# Ocean circulation: quiz 2

This quiz aims at testing your knowledge regarding the most fundamental aspects of lecture 1. Qualitative statements are expected.

1. **Observations.**
   - What are the two main sources of observations for large-scale properties of the ocean?
   - What is the main means of observation of ocean dynamics?
   - How do oceanographers usually estimate currents?
2. **Modelling.** What are the main applications of ocean modelling?
3. **Challenges.** Name three current challenges of physical oceanography that seem most relevant to you.
4. **Hydrography.**
   - What are the two main large-scale patterns of sea surface temperature and what causes them?
   - How does the 500m temperature map relate to the sea level? How do you interpret it in ligh of a two-layer model?
   - In the vertical, what are the three main oceanic layers? Where and how is the deep layer formed?
5. **Circulation.**
   - Where are surface currents most and least intense?
   - Based on dynamic sea level isolines, identify the main North Atlantic and North Pacific gyres.
   - What are the two main sources of oceanic gravity waves? Where are they generated and how do they impact greatly ocean circulation?
6. **Air-sea fluxes.**
   - What is the main source of ocean heating (respectively cooling)?
   - Where is the ocean heated (respectively cooled)? What do you deduce regarding its circulation?
   - What is the physical nature of the surface wind stress? Where is it most intense?
   - What are the main patterns of sea surface salinity? How do they relate to air-sea water exchanges?
7. **Climate.**
   - How does the heat imbalance related to climate change compare to individual terms of surface air-sea fluxes? What can you conclude?
   - What are the two main roles of ocean on global climate?
   - At which latitudes is the ocean most important for the poleward heat transport of the climate system?