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

[S-IT18]Planetary cores: Structure, formation, and evolution

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There are fundamental links between the formation and evolution of planets and their satellites to that of their cores. Defining the physical and chemical properties of the cores of these terrestrial bodies are fundamental for understanding their internal structures and thermal profile. Recent advances in experimental and theoretical studies provide new insights and applications to the Earth's cores and other terrestrial bodies. Future exploration missions will obtain data on the internal structure of terrestrial planets (e.g., Mars and Mercury) and planet-satellite systems. We anticipate presentations on recent advances on the physical and chemical properties of cores and discussions regarding the latest views of their formation and evolution. We welcome contributions from mineral/rock physics, geophysics, geochemistry, geodynamics, and planetary science.

[SIT18-P01]Sound velocity of liquid Fe-Ni-S-Si at Mercury outer core condition

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A large Mercury core consists mainly of Fe and Ni and also contains some light elements. The X-ray spectroscopy measurements by the MESSENGER spacecraft indicates that 1-4 wt% S is included on its surface. Based on the partitioning behavior of S and Si between metal and silicate melts, both S and Si can be contained in metal phase when coexisting silicate melt contains 1-4 wt%S, suggesting that both S and Si are likely to be included in the outer core (Chabot et al. 2014). Thus, elastic properties of liquid Fe-Ni-S-Si are important implication to study the interior structures of Mercury and properties of liquid outer core.

In this study, we performed sound velocity measurement of liquid Fe-Ni-S-Si up to 14.8 GPa and 1943 K using multianvil press at BL04B1, SPring-8 facility. The sound velocity was measured using the pulse-echo overlap method. The P-wave velocity increases with pressure. Although the P-wave velocity of liquid Fe-Ni decreases by addition both of S and Si, it likely to increase from the velocity by addition of only S.