Re-examination for P-V-T equation of state of the lower mantle

Yoshitaka Aizawa[1]; Akira Yoneda[1]

[1] ISEI, Okayama Univ.

P-V-T equation of state for major constituents of the lower mantle was thermodynamically examined. (Mg,Fe)SiO3 perovskite and (Mg,Fe)O magnesiowustite are widely accepted as the major constituent of the Earth"s lower mantle. Thus, their physical properties have been extensively studied at high pressures and temperatures. In order to directly apply those results to the Earth"s interior, the P-V-T equation of state (EOS) plays a critical role on the extrapolation of those experimental results at lower mantle P-T conditions. On the basis of the Mie-Gruneisen-Debye model, in which the Birch-Murnaghan equation is used for describing the isothermal compression and the thermal pressure calculated from the Debye approximation, the P-V-T EOS was obtained by fitting experimentally measured volumes at various P-T conditions. In the present analysis, gruneisen parameter and its volume dependence were estimated primarily for re-constructing the EOS. The reliability of the EOS was examined in comparison with thermoelastic parameters such as the thermal expansion or the temperature dependence of the bulk modulus obtained by experiments. We will discuss the plausible chemical composition model of the lower mantle.