Introduction to Oceanography
EAS 4300

Homework #5:

Review the chapter 7 and 8 “Air-sea interaction” and “Ocean circulation”, and the notes from recent lectures.

1. Figure 1 shows a map of the surface wind stress.

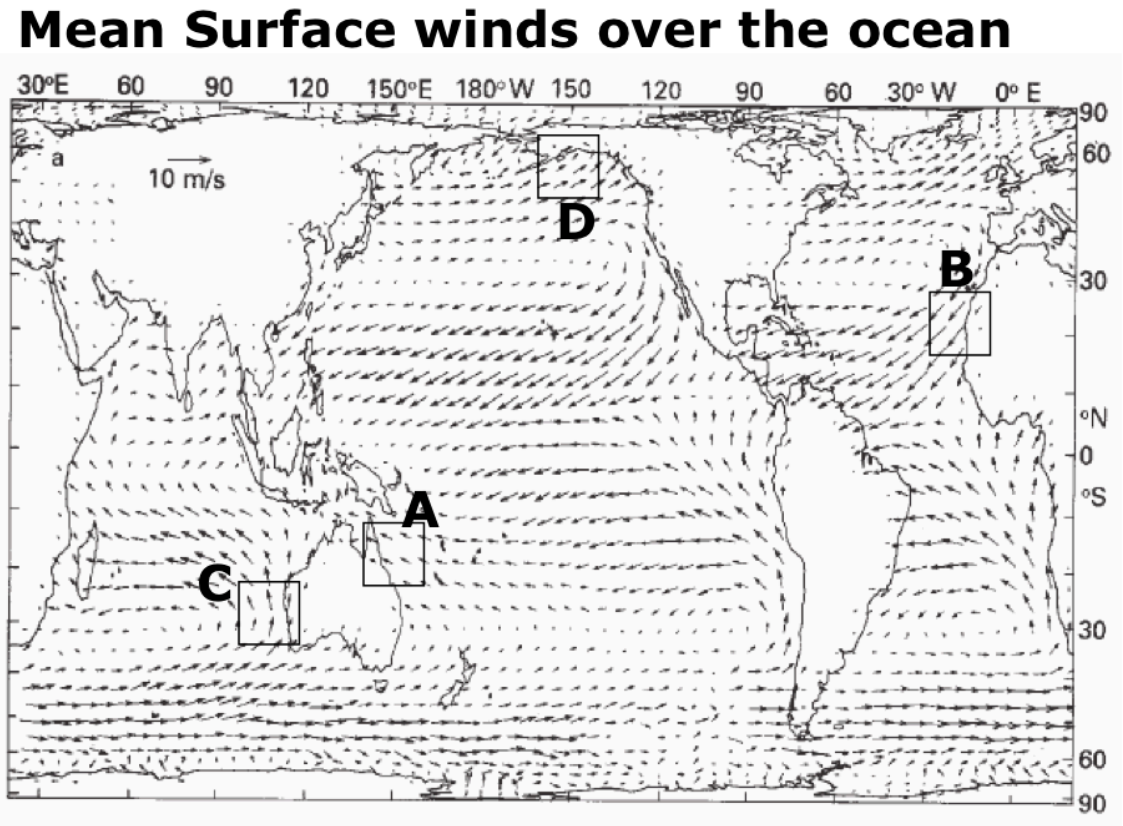
a) What is wind stress and how is it different from wind speed?

b) Indicate the direction of Ekman transport at location A, B, C and D.

c) Indicate upwelling or downwelling conditions at location A, B, C and D.

d) Label with letter T the trade winds and letter W the westerly in the North Pacific.

1.



2. Figure 2 shows a map of ocean temperatures at 150m depth.

In this map, there is a local minimum in the ocean temperature under the ITCZ where sea surface temperature is in fact the highest.

a) What would be the surface atmospheric pressure under the ITCZ? What type of atmospheric geostrophic circulation would you expect under such condition?

b) Given the sense of atmospheric circulation under ITCZ, what would be the direction of Ekman transport? What type of vertical velocity would you expect?

c) Remember that ocean is stratified, in which deep water is generally colder than the surface water. Explain the mechanism behind the local temperature minimum at 150m under the ITCZ.

d) Apply similar consideration to the formation of warm waters at 150m. Describe the underlying mechanism for the warmest subsurface temperatures occurring at subtropical latitudes.

Figure 2. Temperature at 150m depth