Upper mantle structure beneath Antarctica from full-waveform inversion constrained by long-period ambient seismic noise

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Lateral heterogeneity in the upper mantle beneath Antarctica has important implications to understanding the response of the Earth to changes in ice mass loss and estimates of geothermal heat flow. As seismic coverage and employed methodologies improve, lateral variations have been found in regions that were once assumed to be relatively uniform. Here we present the results from a full-wave inversion constrained by long-period (40-340 s) empirical Green's functions (EGFs) extracted by using a frequency-time normalization approach and cross-correlating several decades worth of ambient seismic noise. Using the computational resources at the Alabama Supercomputing Authority, we simulate waveforms within a spherical, finite-difference grid. Phase delays are then measured by cross-correlating the EGFs and synthetic waveforms, sensitivity kernels are constructed using the scattering integral method, and the model is iteratively inverted to obtain a refined upper mantle structure. Preliminary results from our continental-scale model not only emphasize lateral variations in West Antarctica that have been observed in some previous models but also highlight distinct mantle anomalies beneath East Antarctica, many of which were previously unresolved. We will present our final model for the whole of Antarctica, illustrating how mantle heterogeneities are associated with different tectonic terranes, providing further constraints for heat flow and ice-sheet modeling.