dcal	ds (lower)
0.082	1.0179	1.25
0.096	0.9921	1.475
0.114	1.0108	1.7405
0.134	0.9949	2.0538
0.158	1.0044	2.4235
0.187	0.9989	2.8597
0.221	0.9986	3.3744
0.26	1.0042	3.9818
0.307	1.0001	4.6986
0.362	0.9989	5.5443
0.428	1.0009	6.5423
0.505	1.0004	7.7199
0.596	1.0011	9.1095
0.703	1.0005	10.7492
0.829	1.0214	12.6841
0.979	0.9999	14.9672
1.155	1.1116	17.6613
1.363	1.1207	20.8403
1.609	1.2494	24.5916
1.898	1.1643	29.018
2.24	1.3356	34.2413
2.643	1.2091	40.4047
3.119	1.0782	47.6776

3.681	1.7621	56.2595
4.344	1.5509	66.3863
5.126	2.5304	78.3358
6.049	2.5639	92.4362
7.138	3.5757	109.0747
8.424	3.9632	128.7082
9.941	2.6	151.8757
11.73	5.6381	179.2133
13.84	8.6882	211.4717
		249.5366

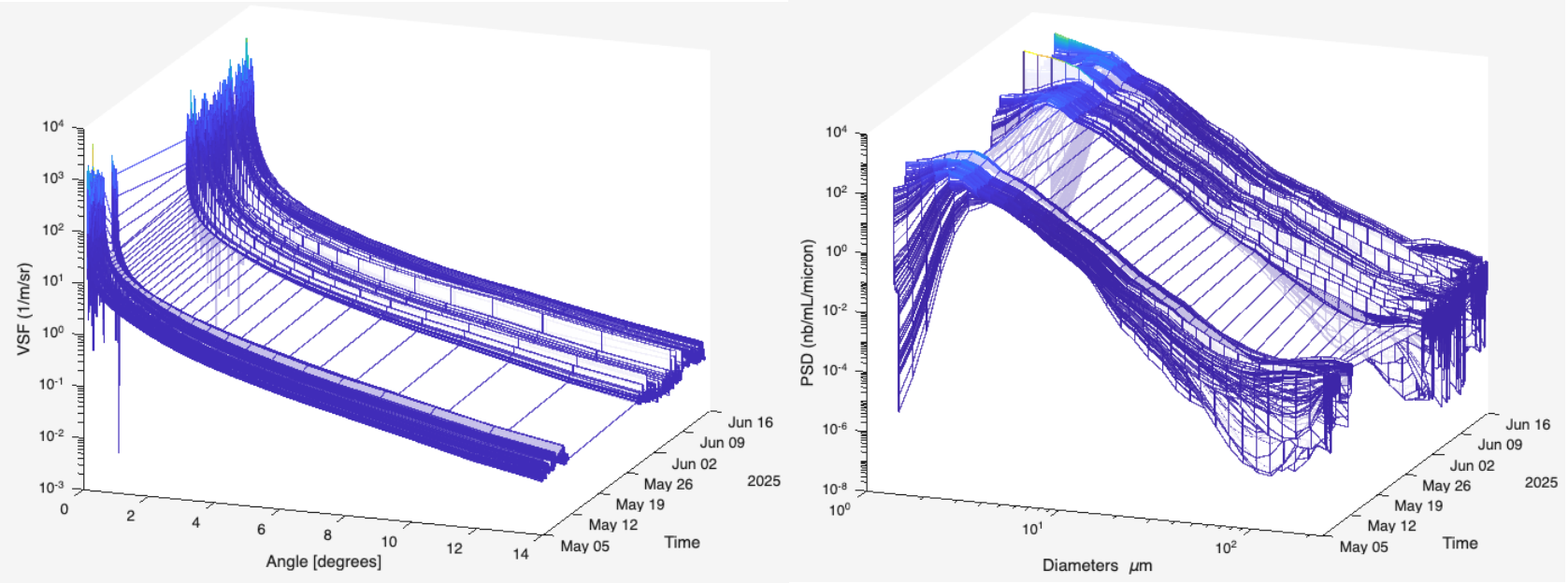

Figure 1: Example of particulate volume scattering function (left) and particle size distribution (right) 2025/05/05 and 2025/06/15.

