[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-P03]Phase relations in the Fe-Ni-Si system at high pressures and high temperatures

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The Earth's core has supposed to be constituted by iron-nickel alloys with some light elements. Silicon is one of the most convincing candidates among the light elements. Therefore, the study of high pressure and high temperature properties and behaviors for the Fi-Ni-Si system is important in understanding and constraining to the properties of the Earth's core. In this study, high pressure and high temperature properties for three different contents of Fe-Ni-Si alloys were investigated by using laser heated diamond anvil cells and in situ X-ray diffraction with synchrotron radiation. We determined the phase relations of $Fe_{(0.94-x)}Ni_{0.06}Si_{x}$ (x = 0.10, 0.17, 0.26) up to 125 GPa and 2800 K, respectively. According to previous Fe-Si system studies, $Fe_{0.83}Si_{0.17}$ alloys transform from hcp to hcp+B2 and fcc+hcp+B2 phases with increasing temperature in isobaric conditions. We observed the change in temperature increase and positive slope of these boundaries due to the nickel containing effect and the difference in silicon content. We report the details of phase relations in the Fe-Ni-Si system and discuss with the differences from the Fe-Si system.