Objective Mapping

Objective mapping is simply a linear estimation where the data are discrete measurements of some variable, and the thing we want to estimate is a continuous field. Now would be a good time to review your notes from the first year class. You just need to know a few statistics such as the mean and covariances between the data and between the data and the desired continuous field. A problem is that we don't know the "true" values of these statistics. A second practical problem is that the inverse you must do can get large very rapidly.

Do a few objective maps with the SeaSoar data, while changing your values for the various statistics just to see what will happen to your map. Be sure to plot the error as well. One of the real benefits of objective mapping over many other methods of interpolation is the measure of error.

Here are some things you might think about:

1. How should you define the mean? A typical approach is to define the mean as a fit to a low-order polynomial. If the mean is homogeneous there is a nifty approach we presented in class, try it. What if you assume the mean to be zero? In all cases look at your map both where the data coverage is dense, and also well outside the data.

2. How do you define the covariance? Look at the effect of different correlation scales. What if there is a noise uncorrelated between the data that is very large or zero?

3. Try to calculate the covariance directly from the data. What assumptions are you going to have to make to do this?

4. Examine the residual after doing one of your maps. Is there any coherence at scales larger than you minimum data spacing?