

# AGU FALL MEETING

San Francisco | 14 – 18 December 2015

## DI11C-2622: The effect of topography of upper mantle discontinuities on SS precursors

ABSTRACT



**Monday, 14 December 2015**

**08:00 - 12:20**

*Moscone South - Poster Hall*

We assessed the reliability of methods used to infer the topography of the mantle transition zone discontinuities. In particular, using the spectral-element method, we explored the effect of topography of the '410' and '660' mantle discontinuities on the travel times of SS precursors recorded on transverse component seismograms.

The latter are routinely used to infer the topography of mantle transition zone discontinuities.

The step from precursory

travel times to topographic changes is mainly done using linearised ray theory, or sometimes using finite frequency kernels.

We simulated exact seismograms in 1-D and 3-D elastic models of the mantle. In a second simulation, we added topography to the discontinuities.

We compared the waveforms obtained with and without topography by cross-correlation of the SS precursors. Since we did not add noise, the precursors are visible in individual seismograms without the need of stacking. The resulting

time anomalies were then converted into topographic variations and compared to the original models of topography.

We found that linearised ray theory gives a relatively good idea on the location of the uplifts and depressions of the discontinuities,

provided that the ray coverage is good, although it seriously underestimates the amplitude of the topography.

The amplitude of the topographic variation is underestimated in average by a factor of 2.8 for the '660' and of 4.5 for the '410'.

Additionally, we found a strong non-linearity in the measured data which cannot be modelled without a fully non-linear inversion for elastic structure and discontinuities simultaneously.

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