



SSA 2010 Annual Meeting Abstract

Session: [Characterizing the Next Cascadia Earthquake and Tsunami](#)

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Presentation Type: Oral

Presenter: Goldfinger, Chris

SEGMENTATION AND PROBABILITIES FOR CASCADIA GREAT EARTHQUAKES BASED ON ONSHORE AND OFFSHORE PALEOSEISMIC DATA

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Analysis of offshore and onshore paleoseismic data suggest at least four seismic segments operating in the Holocene on the Cascadia margin. Along the northern margin, we find a consistent earthquake recurrence averaging ~ 500-530 years. The central Oregon to northern California margin comprises at least three segments that include all of the northern ruptures and ~ 22 smaller events of restricted latitude range that are correlated between multiple sites. At least two northern California sites probably also record numerous small sedimentologically or storm triggered turbidites during the early Holocene. The four segments include 19 full or nearly full -length ruptures; 1 or 2 ruptures comprising the southern 50-70% of the margin, and 20 smaller southern margin ruptures in two smaller segments during the Holocene. The shorter extents and thinner turbidites of the southern margin correspond well with timing and spatial extents interpreted from the onshore paleoseismic record. 41 events define a Holocene recurrence for the southern Cascadia margin of ~240 years. Time-independent probabilities for segmented ruptures range from 7-9% in the next 50 years for full margin ruptures, to ~18% in 50 years for a southern segment rupture. Time dependent failure analysis suggests the probability of an event by 2060 of ~25% for the northern margin and ~80% for the southern margin. The long paleoseismic record also indicates a pattern of clustered earthquakes that includes 4-5 cycles that are more robust in the later Holocene. Probabilities would markedly change for the northern margin if the event were a significant gap or cluster in a clustered model. Probabilities change little for the southern margin where no temporal clustering is apparent. The next Cascadia event is most likely to be a segmented rupture along one or both of the southern segments.

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