MAST-806: Geophysical Fluid Dynamics Student presentations

Goal:

Connect theoretical in-class GFD ideas, concepts, and dynamics to applied problems and observations of primary GFD literature. I expect every student to have an answer or argument with regard to the study guide questions.

Guide:

Unlike a text book the primary literature assumes general knowledge of prior work that is briefly referenced in much condensed form. In your presentations, please demonstrate that you can connect materials covered in-class to their concise treatment in the primary literature. You will not be able to cover all aspects of the assigned paper in your 50 minute, so you will need to decide which material to ignore while being prepared to answer questions as they come up. Also, it sometimes helps to uncover how a particular paper relates to prior and subsequent work. This last task is greatly facilitated by "google scholar" and the careful use of graphics and other materials posted on the web. For example, I just found a 2004 dissertation online with the title "Variability and Processes of the Denmark Strait Overflow," however, I also got distracted by the 1941 sinking of the Bismark and Hood in the Denmark Strait. So watch out where you spent your time …

Paper (Dec.-2, 2005):

Smith, P.C., 1976: Baroclinic instability in the Denmark Strait overflow. J. Phys. Oceanogr., 6, 355-371.

Study Guide Questions:

What's the "big picture" significance of the overflow of dense water from the Nordic Seas into the North-Atlantic Ocean?

What physical processes are considered in the stability analyses and how do the different non-dimensional parameters represent them? [Does the β-effect really matter here?]

What are the governing equations that form the essence of the model applied to the Denmark Strait and how do they relate to what we discussed in class?

How many hours does it take for a 200-km wave to increase its amplitude by a factor of, say, 10 for $B^{-1}=2.5$? [What does $B^{-1}=2.5$ mean or represent?]

Why does the basic geostrophic flow follow bottom contours? Does it?

Which model prdictions can and are compared with observational evidence?

Are the observed motions at the southern section coherent with those at the northern section at the frequencies of the most unstable waves or any other time scales?

Does the mooring array resolve the internal Rossby radius of deformation?