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Dehydration boundary and the EoS of chlorite under high pressure and temperature

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Water in hydrous minerals has been transported to deep Earth's interior by subducting slab, which dehydrate at certain pressure and temperature. The existence of deep Earth's water affects the physical properties of Earth's mantle minerals, such as melting point, viscosity, elastic velocity, and so on. Therefore it is important to study the effect of water for the subducting slab materials. Serpentine ($(Mg,Fe)_6Si_4O_{10}(OH)_8$) is major hydrous mineral in subducting slab, and chlorite ($(Mg,Fe,Al)_6(Si,Al)_4O_{10}(OH)_8$) should be also important hydrous mineral in the subducting slab because Al is included in slab materials. In this study, the dehydration reactions of chlorite were determined by time-resolved X-ray diffraction analysis under high pressure and temperature using MAX80, PF-AR, KEK. In addition, P-V-T experiments of chlorite have also been conducted under HPHT. We found that chlorite was quickly dehydrated to forsterite + pyrope + fluid within 1 hour at 3 - 7 GPa when across the phase equilibrium boundary. On the other hand, the kinetic boundary was observed above 7 GPa because of low temperature phase equilibrium boundary, and the dehydration product was Mg-sursassite + unknown + fluid, The result of P-V-T experiments will be also reported.

Keywords: chlorite, hydrous phase, subducting slab, dehydration, equation of state, synchrotron X-ray in-situ experiment