[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-P01]Waveform inversion for the 3-D S-velocity structure of the mantle transition zone beneath Central America using USArray data

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Our group previously presented evidence for paleoslabs at the base of the mantle beneath Central America (Borgeaud et al. 2017) based on waveform inversion for 3-D S-velocity structure. However, it has not yet been clarified how paleoslabs are subducted through the mantle. Travel-time tomography studies have reported that subducted slabs either are stagnant at depths of ~660 or ~1000 km or penetrate into the lower mantle (Fukao et al. 2009), showing various modalities around the mantle transition zone (MTZ). We further study the fate of paleoslabs using waveform inversion. We assemble a dataset including triplicated S phases associated with the 410 and 660 km discontinuities and infer the 3-D S-velocity structure in the depth range 300-900 km beneath Central using waveform inversion. We use ~6,500 transverse component records at epicentral distances 15 <Δ <35 degrees from ~32 intermediate focus earthquakes beneath South America, Central America, and the Antilles recorded at stations of the USArray and other smaller networks (GSN, FDSN, TO, XT, XN). We filter the records between 12.5-100 s, and use the portions of the waveforms from 10 s before to 70 s after the first S-wave arrival, including S-wave triplications due to the 410 and 660 km discontinuities. We test the robustness of our 3-D inversion results to corrections for shallow mantle heterogeneities, change in

model parametrization, and redetermination of the source time functions of the largest earthquakes in our dataset (Mw >~6-6.5). Our results may provide additional constraints on the complex subduction history of the Caribbean region.