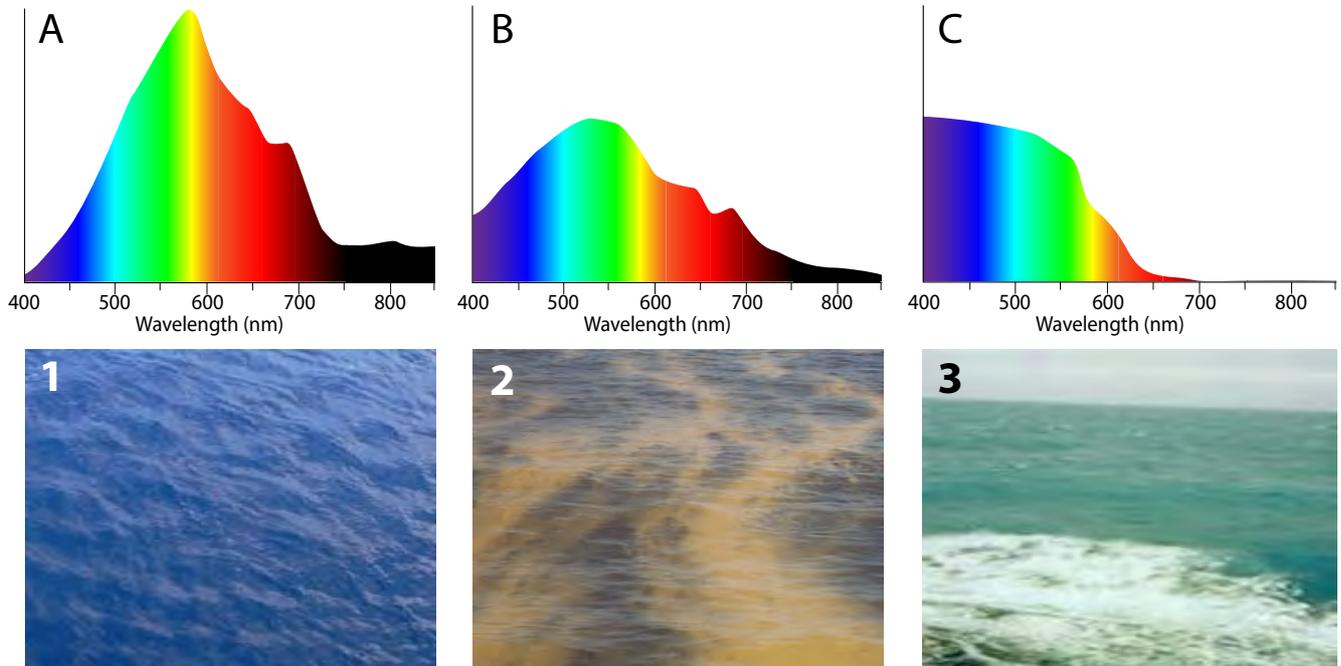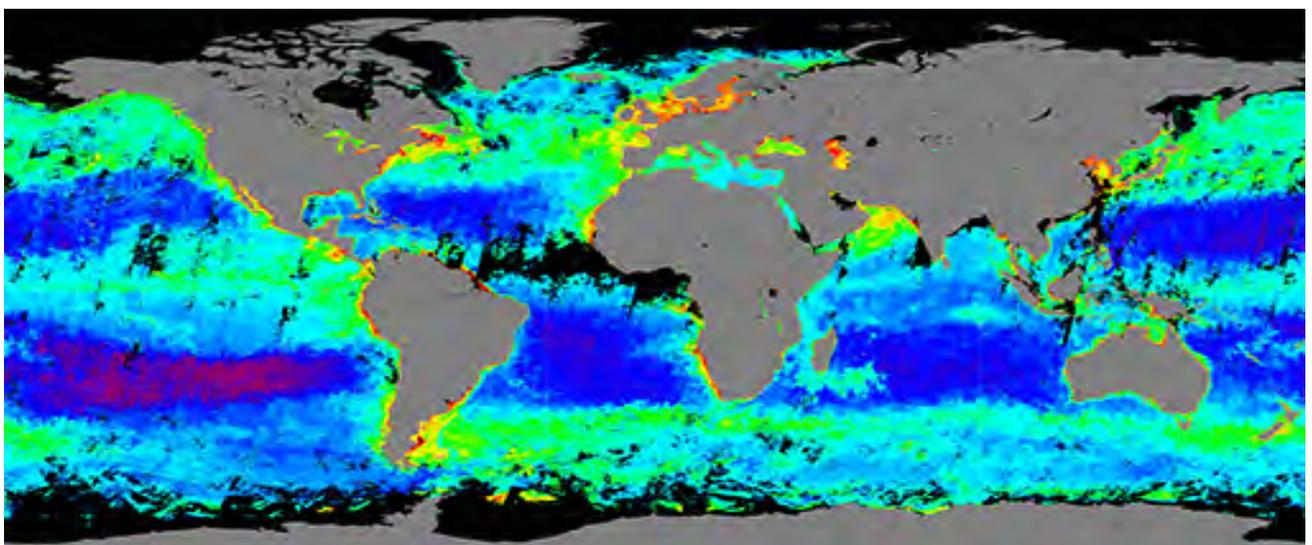# Ocean Colour Quiz

