

Elastic-wave velocities of rock-fluid systems: implications for temperature and fluid distribution in the subduction zone

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

Low velocity zones in the crust and the upper mantle indicate the presence of high temperature and/or fluid. Laboratory seismic studies on crustal and upper mantle rocks show that velocity ratio V_p/V_s is generally low in the presence of H₂O fluid. However, it is high in the case of high temperature and partial melting. We compare P- and S-wave velocity structures with laboratory velocity data, and investigate temperature and fluid distribution in the subduction zone beneath the northeastern Japan arc. Extremely-low velocity regions with low V_p/V_s observed in the upper crust indicate the presence of H₂O fluid. On the other hand, low velocities with high V_p/V_s observed in the upper mantle suggest high temperature and partial melting.

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