

Elastic wave velocity and microstructures of Hida gneisses

KOIKE, Kanta^{1*} ; WATANABE, Tohru¹

¹Department of Earth Sciences, University of Toyama

Seismic velocity is one of the most important sources of information about the Earth's interior. For its proper interpretation, we must have a thorough understanding of the dependence of seismic velocity on microstructural elements, including the modal composition, the crystal preferred orientation (CPO), the grain shape, the spatial distribution of mineral phases, etc. For its complexity, the influence of the spatial distribution of mineral phases has been poorly understood. In this study, we focus on a layered structure seen in gneisses. We are studying elastic wave velocities and microstructures in Hida gneisses.

Rock samples of Hida gneisses were collected at Kubusu River (Yatsuo, Toyama Pref.). A rectangular parallelepiped (the edge length~40 mm) was made from rock samples. Two faces are parallel to the foliation plane, and two faces perpendicular to the elongation direction. Preliminary velocity measurements were made at room conditions by the pulse transmission technique using Pb(Zr, Ti)O₃ transducers with the resonant frequency of 2 MHz. One compressional wave velocity and two shear wave velocities were measured in each of three orthogonal directions. Two shear waves propagating in one direction oscillate in mutually orthogonal directions. The fastest compressional wave velocity (5.91 km/s) was observed in the direction parallel to the elongation, while the slowest (5.51 km/s) perpendicular to the foliation. When a shear wave propagated along the foliation plane, it showed slightly higher velocity for oscillating along the foliation than for oscillating perpendicular to the foliation plane.

However, these velocity values cannot be compared with microstructures, because they must be affected by pores in rock samples. We are now conducting velocity measurements under confining pressures of up to 180 MPa to remove the influence of pores. The relationship between velocity under confining pressures and microstructures will be presented in our poster.

Keywords: gneiss, seismic velocity, anisotropy, microstructure, CPO