Effect of pore fluid on seismic velocity of serpentinite and the origin of high Vp/Vs in mantle wedge

*Ikuo Katayama¹, Yunxi Liu¹, Kanta Zaima¹

1. Department of Earth and Planetary Systems Science, Hiroshima University

Serpentine is one of the candidates to explain low-velocity anomaly and high Vp/Vs in mantle wedge. However, extremely high Vp/Vs found beneath Kanto and southwest Japan requires the presence of aqueous fluid in addition to the serpentinites. In this study, we investigated the effect of pore fluid on elastic-wave velocity of antigorite during triaxial deformation using intra-vessel apparatus at Pc = 10-20 MPa, Pp = 5-10 MPa and room temperature. Compressional and shear-wave velocities decrease during deformation, possibly due to the formation of micro-cracks in the specimen. Since shea-wave velocity changes more drastically than compressional-wave velocity, Vp/Vs increases during deformation, which is consistent with the crack model by O'Connel and Budiansky (1974). In future, we are going to monitor volume change of pore fluid during deformation, and discuss the amounts of pore fluid to explain the observation of high Vp/Vs in mantle wedge.

Keywords: serpentinite, seismic velocity, pore fluid