Cruise data analysis: IOPs.

Processing assignments (so you have a data set to run with Hydrolight on Monday):

1st. Obtain, temperature and salinity-corrected dissolved+particulate and dissolved absorption and attenuation.

Obtain scattering-corrected particulate+dissolved absorption from single (dissolved+particulate) cast.

Obtain scattering-corrected particulate absorption from properties obtained by removing the dissolved cast from the 'total' cast prior to computing absorption. For scattering correction, use a wavelength in the 730nm region as a null wavelength and the proportional method.

Obtain the spectral backscattering coefficient by using the dark values you obtained (if they make sense). Compute the particulate VSF at the angle of measurement and from it compute the particulate backscattering coefficient. Correct for attenuation along the path (how large is this correction ?).

Do not process fluorometer at this stage.

Assignments:

1. Bulk IOPs:

How different is the up-cast from the down-cast in both cases?

How do the dissolved absorption and attenuation compare? What may be causing differences between them?

2. Derived quantities:

a. Obtain the spectral slope of the dissolved material ('s') by fitting an exponential model [$a_g(\lambda_0)\exp(-s(\lambda-\lambda_0)]$ to the dissolved absorption obtained by both the a & c measurements.

b. Obtain the spectral slope of cp by fitting a power-law model [$c_p(\lambda_0)(\lambda/\lambda_0)^{-\gamma}$]to the particulate attenuation. How does it change as you approach the bottom in the deep cast?

c. Compute 'chlorophyll-a'-absorption, at the depth you took water samples from, using the absorption line height at the red absorption peak (pass a base-line between about 650nm and 715nm and measure the amount of absorption from that line to the 676nm absorption peak). Divide the absorption by the chlorophyll concentration you obtained in the lab from water samples (this quantity is denoted as a*(676) in the literature). How does the value obtained compare with literature values (e.g. Bricaud et al., 1995). Use the a*(676) to obtain a profile of chlorophyll.

d. Separate the particulate absorption into the contribution of phytoplankton and NAP, $a_p = a_{NAP} + a_{phi}$, using a model (e.g. that of Roesler et al., 1989 (L&O) as modified by Simeon et al., 2003 (JGR)). Plot the profile of their value at 440nm.

3. Consistency:

a. Plot ac-s-derived chl vs. $b_p(555)$ and $b_{bp}(555)$ for data from within the first euphotic depth. How do they compare with literature relationships?

b. Compute the particulate backscattering ratio b_{bp}/b_p at the 8 wavelengths where b_{bp} and b_p overlap. Does b_{bp}/b_p vary spectrally (don't forget to adjust to FWHM)? Do the values make sense given the type of materials you expect to dominate the bulk particle population (e.g. from Twardowski et al., 2001, Boss et al., 2004)?

c. Compare K_d from Hyperpro to $(a+b_b)$ from IOP package.