Homework 8

due 8am on Nov. 6, 2015

[75 pts.]

Name: _____

Estimate of Time Spent: _____ Actual Time Spent: _____

General Idea

For this assignment you will be formulating a hypothesis about the behaviour of barotropic flow on the sphere. You will then design a series of model experiments to test your hypothesis. Then, you will write a report to summarize your findings and present a 1-slide summary of your results to the class.

This Assignment

1. Formulate a hypothesis regarding the barotropic flow in the GFDL FMS non-divergent, barotropic vorticity equation on the sphere. Clearly write your hypothesis, discuss the experimental design you plan to use to test this hypothesis and what data/figures you will need to determine whether or not your hypothesis is supported. I have listed some possible examples below.

2. Let me know what your hypothesis and experimental design are before moving on to the rest of the assignment. This should be a brief email to me (4 sentences maximum) just so that I know what everyone is working on. Note - I do not want repeat assignments - so please come up with your own unique project.

3. Run your experiments and analyze the data.[1]

4. Write your report (turn in at the start of lecture on 11/6/15, do not email it to me).

5. Prepare a 1-slide presentation (emailed to me *in pdf format* by **8am on Friday, Nov. 6**) to present in class that day. You will each have 3 minutes to describe your question/hypothesis and your results. Note I will be sticking strictly to the 3 minutes or less total time in order to make it through all 15 presentations!

[1] FYI - I expect each of you to be running multiple simulations to properly address your research question. So plan accordingly and give yourself ample time to complete this portion of the assignment.

Example Research Ideas

1. How does the strength of the resulting zonal jet change as the strength of the initial vorticity perturbation is modified?

2. How does the east/west propagation of the Rossby wave vary as a function of the initial zonal wind distribution?

3. How is the Rossby wave propagation (or resulting zonal jet strength) modified as the radius of the Earth is modified?

4. How is the Rossby wave propagation (or resulting zonal jet strength) modified as the rotation rate of the Earth is modified?

5. How does the wave propagation vary with the wavenumber of the initial vorticity disturbance?

6. How does the time it takes for the wave to decay vary with the damping coefficient (ν)?