

Assessment of tomographic models' predictions of regional S and surface waveforms

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Regional tomographic models of North America have imaged various mantle and lithospheric structures in the continent's stable interior. It is well-known that the resolving power of these models was limited due to the scarcity of stations in the central and eastern US. The passage of EarthScope's Transportable Array into this region, combined with the occurrence of several $M > 5$ earthquakes within stable North America, provides an opportunity to assess the ability of tomographic models to predict regional S and surface waveforms.

We test the predictive power of a handful of 3D tomographic models by comparing synthetic vertical-component S and surface waveforms to data recorded by Transportable Array and SPREE Flexible Array stations. Synthetic seismograms are generated by calculating the path-averaged velocity between each earthquake and station through the 3D model of interest and summing modes. Earthquakes used in our analyses include moderate-sized events in Colorado (M5.3), Virginia (M5.7), and Oklahoma (M5.7). We calculate the phase misfit between observed and synthetic seismograms using the time-frequency misfit methods of *Kristekova et al. (2009)*. Phase misfits are plotted on maps to demonstrate spatial variations in fit quality for various combinations of events, earth models, and portions of the wavetrain.

Education and outreach efforts related to this work include radio and video interviews given by SPREE team members to various media outlets; SPREE station hosts also receive newsletters explaining the project's scientific motivation and new results. SPREE also has Facebook (www.facebook.com/superiorrifting) and Twitter (@seismospredom) pages.

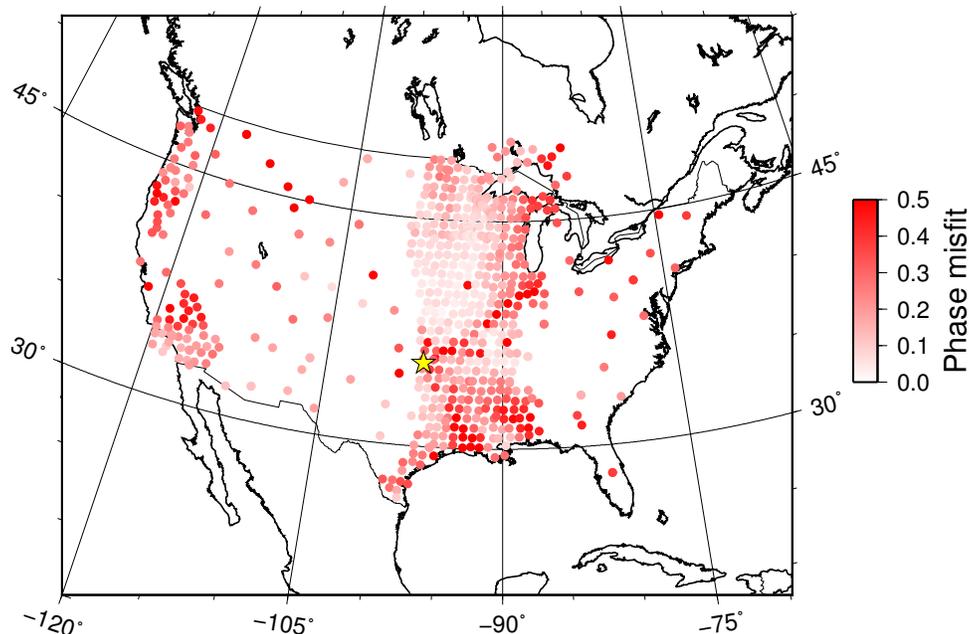


Figure 1: Phase misfits for the November 6, 2011 M5.7 Oklahoma earthquake. Synthetic seismograms were calculated using the 1D average from the NA07 tomographic model (*Bede and van der Lee, 2009*). Lighter colors (smaller phase misfit values) indicate a better fit to the observed data.

References:

- Bede, H., and S. van der Lee (2009), S velocity variations beneath North America, *Journal of Geophysical Research: Solid Earth*, 114(B7), doi: 10.1029/2008JB005949.
- Kristekova, M., J. Kristek, and P. Moczo (2009), Time-frequency misfit and goodness-of-fit criteria for quantitative comparison of time signals, *Geophysical Journal International*, 178(2), 813–825, doi: 10.1111/j.1365-246X.2009.04177.x.