

# Along Strike Variations of Episodic Tremor and Slip in the Cascadia Subduction Zone

Gina Schmalzle

Variations in episodic tremor and slow slip (ETS) along the Cascadia subduction zone margin are investigated using 6 years of continuous GPS position time-series. The goal of this project is to explore relationships between slow slip events (SSEs) and other features of the subduction system. An elastic half-space model is used to simultaneously invert continuous horizontal time-series observations at 378 GPS sites from January 1, 2005 through January 1, 2011 for inter-event megathrust plate locking, two earthquakes, fourteen SSEs and rotations of 27 crustal blocks. To our knowledge, this is the first synoptic model of the Cascadia subduction zone that encompasses inter-plate locking, periodic SSEs and earthquakes for the entire margin, including California north of the Mendocino Triple Junction. Surface displacements due to slow slip are largest in Washington at the latitude of Puget Sound and to the south near Cape Mendocino, CA and are smallest in central and southern Oregon during this study period (Figure 1). We compare the Cascadia-wide distribution of estimated slow-slip rates with long term, megathrust plate locking and the distribution of regional crustal terranes.

Figure 1. GPS displacements per year due to SSEs. Figure A. Map of SSE displacement rate vectors (summed displacements due to all SSEs divided by 6 years). Figures B and C. Magnitude and azimuth, respectively, of SSE displacement rate vectors as a function of latitude. Colors represent depth of subduction interface beneath the geodetic monument.

