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Elastic wave velocity and petrofabric of amphibolites and eclogite from the Sanbagawa metamorphic belt

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Hydration and dehydration processes in the oceanic crust materials play important roles in subduction zone processes as water transportation and slab earthquakes. Seismological constraints to constituent materials and their water content in the slab crust should lead to further understanding of subduction zone processes. It is thus essential to understand elastic properties of slab crust materials. We have made velocity measurements and petrofabric observations on amphibolites and an eclogite from the Sanbagawa metamorphic belt, which might have been subducted oceanic crust.

Rock samples are amphibolite schist, garnet amphibolite (Iratsu amphibolite body, Shikoku-chuou, Ehime Pref.), and eclogite (Higashi-Akaishiyama peridotite body, Shikoku-chuou, Ehime Pref.). The density are 3120, 3250, 3460 kg/m3, respectively at room conditions. A rectangular parallelpiped (the edge length ˜ 30 mm) was cut from each rock sample for velocity measurements. Two faces are parallel to the foliation plane, two faces perpendicular to the elongation direction, and the remaining two faces perpendicular to the foliation plane and parallel 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. Arithmetic means of Vp and Vs are 5.70 km/s and 3.60 km/s for amphibolite schist, 3.92 km/s and 2.69 km/s for garnet amphibolite and 5.50 km/s and 3.60 km/s for eclogite. The azimuthal anisotropy of Vp is around 10% for amphibolite schist and eclogite, whereas it is 36% for garnet amphibolite. However, these velocity values cannot be compared with petrofabrics, because they must be affected by pores in rock samples. We are now conducting velocity measurements under the confining pressures of up to 180 MPa to remove the influence of pores. The relationship between velocity under the confining pressure and petrofabrics will be presented in our poster.

Keywords: amphibolite, eclogite, elastic wave velocity, petrofabric