Fluid distribution in mantle rocks at high pressure and temperature: constraints from Vs-Vp/Vs diagram

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http://psmac0.ess.sci.osaka-u.ac.jp/matsudalab-j.html

Dehydration process and geometry of H_2O fluid in mantle rocks are investigated from elastic-wave velocity. With increasing temperature, serpentine releases H_2O, and complete dehydration of serpentinite yields an olivine-pyroxene-H_2O system. Velocities in serpentinites were measured as a function of temperature to 900 C at 1 GPa. SEM observations of the run products show that the dehydration of serpentinite is complete and the sample consists of olivine, pyroxene and H_2O. We calculate velocities in olivine, pyroxene and H_2O to 900 C at 1 GPa. By assuming the geometry of H_2O fluid, we compute both P and S velocities in olivine-pyroxene-H_2O system. The calculated velocities are compared with laboratory results, and the amount and geometry of H_2O fluid are discussed.