Geodynamics Seminar

第356回ジオダイナミクスセミナー

Equation of state of hydrous phase A, $Mg_7Si_2O_8(OH)_6$ under high pressure and high temperature

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主催：愛媛大学地球深部ダイナミクス研究センター
日時：5/10（金）午後 4時30分～
場所：総合研究棟 4F 会議室

Abstract

Dense hydrous magnesium silicate (DHMS) minerals are important potential carriers of water into the Earth's deep mantle, where most of the hydrous minerals were dehydrated. Phase A is one of members in MgO-SiO_2-H_2O (MSH) system with the general formula $mMg_2SiO_4.nMg(OH)_2$, and the ideal end member is $Mg_7Si_2O_8(OH)_6$, with about 12wt% water. Phase A is a breakdown product of serpentine, which means it is a possible water carrier in the subduction zones. We did in-situ x-ray diffraction measurement on Phase A, under pressure and temperature conditions up to 10GPa, 700° C. 49 P-V-T data were collected successfully, and were fitted to a high temperature Birch-Murnaghan equation of state, yielding V_0=511.7(4) Å^3, K_0=106.4(32) GPa, K'=3.6(6), dK / dT = -0.009(6) GPa / K, and thermal expansion $\alpha_0 = 3.73(39) \times 10^{-5}$ / K; for comparing with previous studies, we fixed K' to 6, and got the V_0=512.9(4) Å^3, K_0=94.1(13) GPa, dK / dT=-0.019(5) GPa / K, and thermal expansion $\alpha_0 = 4.46(34) \times 10^{-5}$ /K. V_0 is quite consistent with previous studies, while the bulk modulus obtained is much smaller than the value 145(5) GPa reported by Pawley et al. (1995), and consistent with the results from recent studies within uncertainties. Temperature derivative of bulk modulus, dK/dT, of Phase A was reported independently for the first time. The compressibility of Phase A is very anisotropic along a- and c-axis, and a-axis is ~25% more compressive than c-axis, which supported previous studies (Holl et al., 2006; Crichton and Ross, 2002). Density of Phase A along subduction zone geotherm also calculated and will show in the presentation.

詳細は当センターホームページ: http://www.ehime-u.ac.jp/~grc/をご覧ください
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