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Twin induced attenuation of seismic anisotropy in lawsonite blueschist

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Lawsonite is an important mineral to understand seismic anisotropy in subducting oceanic crust because of its large elastic anisotropy and prevalence in cold subduction zones. However, there is a lack of knowledge on how lawsonite twinning affects seismic anisotropy despite previous reports showing the existence of twins in lawsonite. We thus investigated the effect of twins in lawsonite on crystal preferred orientation (CPO), fabric strength, and seismic anisotropy of lawsonite using the lawsonite blueschists from Alpine Corsica (France) and Sivrihisar Massif (Turkey). CPOs of minerals were measured by using the electron backscattered diffraction (EBSD) facility attached to scanning electron microscope. The EBSD analyses of lawsonite revealed that {110} twin in lawsonite is developed and [001] axes are strongly aligned subnormal to the foliation and both [100] and [010] axes are aligned subparallel to the foliation. It is found that the existence of twins in lawsonite could induce a large attenuation of seismic anisotropy, especially for the maximum S-wave anisotropy up to 18.4 % in lawsonite and 24.3 % in the whole rocks. Therefore, lawsonite twinning needs to be considered in the interpretation of seismic anisotropy in the subducting oceanic crust in cold subduction zones.