



**NSF Award Abstract -
#9814565**

**An Analysis of Upper Mantle Heterogeneity and
Anisotropy in Western North America Using
Recordings Broadband Permanent and
Temporary (PASSCAL) Seismic Stations**

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Abstract

9814565 Gaherty This research involves the determination of seismic heterogeneity and anisotropy in the upper mantle beneath North America using two complementary analyses of surface and body waves recorded at broadband stations across the continent. Data will be retrieved from the Global Seismic Network (GSN), the U.S. National Seismic Network (USNSN), and numerous temporary deployments of the high-capability PASSCAL seismometers. Two new analysis techniques will be applied to explore the nature of seismic anisotropy and its relationship to the tectonic behavior and evolution of the continent. The first technique involves multi-station differential phase-delay analysis applied to fundamental and higher-mode surface waves, both Love and Rayleigh waves, propagating across the array at various azimuths. The data will be inverted for a three-dimensional model of azimuthal anisotropy, with length scales spanning roughly a few 100 km to a few 1000 km. The second technique involves measuring S-wave splitting time separations throughout the region. Depth sensitivity is achieved through the use of a variety of body- and surface-wave phases. Application of these techniques to shear wave propagation across North America will illuminate the basic geodynamic processes giving rise to seismic anisotropy in the upper mantle.

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