Geophysical Research Abstracts
Vol. 21, EGU2019-11111, 2019
EGU General Assembly 2019

A global Bayesian radially anisotropic mantle model from transdimensional inversion.

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We present the results of a new global Bayesian tomographic inversion for a radial anisotropic shear wave velocity model of the Earth. The development of radial anisotropic shear wave models are useful for understanding mantle dynamics. Our model improves on existing work by providing robust estimates of uncertainties.

A key aspect of this new model is the careful selection of surface wave observations produced by earthquakes from the Harvard CMT catalog. We automatically process a large set of seismic signals recorded for these events by simultaneously inverting Love and Rayleigh waveforms up to the fifth overtone. After initial processing, only events where high quality Love and Rayleigh surface waves are observed are retained for the tomographic inversion. This careful data selection ensures that inference of radial anisotropy is not biased due to variations in spatial coverage of Love and Rayleigh observations.

Our tomographic inversion uses a novel Bayesian Trans-dimensional Tree approach that dynamically adapts the complexity of the solution to increase spatial resolution where observations provide additional constraint. This leads to a robust estimation of both the shear wave model and its uncertainties. Furthermore, we demonstrate how our approach can be extended to a joint inversion to include body shear waves to further constrain radial anisotropy of the Earths mantle.