Geophysical Research Abstracts
Vol. 15, EGU2013-3439, 2013
EGU General Assembly 2013

Intrinsic versus extrinsic seismic anisotropy-The case of the Preliminary Reference Earth Model (PREM)

Nian Wang (1), Jean-Paul Montagner (1), Andreas Fichtner (2), and Yann capdeville (3)

(1) IPGP, Sismology, France (happyxiaoxi114@163.com), (2) Department of Earth Sciences, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, The Netherlands., (3) Laboratoire de Planétologie et de Géodynamique de Nantes, 2 rue de la Houssinière, BP 92208, 44322 Nantes cedex 3, France

Seismic anisotropy is necessary for explaining different kinds of seismic and mineralogical data and provides invaluable information on geodynamics and rheology of the earth. However, its interpretation is difficult and non-unique because the observed anisotropy is due to different mechanisms, and is usually a mixture of intrinsic and extrinsic (artificial) anisotropies at all physical length scales. Anisotropy may result from the lattice or crystallographic preferred orientation (L.P.O., C.P.O.), from shape preferred orientation (S.P.O.) produced by alignment of micro-cracks with and without fluid inclusions, or from fine layering. Here we give a thorough analysis of anisotropy introduced by fine layering, including discussions on the effective elastic constants of a characteristic finely layered isotropic model which is called the periodic, isotropic, two layered (PITL) model, together with the amplitude of the associated radial artificial anisotropy. We also explore the possibility of the PITL model explaining the radial anisotropy in the PREM, and find that the fine layering can explain part of the observed anisotropy in the lithosphere, whereas the anisotropy in the asthenosphere is more relate to the intrinsic anisotropy or partial melting.