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中央海嶺玄武岩（MORB）の下部マントル条件下における相関係と密度変化
Phase relations and density changes in mid-ocean ridge basalt (MORB) under the lower mantle condition

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The phase relations and density of a mid-ocean ridge basalt (MORB) composition were investigated at pressures 43 and 53 GPa and at a temperature of 2050 K using multianvil apparatus with sintered diamond anvils. The unit-cell volumes of the samples and the produced pressures were determined using in situ X-ray diffraction measurements at SPring-8, while chemical analyses of the quenched samples were made using transmission electron microscopy (TEM). The observed diffraction lines were assigned to those of five phases, namely MgSiO3-rich perovskite phase (MgPv), CaSiO3-rich perovskite phase (CaPv), stishovite phase (St), calcium ferrite-type phase (CF), and the new alminous rich (NAL) phase. The phase proportions were estimated from a least squares mass balance calculation using chemical compositions of the phases obtained by the TEM analyses. The density of MORB at each pressure and temperature was calculated using the measured volumes, phase proportions, and chemical compositions of the coexisting phases. The present phase relations and phase proportions in MORB are consistent with the results of recent study (Ricolleau et al., 2010) except for the presence of a small amount of the NAL phase even at the pressure of 53 GPa. The calculated MORB densities were then compared with the density profile of PREM. It is demonstrated that MORB is 2.0%˜2.8% denser than that of PREM at pressure of 43 GPa and 53 GPa, suggesting that basaltic oceanic crust may subduct to deeper region of the lower mantle.

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