TSM (total dissolved material) and K_d, the diffuse attenuation coefficient (PAR)

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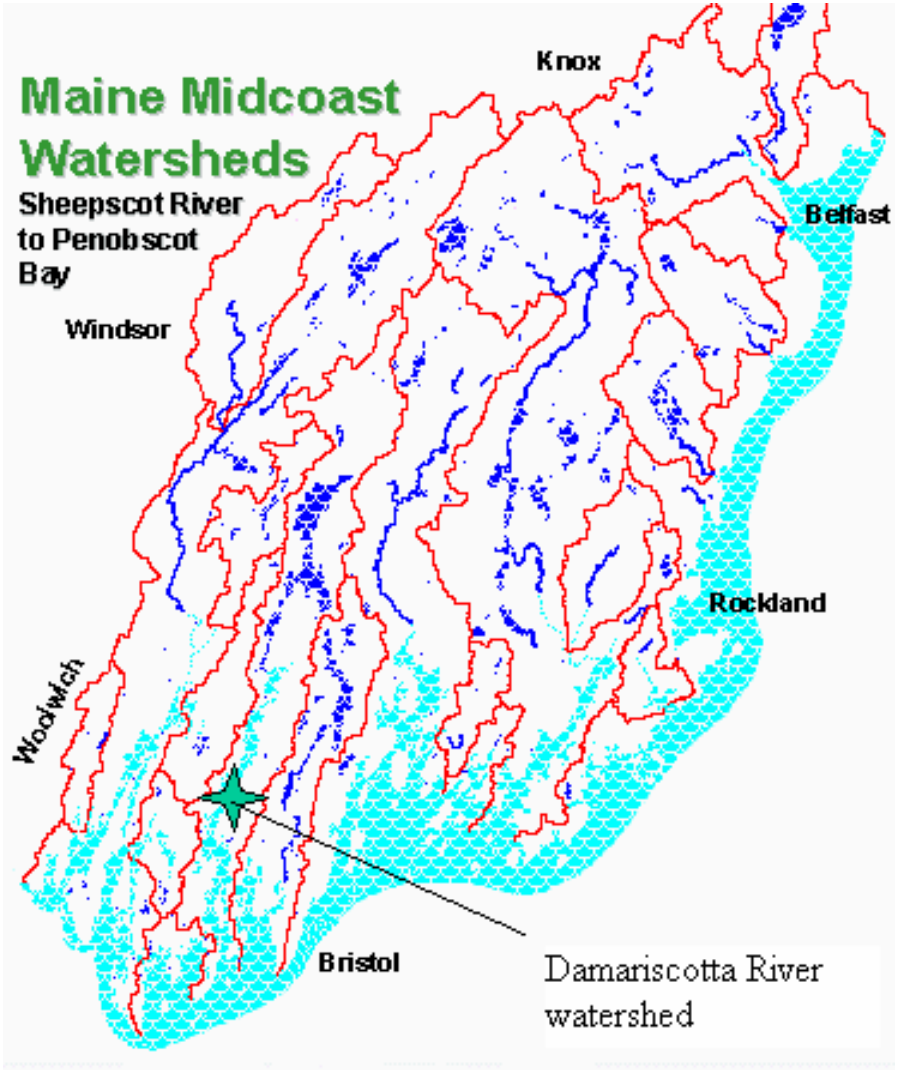
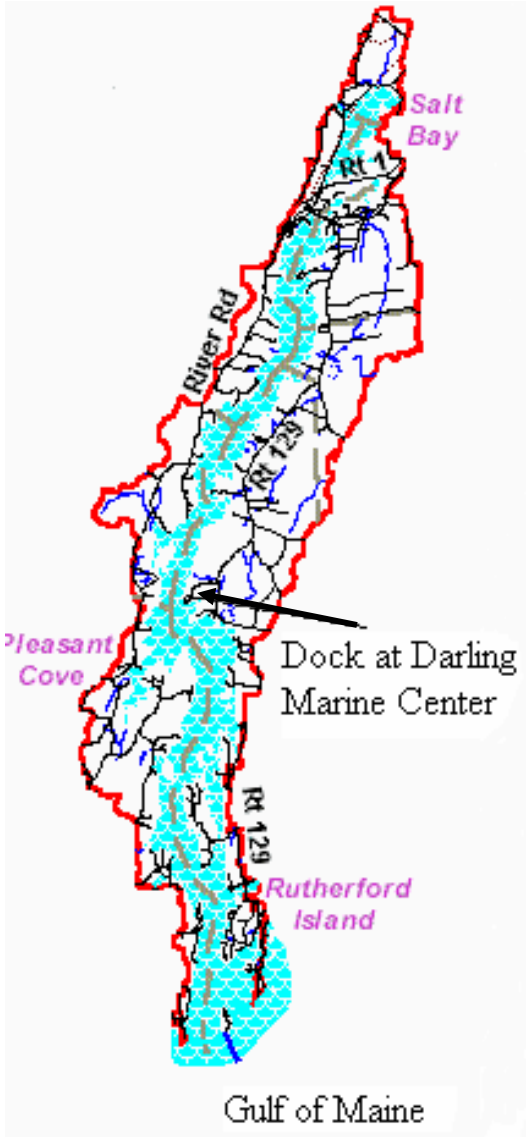
- TSM is a measure of the particulate “stuff” in the water. It does not include the dissolved matter such as salts or DOM (dissolved organic material).

