

***Ab initio* Simulations of Light Elements in the Earth's Core**

BURKHARD MILITZER¹, SHOH TAGAWA^{2,3}, KEI HIROSE^{2,3}, SEAN WAHL¹

¹Department of Earth and Planetary Science,
University of California, Berkeley, CA 94720,
USA.

² Earth-Life Science Institute, Tokyo Institute of
Technology, Tokyo 152-8550, Japan.

³ Earth-Life Science Institute, Tokyo Institute of
Technology, Tokyo 152-8550, Japan.

Since the seminal work by Birch, it is known that light elements must be present in the inner and outer core of the Earth. However, the actual composition of the light, alloying component has remained illusive. While the density deficit in the core can be explained with various light elements, matching the observed low velocities of seismic shear waves (V_s) has remained a particular challenge. Here we discuss results from different sets of *ab initio* simulations in order to constrain the composition of light element component. We then discuss various proposals to match the seismic observations in the Preliminary Reference Earth Model (PREM) including the density (ρ) and the velocity of compressional waves (V_p) in the outer core, the density jump across the inner-core boundary, as well as the density, V_p , V_s , and anisotropy in the inner core.