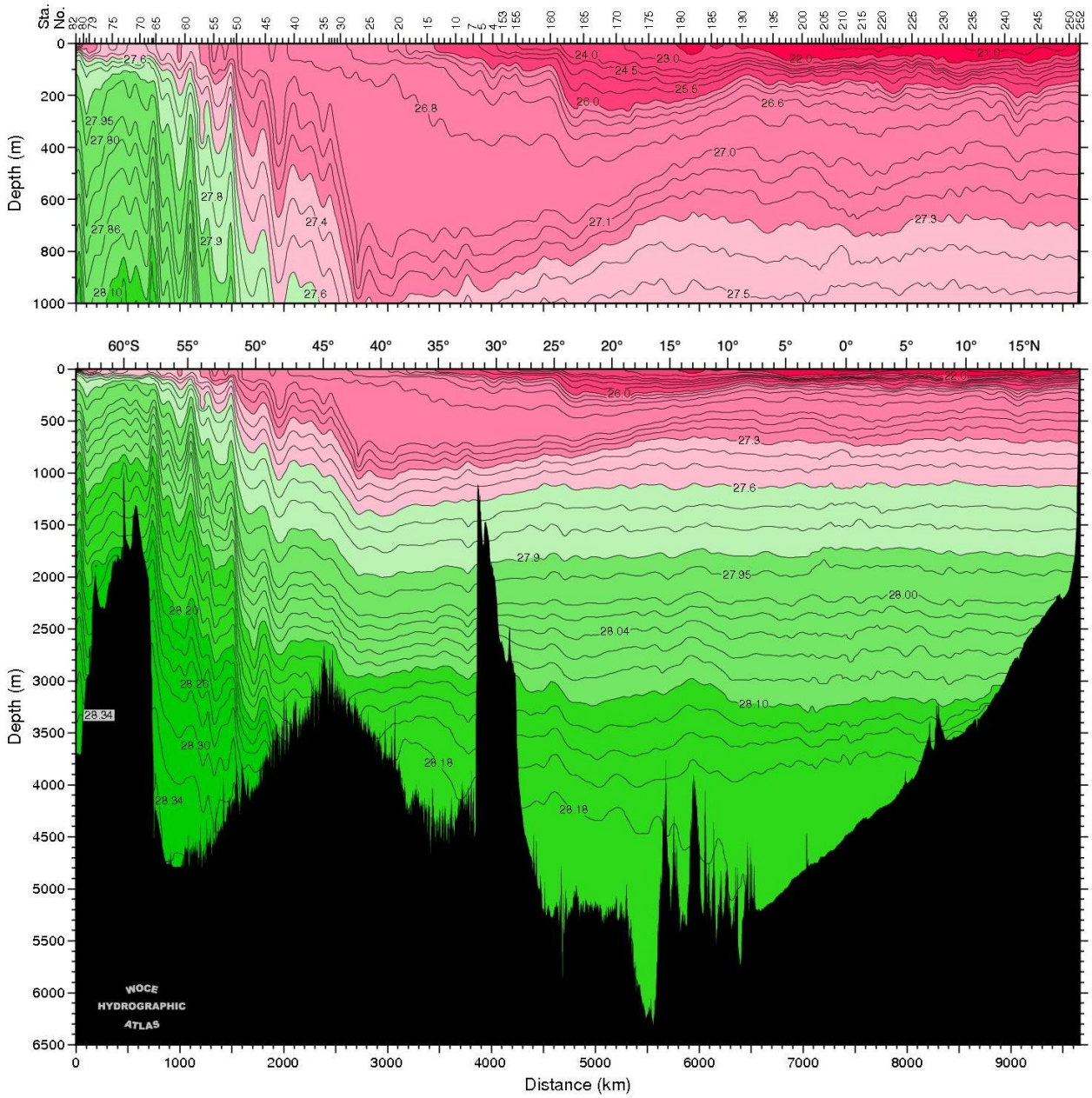
Homework 5 - Indian Ocean, Southern Ocean, Ekman Pumping
Due Wednesday 04/19/17

1. Shown below is a meridional density in the Indian Ocean at 95°E. Refer to the altimeter image in **Slide 3 of Lecture 18** and:

a) Using symbols like ⊙ ⊗ locate the ACC, the Eastern Gyral Current, and the South Equatorial Current and indicate the Thermal Wind shear in each current.

b) Sketch the sea surface slope above each of these currents.



2. The attached EXCEL file contains long term average January zonal wind stress at 190 degrees E in the central Pacific Ocean

a) Plot zonal wind stress as a function of latitude from 62°S to 0°.
   Calculate the **Ekman transport** and plot it as a function of latitude 62°S to 0°. Comment on the variations in magnitude and direction. **Use variable f .
b) Indicate clearly the areas of **Ekman pumping and Ekman suction.**

3. 1. Figure X1 shows the trajectory of a surface drifter, which made one and a half loops around Antarctica between March, 1995, and March, 2000. Red dots mark the position of the float at 30 day intervals.

a) Compute the mean speed of the drifter over the 5 years.
b) Assuming that this near surface mean current is in geostrophic balance, given this value of the speed estimate the slope in the sea surface that must accompany the flow. Using this estimate, how large is the change in sea surface height (SSH) across the 600 km-wide Drake Passage?
c) Assuming that the mean zonal current at the bottom of the ocean is zero, use the thermal wind relation to compute the depth-averaged density gradient across the Antarctic Circumpolar Current.