



Global radial anisotropy in the Earth's mantle: new constraints from seismology and geodynamics

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When combined with information from mineral physics and geodynamics, seismic anisotropy is one of the most direct ways to constrain mantle deformation and flow. However, it can be challenging to image it globally due to limited data's sensitivity and difficulties in separating shallow and deep Earth signals. In this presentation we review recent developments in the global seismic imaging and interpretation of radially anisotropic mantle structure. We show that it is highly beneficial to invert simultaneously for mantle and crustal structure using multiple datasets, notably: (i) short-period group velocity data with strong sensitivity to the crust; and, (ii) surface wave overtone measurements sensitive to the transition zone and uppermost lower mantle. Moreover, we show that comparisons between anisotropy tomography and combined micro- and macro-flow geodynamic simulations help constrain the Earth's mineralogy and the patterns of mantle convection. As a case study, we present new results highlighting the ubiquitous presence of anisotropy in the uppermost lower mantle beneath subduction zones. These observations are consistent with 3-D numerical models of deformation from subducting slabs and the associated lattice preferred orientation of bridgmanite produced by a combination of dislocation and diffusion creep mechanisms.