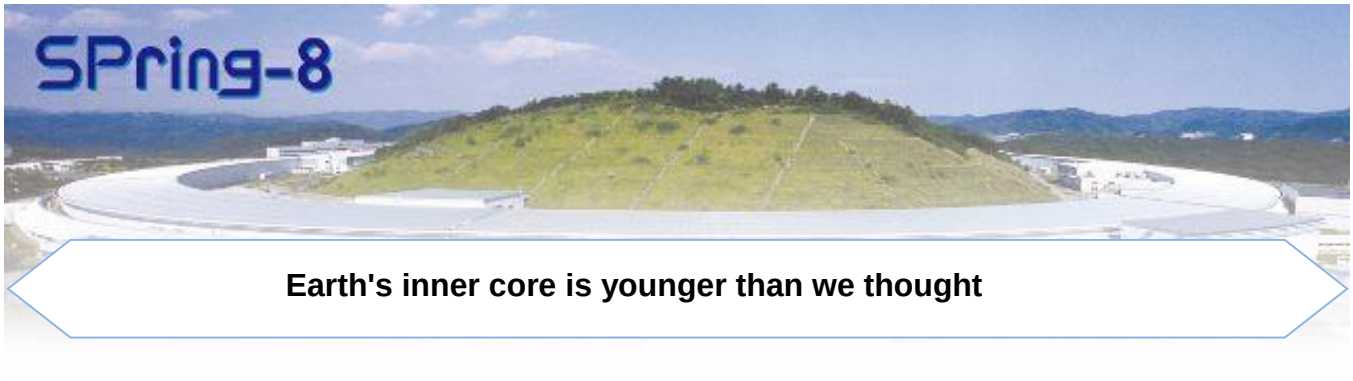

Earth's inner core is younger than we thought

Drs. K. Ohta and K. Hirose with his colleague measured the electrical resistivity of solid iron at high pressures and temperatures similar to those found at the Earth's core. Their experimental results support the theory that the inner core formed less than 0.7 billion years ago, which is younger than previously thought.

The measurement of the core is difficult to replicate in the laboratory. They have made use of advanced technology to demonstrate that the electrical resistivity of solid iron at high pressures (P) and temperatures (T) is far lower than previously thought. Their experiments back up recent theoretical studies suggesting the Earth's inner core is less than 0.7 billion years old.

They measured the electrical resistivity of solid iron in a laser-heated diamond-anvil cell (Fig.2) at SPring-8 on BL10XU, simultaneously monitoring the lattice spacing of iron by X-ray diffraction to estimate the pressure. They measured from 300 kelvin (K) to 4500 K and at pressures of up to 212 gigapascals (GPa) — the high end of both scales representing Earth's core conditions. The researchers found that the high P-T resistivity of iron measured in this study is even lower than the extrapolation of high-P/low-T data by the Bloch-Grüneisen law that only considers the electron—phonon scattering. This shows that the iron resistivity is significantly suppressed by the resistivity saturation effect at high temperatures.

From these results suggest that rapid core cooling and a young inner core less than 0.7 billion years old. Therefore an abrupt increase in palaeomagnetic field intensity around 1.3 billion years ago may not be related to the birth of the inner core.

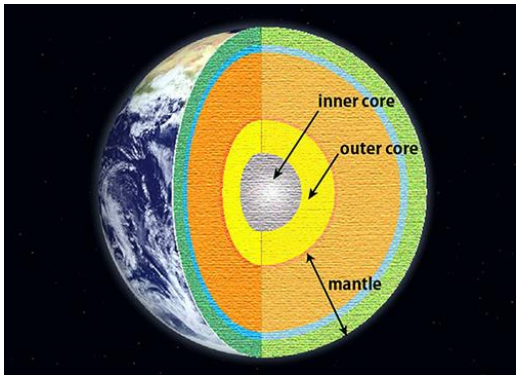

Fig. 1 A cross-sectional drawing of the Earth

Fig.2 Diamond-anvil cell