[EE] Evening Poster | S (Solid Earth Sciences) | S-IT Science of the Earth's Interior & Tectonophysics

# [S-IT22]Interaction and Coevolution of the Core and Mantle in the Earth and Planets

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Recent observational and experimental investigations have significantly advanced our understanding of the structure and constituent materials of the deep Earth. Yet, even fundamental properties intimately linked with formation and evolution of the planet, such as details of the chemical heterogeneity in the mantle and light elements dissolved in the core, remained unclear. Seismological evidence has suggested a vigorous convection in the lower mantle, whereas geochemistry has suggested the presence of stable regions there that hold ancient chemical signatures. The amounts of radioactive isotopes that act as heat sources and drive dynamic behaviors of the deep Earth are also still largely unknown. We provide an opportunity to exchange the achievements and ideas, and encourage persons who try to elucidate these unsolved issues of the core-mantle evolution using various methods, including high-pressure and high-temperature experiments, high-precision geochemical and paleomagnetic analyses, high-resolution geophysical observations, geo-neutrino observations, and large-scale numerical simulations. Since this session is co-sponsored by geomagnetism, paleomagnetism and rock magnetism division of the SGEPSS, contributions in geomagnetism and geodynamo simulation are also encouraged.

## [SIT22-P15]Melting of iron to 290 gigapascals

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The Earth’s core is composed mainly of iron. Since liquid core coexists with solid core at the inner core boundary (ICB), the melting point of iron at 330 gigapascals offers a key constraint on core temperatures. However, previous results using a laser-heated diamond-anvil cell (DAC) have been largely inconsistent with each other, likely because of an intrinsic large temperature gradient and its temporal fluctuation. Here we employed an internal-resistance-heated DAC and determined the melting temperature of pure iron up to 290 gigapascals, the highest ever in static compression experiments. A small extrapolation indicates a melting point of 5500 ± 80 kelvin at the ICB, about 500–1000 degrees lower than earlier shock-compression data. It suggests the upper bound for the temperature at the core–mantle boundary (CMB) to be 3760 ± 180 K. Such present-day CMB temperature combined with the recently-proposed nominal core cooling rate suggests that the lowermost mantle was no longer globally molten, at least in the early Proterozoic Eon, consistent with the recycling of subducted crustal materials originally formed more than 1.5 Gyr ago.