EGU22-12169
https://doi.org/10.5194/egusphere-egu22-12169
EGU General Assembly 2022

Surface wave detectability of transition zone anisotropy induced by non-Newtonian mantle flow

John Keith Magali, Sébastien Merkel, and Estelle Ledoux
Univ. Lille, CNRS, INRA, ENSCL, UMR 8207 - UMET - Unité Matériaux et Transformations, 59000 Lille, France

Large-scale anisotropy inferred from long-period seismic tomography mainly results from the crystallographic preferred orientation (CPO) of olivine aggregates due to mantle deformation. In the 410-km transition zone, the inclusion of wadsleyite CPO diminishes the overall anisotropy. This may predispose the latter below the seismic detection limit. In this study, we attempt to assess the detectability of the anisotropy in the 410-km transition zone using surface wave dispersion measurements. Proceeding as a purely-forward approach, we consider non-Newtonian mantle flows reminiscent to the deformation by dislocation creep of olivine. A wadsleyite layer is imposed underneath the discontinuity down to a depth of 520 km. We model the CPO development in olivine and in wadsleyite using a visco-plastic self-consistent (VPSC) approach. Finally, we compute local surface wave dispersion curves and its azimuthal variations to study the surface imprint of transition zone anisotropy. We anticipate the sensitivity kernels to as well provide key insights in evaluating its detectability.