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Global mapping of Lithosphere Asthenosphere Boundary from surface wave tomography

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The coupling between rigid lithosphere and the weaker underlying asthenosphere is a key point of Plate Tectonics and Mantle dynamics. The characterization of the properties of the Lithosphere/Asthenosphere Boundary (LAB) is essential for understanding the Upper Mantle. Recent studies, using receiver functions for example, provide local constraints. In this study a global view by surface wave tomography is given. A large amount of data from different groups (Harvard, Boulder, Utrecht, Paris) has been collected. There are more than 100,000 phase and group velocicties measurements on the fundamental mode of Rayleigh and Love waves. This global scale dataset in the period range 15s-200s, enables us to investigate the LAB with an approximative lateral resolution of 500km. The regionalization of the path-averaged velocities is performed to extract isotropic and azimuthally anisotropic terms of local velocities. First we derive our own crustal model (taking account of topography-bathymetry, sediments and crustal thickness) by a MonteCarlo inversion with the shorter periods of the data. Second, to provide a first estimation the LAB properties and obtain a global map, we choose a very simple parameter space ajusted with the larger periods of the data. The larger periods of phase velocities have been inverted to obtain a tomographic model including isotropic Sv velocity, radial anisotropy and azimuthal anisotropy. Different proxies for LAB are tested from this model such as the strongest negative Sv velocity gradient. LAB determination seems consistent in oceanic regions in both analyses, presenting a good correlation with ocean floor age. While the shallower estimated depths beneath continents are very far from those obtained by inversion at depth and heat flux studies. A more complex parametrization is necessary for continental parts.