

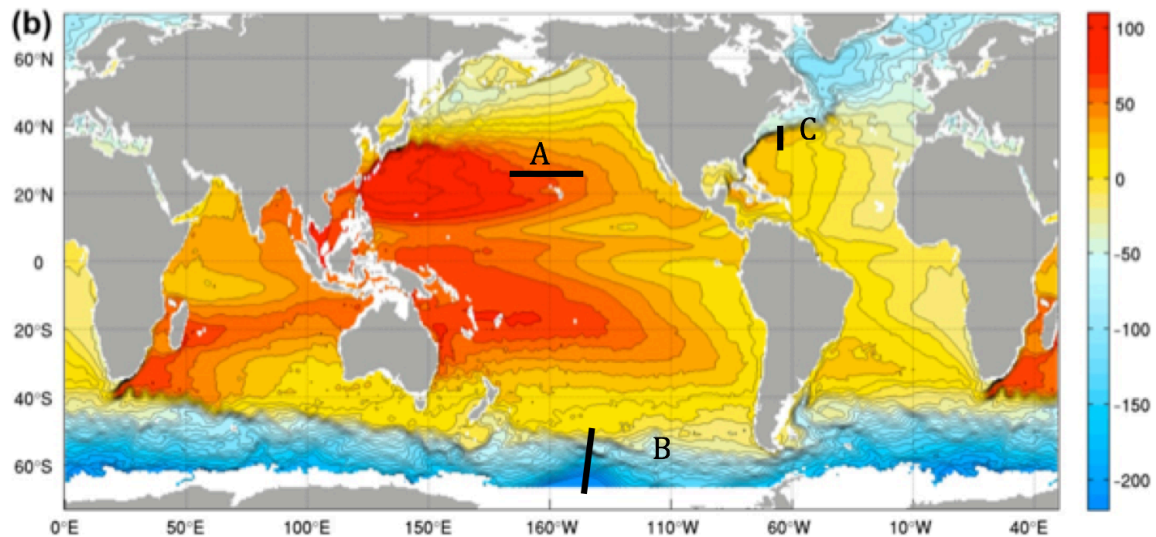
EAS 4305/6305 Physics and Chemistry of the Oceans
Homework #4: Due September 27th

Geostrophic currents

1. The map below is a satellite observation of sea surface height in the units of cm. Contour interval is 10 cm.

At the section A, B and C (marked by the black line), estimate the direction and average speed of the geostrophic current. Explain your answer for each case.

*If counting every single contour lines may not be easy or practical, make use of the color shading to estimate the sea surface height. I'm not looking for exactly correct numbers but I'm interested in how you derive your solution.



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2. The panel on the lower right shows the zonal (east-west) transect across the Florida Strait. The geostrophic flow can be calculated based on this density structure.

- (a) What is the balance of forces in the geostrophic current?
- (b) In the Florida Strait, which of the three equations of state (x , y , or z component) express this balance?
- (c) Explain what controls the variation of sea level in this section. Which side (east or west) of the Florida Strait has the higher sea level?
- (d) Based on your answer to (c), explain the direction of the Pressure Gradient Force.
- (e) Assume the ocean current is in the geostrophic balance in this section. What would be the direction of the geostrophic current? Explain your answer.

