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Upper Mantle Anisotropy: Correlation Between SKS Measurements and Surface Wave Tomography

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To better constrain the source of the anisotropy in the upper mantle, we compare a global compilation of shear-wave splitting measurements with anisotropic parameters inferred from surface wave tomography. While surface waves have good vertical resolution, their lateral resolution is rather poor. Alternatively, SKS waves have good lateral but poor vertical resolution. The currently available SKS splitting dataset is taken from a comprehensive collection of available publications that is available at http://www.gm.univ-montp2.fr/splitting/. The comparison between the two types of data is made by calculating predicted splitting parameters from the anisotropic tomography model, and averaging observed splitting measurements laterally. Comparing these predicted splitting parameters with the observed ones, we observe a clear correlation between the two datasets at global scale. This result is noteworthy, since such correlation did not seem to exist in previous studies. Mineral physics in fact suggests that anisotropy is strongest in the upper mantle, a depth region to which both types of constraints are sensitive. Both techniques thus record the same anisotropy, however 'averaged' either laterally and vertically. The correlation also confirms the generally good quality of the shear-wave measurements, as well as that of the anisotropic tomography model.