[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

convener:Tsuyoshi Iizuka(University of Tokyo), Hidetoshi Shibuya(Department of Earth and Environmental Sciences, Faculty of Advanced Science and Technology, Kumamoto University), Taku Tsuchiya(愛媛大学地球深部ダイナミクス研究センター, 共同), Kenji Ohta(Department of Earth and Planetary Sciences, Tokyo Institute of Technology)

Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

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-P09]Stability of hydrous aluminosilicates at the transition zone and the lower mantle

Ryota Abe[1], Yuki Shibazaki[2], Shin Ozawa[1], Itaru Ohira[1], Hiromu Tobe[1], *Akio Suzuki[1] (1.Department of Earth Science, Graduate School of Science, Tohoku University, 2.Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Tohoku University, Sendai 980-8578, Japan)

Keywords:hydrous alminosilicate, phase Egg, synchrotron X-ray diffraction, lower mantle, subducting slab

Water is transported into the deep Earth’s interior by hydrous minerals in the descending slabs. Previous studies showed that hydrous aluminosilicates would be stable in the sedimentary layer of subducting slab. Discovery of phase Egg in the diamond inclusion also supports that hydrous aluminosilicate could exist in the earth’s deep interior. Topaz-OH II was synthesized by Kanzaki (2010 Am. Mineral.) at the pressure of 14 GPa and the temperature of 1400 °C. In the high pressure and high temperature experiment using starting materials of $Al_2SiO_4(OH)_2$ composition have reported stable regions only at 26 GPa (Pamato et al., 2014 Nature Geoschi.). The phase relation of $Al_2SiO_4(OH)_2$ aluminosilicates between 14 and 26 GPa is important for the discussion of water transport from the mantle transition layer to the shallow part of the lower mantle. In this study, quench experiments and in situ X-ray diffraction studies on the phase relation of $Al_2SiO_4(OH)_2$ were conducted in the pressure range of 12.0–32.2 GPa and in the temperature range of 800–1600 °C. We observed the coexistence of delta-AlOOH and stishovite at 31.0 GPa and 1500 °C and the formation of phase Egg together with corundum at 30.6 GPa and 1600 °C. These results indicate that phase Egg is stable at least up to 30.6 GPa and 1600 °C, which is higher pressure and temperature condition than that reported previously. Phase Egg should be the important water carrier after the avalanche of the

stagnant slab up to the depth of approximately 900 km in the lower mantle.