

## QUIZ #4 – Questions covering lectures Atm4 and Oc1

### Atm4

1. On the January map of mean air temperature at sea level, where are located the regions of high temperature?  
**Central Australia, Bolivia/Argentina, Southern Africa**
2. On the July map of mean air temperature at sea level, why are the regions of maximum temperatures lining up along the 30°N parallel of latitude?  
**Because these regions are located under the descending branch of the Hadley cell during Northern Hemisphere summer. They correspond to the presence of high surface pressures, subsiding air and clear skies.**
3. Why is the annual range of surface temperatures largest over the Northern Hemisphere?  
**The annual range of surface temperatures is largest over land because the vertical diffusivity of heat through soils and rocks is much less than that through water, resulting in larger temperature variability over land. Most of the land is concentrated in the Northern hemisphere.**
4. On the map showing the mean annual precipitation, which region appears driest, west or east of the Rocky Mountains?  
**East of the Rocky Mountains.**
5. The presence of a cold ocean current along the California coast (Californian current) reduces the amount of precipitation falling on California and the Baja peninsula. Describe the chain of physical processes responsible for the lack of rain in this region.  
**Cold coastal current => cool air + less evaporation => less convection + precipitation over adjacent land.**
6. The hydrological cycle describes the exchanges of water among the following three reservoirs: Oceans, Atmosphere and Land. Evaporation and Precipitation correspond to the largest exchanges. What net effect does the atmosphere have on the Oceans and Land reservoirs with respect to the actions of water evaporation and precipitation?  
**The Atmosphere accomplishes a net transport of water from the Oceans reservoir to the Land reservoir. This net transport corresponds to  $37 \times 10^{12} \text{ m}^3/\text{year}$ .**

### Oc1

1. Where are trenches located in the ocean? How deep is the deepest trench in relation to the highest mountain?

**In the abyssal plains. Deepest trench is 11km deep while Mount Everest is 9km high.**

2. Why is temperature nearly uniform with depth from the ocean surface down to approximately 200m?  
**Because of the constant mixing of surface waters by the surface wind.**
3. What is the Thermocline?  
**It is the oceanic region where temperature decreases the most rapidly with depth.**
4. In which regions of the oceans are the strongest oceanic currents found and how fast does the strongest current flow?  
**The strongest currents occur in the top layer of the oceans near their boundaries with land. The strongest current reaches speeds of 1 to 2 m/s.**
5. What causes gyre motion at the surface of the oceans? In which direction does an oceanic gyre flow in the Northern Hemisphere?  
**The cause of gyre motions is surface wind stress. In the Northern Hemisphere, oceanic gyres follow a clockwise motion.**
6. In the Northern Hemisphere, in which latitudinal region is located the maximum poleward transport of heat produced by the Earth's fluid components?  
**Around 40°N.**