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Seismic Anisotropy in the Transition Zone of the mantle

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The transition zone plays a key role in the understanding of mantle convection, particularly the 660km-discontinuity which might inhibit the passage of matter between the upper and the lower mantle. An efficient way for investigating mantle flow circulation is to map seismic anisotropy in this depth range. There are some good evidences of seismic anisotropy in the top 300km of the upper mantle and the bottom D"-layer. *Montagner and Kennett* (G.J.I., 1996) found that radial anisotropy (transverse isotropy with vertical symmetry axis) is also necessary in the mantle transition between 410 and 900km depth for explaining eigenfrequency data. There are also some other evidences of anisotropy by using different kinds of body wave data (P-to-S receiver functions, shear-wave splitting), demonstrating lateral variations of anisotropy in the transition zone. On a global scale, *Trampert and van Heijst* (2002) using overtone data show a long-wavelength azimuthal anisotropic structure in the transition zone. The rms amplitude of their lateral variations is small (about 1%), much smaller than in the uppermost and lowermost mantle.

If we want to obtain a global mapping of seismic anisotropy in the upper (410-660km) and lower (660-900km) transition zones, only overtones of surface waves (higher modes) are able to achieve that. We present some preliminary results of simultaneous inversion of Rayleigh and Love wave overtone data obtained by *Beucler et al.* (2006) and *Visser et al.* (2008). New determinations of seismic anisotropy in the transition zone are obtained from these higher mode phase velocity measurements. We show that seismic anisotropy is small below most of the transition zones except below subduction zones, all around the Pacific Ocean and beneath eastern Eurasia where the slab is stagnant. Since the presence of anisotropy is due to intense deformation of minerals, it is related to boundary layers and to flow circulation in convective systems. Therefore, the transition zone seems to be a secondary boundary layer within the mantle.