Seismic velocity anisotropy in rocks having the lattice preferred orientation and the crack preferred orientation

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In metamoriphic rocks, foliation is a common structure. Lattice preferred orientation and crack preferred orientation are often accompanied with foliation. When the two types of preferred orientation coexist, seismic velocity anisotropy shows a unique character depending on the anisotropy caused by lattice preferred orientation. When cracks are closing, the effect from the crack preferred orientation becomes weak. The effect from lattice preferred orientation becomes remarkable. Sometimes the crack preferred orientation masks anisotropy caused by lattice preferred orientation. We observed this in biotite schist sampled from the Hidaka metamorphic belt.

The experimental results are well explained by model calculation having two types of anisotropy: the lattice preferred orientation and the crack preferred orientation. We observed that P-wave velocity anisotropy due to the lattice preferred orientation is masked by the crack preferred orientation.