- K_d is a measure of how light is attenuated with depth in a water column due to absorption and scattering. It is a function of wavelength, but in our case our instrument, the Li-Cor quantum sensor measured over all wavelengths 400-700 (PAR).

- My goal is to see if there is a relationship between TSM and K_d in the Damariscotta River.

The Damariscotta River



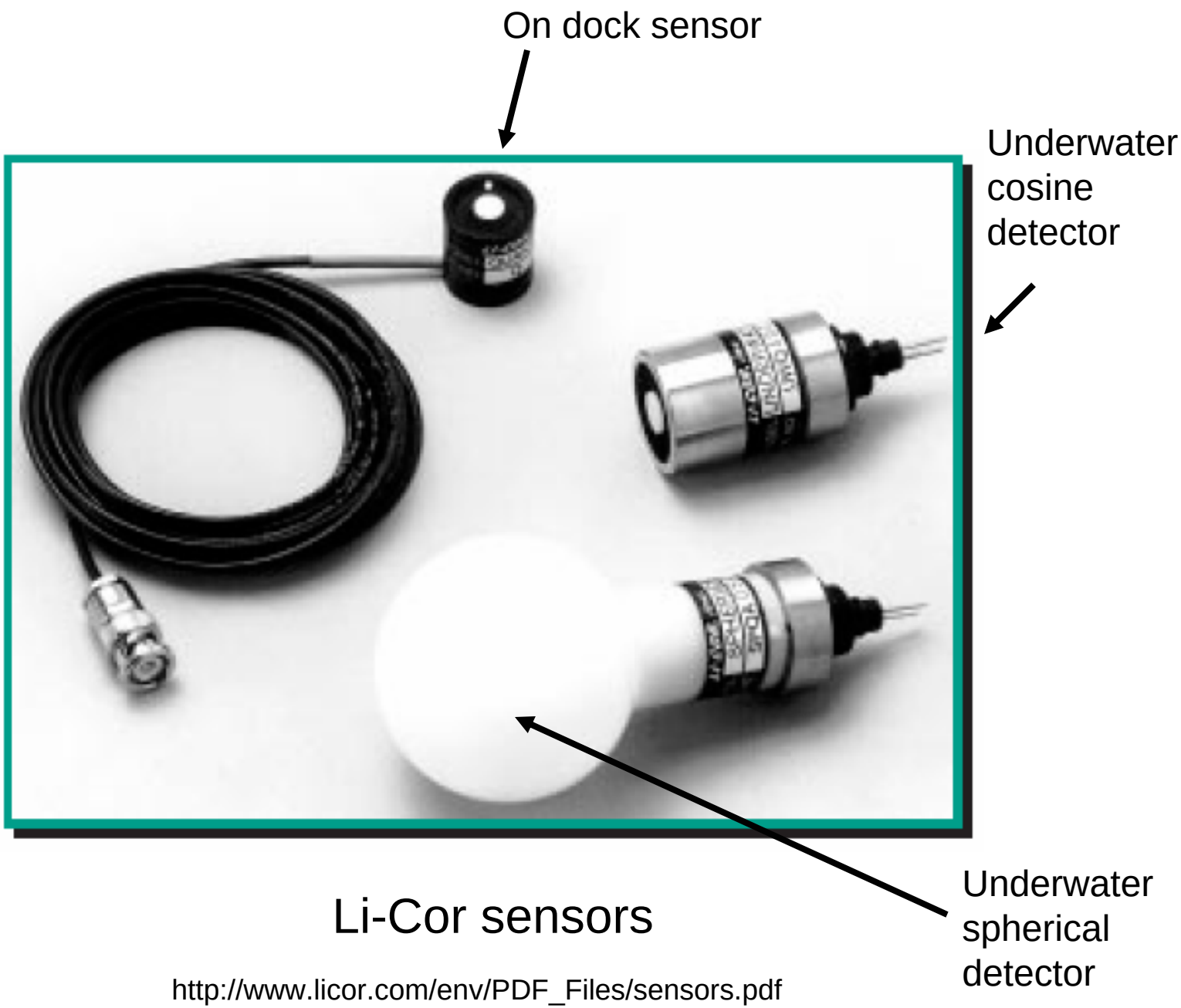


Adapted from http://www.mywatershed.com/mid/mid21.htm

Methods

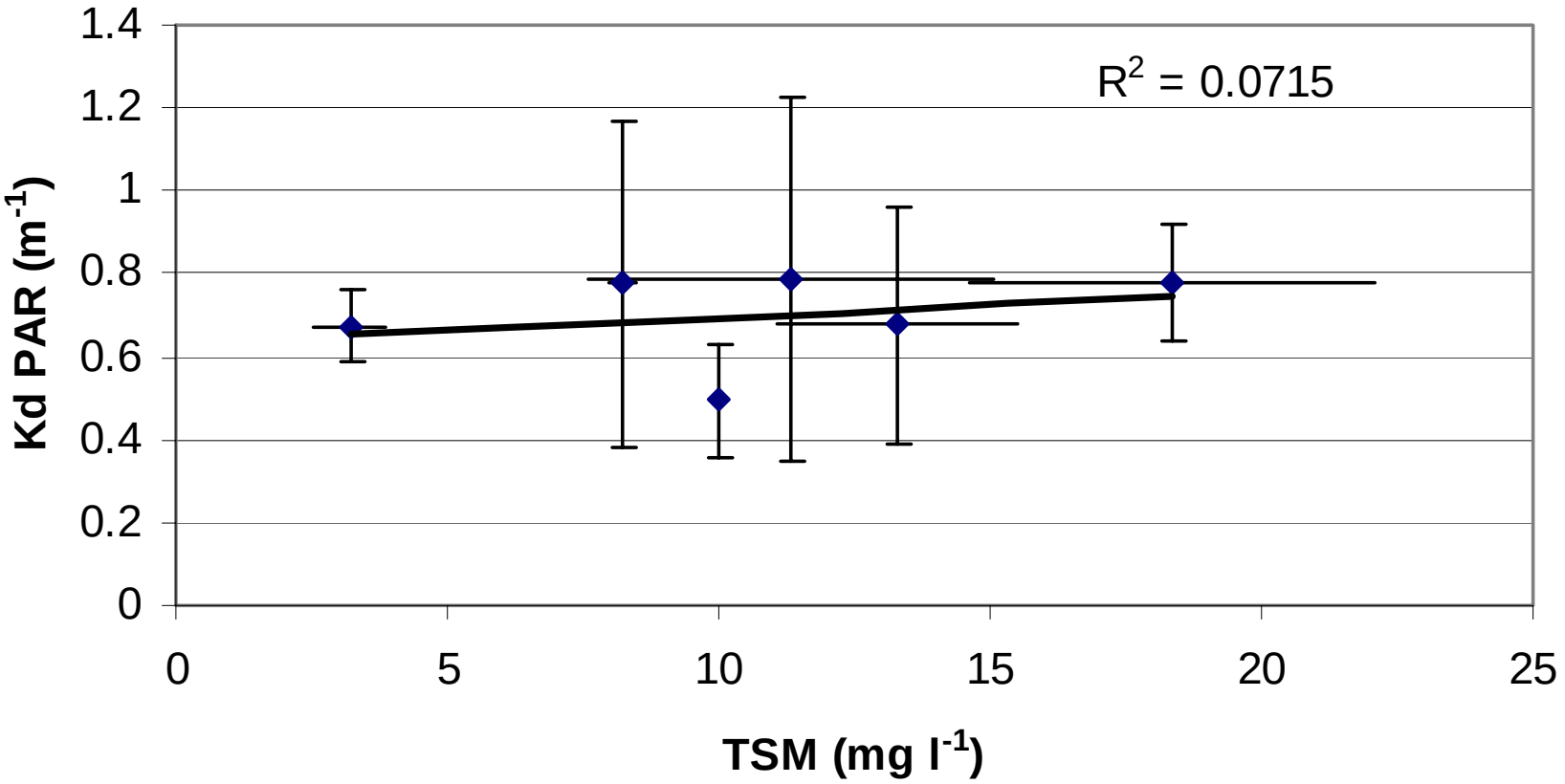
- TSM- During the period July 6-15, 2004, 400 ml of surface dock water at the Darling Marine Center were filtered (in triplicate) and particulates collected on 0.7 µm Whatman GFF filters. Salts were rinsed out and the weight of material determined and TSM calculated in mg l^{-1}.

- At the time of water collection K_d was determined by use of a Li-Cor PAR quantum sensor to a depth of 6 m off the dock. Downwelling light at depth intervals and light above the surface were measured in µmoles m^{-2} sec^{-1}.



Li-Cor sensors

http://www.licor.com/env/PDF_Files/sensors.pdf


1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
5
10
15
20
25
Kd PAR (m-1)
TSM (mg l-1)
R2 = 0.0715

Conclusions

- Due to the large variability in the replicates and the lack of a dynamic range it is hard to draw a conclusion about a relationship between TSM and K_d. Another factor is that other absorbing water constituents such as CDOM also contribute to K_d. This means the intercept of the regression line will not likely be at the origin when there is significant CDOM present. Water itself contributes by absorbing light, especially in the far red.

- When samples are obtained that cover a larger range of values and with better sampling techniques it is likely that a positive correlation between these two variables will be found.