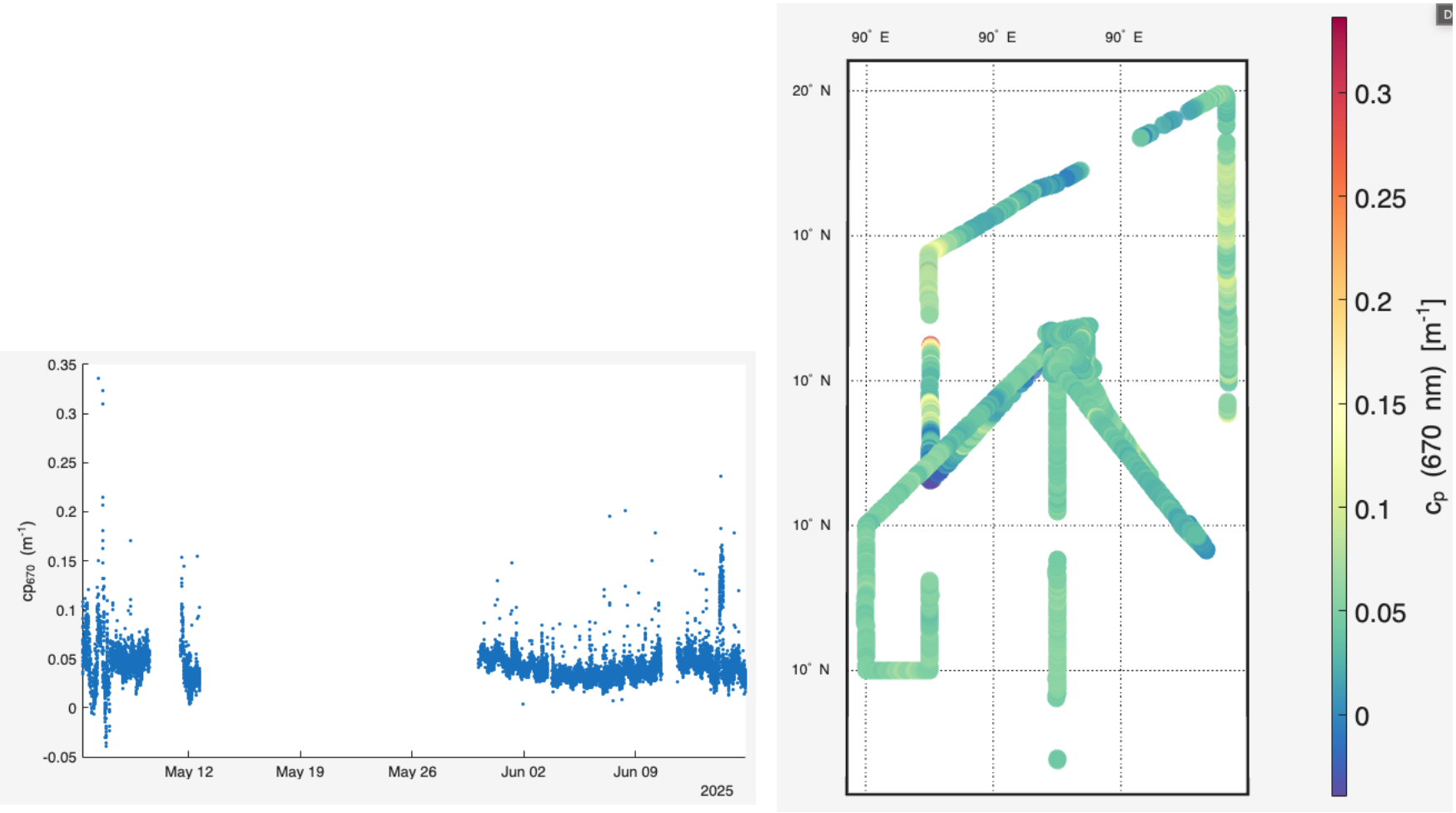

Figure 3: Time series and map of particulate beam attenuation measured with the LISST1183 during TN444

References:

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