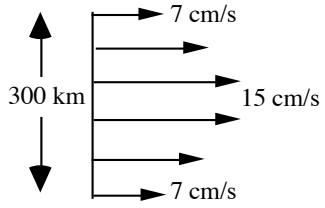
Geography 163 **Homework 3** **Due May 22, 2008**

1) Explain why eastern boundary currents regions typically are highly productive and have great fisheries. What happens to this biological activity during an El Niño event?

2) For the zonal current jet portrayed below, sketch and calculate the relative vorticity (ζ) distribution on either side of the jet. Get the signs right. You know that $\zeta = \Delta v/\Delta x - \Delta u/\Delta y$ and that this jet is centered at 40°N latitude. How does the relative vorticity compare with the planetary vorticity?



3) Repeat the last calculation now with the jet going to the south instead of the east. (Rotate the above figure 90° clockwise)

4) Use the concept of conservation of total vorticity (relative + planetary, $\zeta + f$) to explain western intensification in the South Pacific subtropical gyre. Draw a picture that explains how this works.

5) Benthic sediment distributions along the equator show a definite stripe of siliceous materials (the byproducts of diatom algae populations). Diatoms are phytoplankton found normally in high nutrient regions of the ocean. What physical oceanographic factor do you think has created this stripe on the ocean floor?

6) What processes support the Equatorial Undercurrent (EUC)? What happens to the EUC during an El Niño? Why?

7) Explain how Equatorial Kelvin waves are generated and propagate across the Pacific Ocean. How are coastal and equatorial Kelvin waves part of the El Niño signal?