Geodynamics Seminar

第363回ジオダイナミクスセミナー

Thermal equation of state of lawsonite

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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：7/12（金）午後 4時30分～
場所：総合研究棟 4F 会議室

Abstract

 Lawsonite, which contains about 11.5 wt% of water, is considered to be stable as deep as 300 km in the MORB system during its descending into the deep mantle, thus it maybe a potential carrier for water transporting into the deep upper mantle. Although previous studies have obtained its bulk modulus and thermal expansivity under high pressure and high temperature, the values are not quite consistent with each other. Here we conducted in-situ X-ray diffraction experiments at 2 - 10 GPa and 300 - 973 K. The results show that c axis becomes less compressible as the pressure increased, comparing with a and b axis. This should relate to its crystal structure. Fitting the third order Birch-Murnaghan equation of state yields: $V_0=674.4(4)$ Å^3, K=128.5(16) GPa at room temperature. These values are slightly higher than previous study. The high temperature data show a second order dependent of bulk modulus on temperature, which yield: $V_0=674.3(4)$ Å^3, $K_0=128.9(12)$ GPa, $(\partial K_T/\partial T)_P= -0.046(9)$ GPa K^{-1}, $(\partial^2 K_T/\partial^2 T)_P=0.029(8)$ 10^{-3} GPa K^{-2}, $a_0=3.0(3)$ 10^{-5} K^{-1}. In all cases K' is fixed at 4. The modified parameters are quit consistent with room temperature data in this study, but higher than previous studies.