[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-P23]Recycled Archean sulfur in the mantle wedge of the Mariana Forearc

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Non-mass dependent (NMD) sulfur isotopes in rock record is found in the Archean (>2.5 Ga) period, probably owing to the low oxygen concentration in atmosphere at that time (e.g., Farquhar et al., 2000). Recent studies reported NMD sulfur isotopes in sulfide inclusions in olivine within OIB, suggesting recycling of Archean materials in the mantle (Cabral et al., 2013; Delavault et al., 2016). However, sulfur isotopes in the mantle wedge is poorly constrained. In order to evaluate sulfur cycle in the mantle and incorporation of surface materials through subduction, we analyzed quadruple sulfur isotopes of dissolved sulfate in upwelling seepage fluids collected as deep as 202 mbsf (meters below the seafloor) in a cased hole near the summit of the South Chamorro serpentinite seamount in the Mariana Forearc. Sulfate in the upwelling fluids show NMD ($D^{33}S$ ranging from −0.2‰ to −0.3‰ with analytical errors of ±0.01‰). These are unlikely to originate in typical sulfur components in the subducting plate, which is a mixture of sulfide in the MORB ($D^{33}S$ ≈ 0‰; Labidi et al., 2013) and sulfide produced by reduction of seawater sulfate ($D^{33}S$ >+0.05‰). Instead, it is comparable if Archean materials or the plume-related OIB is present in the mantle wedge beneath Mariana Forearc. Because NMD sulfur primarily originates in Archean sulfur, our results may extend the potential presence of recycled Archean materials in the upper mantle due to subduction of oceanic crusts in the Archean period or ongoing subduction of OIB seamounts abundantly exist in the Pacific Plate.

References

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