Geophysical Research Abstracts
Vol. 16, EGU2014-1547-1, 2014
EGU General Assembly 2014

Evidence of absence of PP precursors

Stephan Lessing (1), Christine Thomas (1), Morvarid Saki (1), Nicholas C. Schmerr (2), and Elizabeth Vanacore (3)

(1) University of Münster, Institute of Geophysics, Münster, Germany, (2) University of Maryland College Park, Department of Geology, College Park, MD, USA, (3) The University of Leeds, School of Earth and Environment, Institute of Geophysics and Tectonics, Leeds, United Kingdom

PP and SS underside reflections off upper mantle discontinuities are frequently used to map discontinuity topography, impedance contrasts and interpret these with respect to thermal and/or mineralogical variations. While the seismic discontinuities at 410 km and 660 km depth should be a global feature, several events show no evidence for the precursors and many events show smaller amplitudes for observed precursors. We investigate several possible causes that could be responsible for these apparently absent precursors. Source and attenuation effects are unlikely candidates, there is also little evidence for deviations off the theoretical travel path. Factors that have stronger influence are the stacking procedures in the presence of large, interfering phases, topography on the discontinuities and the velocity and density changes with depth across the transition zone. We can fit the observed small precursor amplitudes better with a model using a pyrolite composition since it produces a wide minimum in the reflection coefficients compared with other Earth models and therefore reduces amplitudes of the PP and SS precursors. To suppress the precursors entirely for some events, some of the other effects, such as topography and processing, are necessary in addition to the changed velocity model.