Slow Slip Events On The Cascadia Subduction Zone

David Schmidt
Dept. Geological Sciences
University of Oregon

Presentation Overview

- Introduction to slow slip events in Cascadia
- Slip distribution of Jan 2007 event
- Comparison of the past 4 events
Intro to slow slip events
Intro to slow slip events

Interseismic motion

Slow slip event

Interseismic motion

Graphic: Geological Survey of Canada
Slow Slip in Cascadia: Key Observations

- Total duration ~10 days
- Limited to depths of 30-40 km.
- Maximum slip ~4 cm.
- 14 month recurrence interval.
- Associated with tremor.

GPS and Strainmeter Instruments in the PNW

Graphic: Geological Survey of Canada
Methodology

- GPS time series from PBO data products.
- Geometry of plate interface defined by McCrory et al. (2004).
- Invert for transient slip using the Extended Network Inversion Filter (Segall and Matthews, 1997; McGuire and Segall, 2003).

\[ d(\vec{x}, t) = \sum G(\vec{x})s(\vec{x}, t) + L(\vec{x}, t) + \epsilon_d \]

- Observed GPS time series
- Tectonic motion
- Benchmark motion
- White noise

2007 Slow Slip Event

- Estimated slip (cm)
- Time (days)

<table>
<thead>
<tr>
<th>Location</th>
<th>East (mm)</th>
<th>Time (days)</th>
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<tbody>
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2007 Slow Slip Event

Comparison of Recent Slow Slip Events

|------------|------------|------------|------------|

estimated slip (cm)
Summary

2007 Slow Slip Event
- Nucleation point centered beneath Puget Sound.
- Northward propagation resolved by GPS data.
- 4 cm peak amplitude, $M_w \approx 6.8$.

Comparison of Recent Events
- Strain release is fairly continuous along strike.
- Events tend to rupture in distinct patches.
- Slip and tremor remain correlated.