MAST 4667/667: Introduction to Arctic Oceanography (Fall 2014)

Sept.-18, 2014

Workshop/Homework-3: Graphing Online Data

Data: Ice-Tethered Profiler (ITP) at http://www.whoi.edu/website/itp/overview

Introduction. For our third workshop we will built on the Arctic Ocean Profiling buoy data work of the last 2 weeks. Together we will calculate and estimate the freshwater content at all buoy locations to the north of Alaska, Canada, Russia, and Spitsbergen.

Goal. Extract all profile from your ITP buoy tethered to an ice floe. Develop graphing as well as quantitative skills related to Arctic Oceanography and climate.

Assignment. Select all profile from your buoy for the following tasks

1. Create a loop around your code for a single profile, so that you process all profiles.

[*scripting loops*]

2*. Calculate the liquid freshwater content FWC defined as

$$FWC = \int (1-S/S_{ref})\, dz \approx \sum_i (1-S_i/S_{ref})\, \Delta z \quad i=1,2, \ldots, n$$

where S=S(z) is the salinity as a function of depth z and S_{ref} = 34.8. The integral can be approximated as the finite sum over all the salinities S_i>34.8 (i=1,2, .. n) in your profile separated in the vertical by a constant Δz.

[*linear data transformations*]

3. Create a single new ascii file that contains as columns the variables time, longitude, latitude, FWC, the depths of the 34.8 isohaline, and the depth of the first salinity record

Graph FWC, surface depth, and isohaline depths as a function of time, e.g., f=f(t).
Graph FWC as a function of space, e.g., f=f(x,y).
Repeat the above for 10-day averages.

[*graphing, quantitative interpretation*]

4. Post both graphics and data file on your class web-page for other people to use.

[*web-posting, data sharing*]

5. Use other student's data files of FWC, merge them with your own, produce a map of FWC for the entire Arctic Ocean, and post it on the web.

[*file transfer and map-making*]

6. Compare and constrast your map with that of other students. Discuss results with each other AFTER you each created your map.

[*interpretation, discussion of results*]

(*) Proshutinsky et al., 2009: Beaufort Gyre freshwater reservoir: State and variability from observations, J. Geophys. Res., 114, doi:10.1029/2008JC005104.