

Anisotropy preservation/alteration in young subducted oceanic mantle

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Knowledge of the rate of plate-spreading at mid ocean ridges is critical for estimating plate motions and the outward flux of heat from the interior of the Earth. Strong seismic anisotropy in the oceanic plates can be demonstrated by observations of azimuthal variations in refracted Pn velocity, Rayleigh wave phase velocity and splitting of teleseismic core phases such as SKS waves. In particular, Pn azimuthal anisotropy up to several per cent in the topmost oceanic mantle is strongly linked to a mantle ophiolite section containing anisotropic dunite and harzburgite. However, it is not clear if the seismic anisotropy is radially homogeneous within the oceanic plate or there are intrinsic layering that are relevant to the formation of oceanic lithosphere. In addition, if such a strong anisotropy can be preserved through subduction and if a relationship between spreading rates and Pn azimuthal anisotropy can be established, it is possible to access paleo spreading rates. Here I will attempt to highlight recent progress on localized seismic anisotropy in the uppermost mantle of subducted plates in several young subduction zones and discuss potential implications on the evolution of oceanic lithosphere.

Keywords: anisotropy, subduction