1. Ocean colour spectra are plots that show proportion of sunlight reflected from the water, plotted against the wavelength of the light. The more light is reflected at a particular wavelength, the stronger the colour that corresponds to that wavelength.

   Can you match the spectra below to the three photos of different types of seawater? (3 points)

**Note: one of the remining six questions has more than one correct answer.
7 correct answers give a score of 7.**

2. The chlorophyll map below shows global chlorophyll concentrations calculated from ocean colour measurements by the European Space Agency's MERIS sensor on Envisat. Even when averaged the whole month of March 1012 there are many areas with missing data. How would you explain this?

   A. In some countries scientists don't work at the weekend

   B. In some areas clouds usually prevent the satellite from 'seeing' the Earth's surface.

   C. Sometimes there is no daylight to be reflected back at the satellite

   D. The sky is very busy, so sometimes other satellites get in the way

   E. When it is cloudy it is too dark for the phytoplankton to produce any chlorophyll

3. In ocean colour images the seas around the UK look as if they have very high concentrations of chlorophyll in the winter. What is the main reason for this?

   A. Pollution from big cities near the coast fertilise the water so plankton can grow all year

   B. When the sea is very shallow the satellites see plants on the bottom, which look similar to phytoplankton in ocean colour images.

   C. Phytoplankton cells have more chlorophyll in winter because there is so little light.

   D. Rivers bring sediment (mud) and dissolved coloured organic matter from decomposing land plants into the coastal seas.

4. Phytoplankton are known as the 'grass of the sea'. Why is this?

   A. Because the plankton cells are thin and green like grass.

   B. Because they grow on the sea floor in thick carpets that resemble lawns.

   C. They are the main plants in the ocean, and marine plant eaters 'graze' on the plankton cells.

   D. Because they are found everywhere on the Earth's surface, just like grass.

5. There are five large subtropical gyres in the ocean, north and south of the equator in the Pacific and Atlantic and one in the South Indian Ocean. These are at the same latitude as deserts on land, and have very low chlorophyll concentrations. What is the reason for this?

   A. There is little mixing with deeper water, and not enough plant nutrients in the sunlit zone where phytoplankton can photosynthesise.

   B. Phytoplankton dislike warm water so they avoid the subtropics.

   C. There is very little rain in the subtropics so the plants don't get enough water.

   D. The phytoplankton cells are too deep for the ocean colour satellites to 'see' the chlorophyll.

6. What is the 'biological carbon pump'?

   A. Animals splashing and jumping out of the water increase the ability of the ocean to absorb carbon dioxide from the atmosphere

   B. Phytoplankton remove carbon dioxide from surface water during photosynthesis. When they die and sink into deep water the carbon they contain is transported into the deep ocean.

   C. Zooplankton move up into surface water to graze during the night, and back down during the day, bringing organic carbon from the surface into deeper water.

   D. A method of geo-engineering which traps seals and other marine mammals to operate a treadmill that pumps carbon dioxide into deep water.

7. The upwelling ecosystems on the eastern side of each subtropical gyre support particularly rich fisheries. What is the reason for this?

   A. Long-shore winds drive the surface water away from the coast, and cause cold, deep water to well up, bringing plant nutrients back to the surface.

   B. Land areas nearby are very dusty, and the dust fertilises the coastal ocean.

   C. Strong winds pile all the marine plants up along the coast.

   D. The phytoplankton get more light because the coastal upwelling push them up towards the sea surface.