Water transport of subducted slab

Shigeaki Ono[1]

[1] IFREE, JAMSTEC

The effect of pressure and temperature on the dihedral angles of aqueous fluid in a pyrope matrix was investigated. Experiments were performed on an H2O-pyrope system in a multianvil apparatus over the pressure and temperature ranges of 4 to 13 GPa and 900 to 1200 degC, respectively. The dihedral angle of the fluid in contact with the pyrope exhibited a significant change at pressures around 8-9 GPa. The dihedral angles increased with increasing pressure up to 9 GPa. At higher pressures above 9 GPa, the dihedral angles were greater than 60 deg at temperatures below 1000 degC. Therefore, the efficient percolation of aqueous fluid in a pyrope matrix is not feasible in the upper mantle and the transition zone. The fluid released from the breakdown reactions of the hydrous minerals lawsonite and phengite exists in the oceanic crust, which mainly consists of garnet in the upper mantle and transition zone. We conclude that a part of the aqueous fluid released from the hydrous minerals may be retained in the subducted oceanic crust, and transferred into the deep mantle by the subduction process.