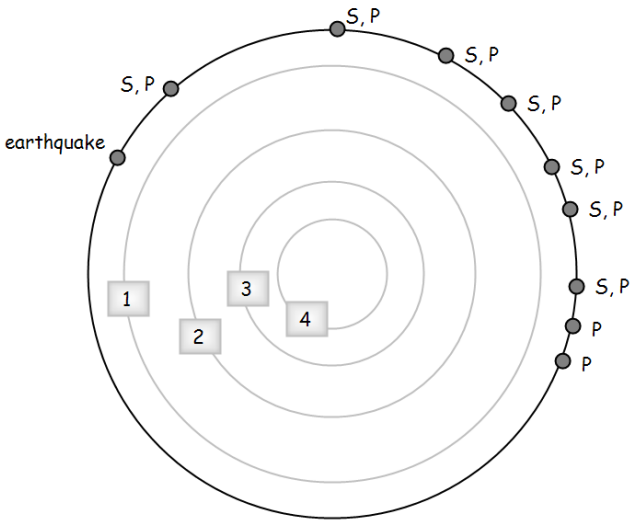
Science for the Contemporary World: Mock Exam

1. Determine the size of the internal liquid layer for a planet that is consisten with the data provided (the place of the earthquake and the waves registered by the different seismographs).



2. The discovery of planets out of our solar system is a hard task. Which is the main difficulty?

3. Write a possible consequence of the lost of magnetic field in the Earth.

4. Link the existence of life deep in the ocean with the possibility of extraterrestrial life.

5. Construct your personal conceptual map based on the information provided in this article.

Earth's core runs ahead of crust

US scientists claim to have confirmed that the Earth's core is spinning faster than its outer layers.

The inner core is important in generating Earth's magnetic field

The team compared seismic waves being produced by pairs of earthquakes occurring at the same location on the planet, but at different times.

Waves from these nearly identical quakes passed through the Earth's core, they explain in Science magazine.

The results show that the inner core is rotating faster than the rest of the planet by about 0.009 seconds per year.

Earth has a solid inner core made of iron and nickel that is about 2,400km in diameter and a fluid outer core about 7,000km in diameter.

The inner core plays an important role in the dynamo that generates Earth's magnetic field. An electromagnetic torque from this dynamo is thought to drive the inner core to rotate relative to the mantle and crust.

Xiaodong Song, of the University of Illinois at Urbana-Champaign, and Paul Richards, of Columbia University, argued that the inner core was spinning faster than the rest of the planet in 1996. But their findings were greeted with widespread scepticism.

Slow turn

The new findings, however, provide more persuasive evidence, the authors say.

Song, Richards and colleagues studied waves generated by small earthquakes in the southern Atlantic Ocean that passed through the core to a seismograph in Alaska where they were measured.

The researchers hunted for quakes with nearly identical patterns of peaks and troughs on a seismograph reading. For the wave shapes to match, the quakes must have taken place less than a kilometre apart.

They found that when earthquakes struck in nearly the same place years or decades apart, seismic waves generated by the later quakes arrived in Alaska a little sooner than they had the time before.

The only way this could be explained was if the inner core was spinning slightly faster than the rest of the planet.

"We're saying that the inner core rotates just slightly faster. So in one day, it has rotated once plus a little bit more - in other words, it rotates just a little bit more each day than the crust and the mantle," co-author Paul Richards, of the Lamont-Doherty Observatory, told the BBC News website.

This so-called "superrotation" of the inner core is of the order of 0.3 degrees to 0.5 degrees each year. This means that in 900 years, the inner core would gain one full rotation on the rest of the planet.

The research could help test simulations of how the outer, fluid core generates the Earth's magnetic field, which shields our planet and the teeming life on it from harmful cosmic rays.