

PHYC/OCEA 4412/5412

Assignment #1

Due: Tuesday, January 19, 2010

1) Links to meteorological charts and satellite measurements are provided on the Web site. Over a series of days, track the life cycle of a baroclinic storm from its initial stages to full development. Write a discussion (1-2 pages hand-written) describing the storm and compare it extensively with the idealized model presented in class. Is the real storm well-represented by the model? Provide graphics as needed in your discussion. Mark them up so that the features you are describing are easy to identify.

2) Show that $\beta = 2\Omega_e \cos \phi_0 / r_e$ where $\phi_0 = \phi(y_0)$ and evaluate it at 45 deg N.

3) Show that the following relationships hold under a synoptic-scale analysis:

a) $\frac{D^2 u}{Dt^2} \ll f^2 u$

b) $\beta v^2 \ll f^2 u$

c) $f_0^{-3} \frac{D}{Dt} \frac{\partial \phi}{\partial x} \ll f_0^{-2} \frac{\partial \phi}{\partial y}$