Anisotropy in the Pacific asthenosphere from inversion of a surface-wave dispersion dataset

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We present a three-dimensional model of the anisotropic velocity structure of the Pacific upper mantle, including lithosphere and asthenosphere. The presence of seismic anisotropy in the oceanic upper mantle provides information about the geometry of flow in the mantle, the nature of the lithosphere-asthenosphere boundary, and the possible presence of partial melt in the asthenosphere. Our dataset consists of fundamental-mode dispersion for Rayleigh and Love waves of 25-250 s with paths crossing the Pacific Ocean. We invert the phase anomaly measurements directly for three-dimensional anisotropic velocity structure. Our models are radially anisotropic and include the full set of elastic parameters that describe azimuthal variations in velocity (e.g. *Gc, Gs*). We find large radial anisotropy with $v_{sh} > v_{sv}$ in the asthenosphere of the central Pacific. There is a distinct contrast in the elastic properties of the asthenosphere between the Pacific and Nazca plates, across the East Pacific Rise. We also investigate lateral variations in azimuthal anisotropy throughout the Pacific asthenosphere and find that there are many locations where the anisotropy fast axis does not align with absolute plate motion, suggesting the presence of small-scale convection or pressure-driven flow beneath the base of the oceanic plate.

Keywords: anisotropy, surface waves, Pacific

