



SSA 2010 Annual Meeting Abstract

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

Schedule: Wed 21 Apr – 11:30 AM

Location: Salon F

Presentation Type: Oral

Presenter: Wong, Ivan

AN ANALYSIS OF TEMPORAL CLUSTERING OF CASCADIA SUBDUCTION ZONE EARTHQUAKES AND ITS IMPLICATIONS TO SEISMIC HAZARD

WONG, I., URS Corporation, Oakland, CA USA, [ivan_wong \[AT\] urscorp \[DOT\] com](mailto:ivan_wong@urscorp.com) ; KULKARNI, R., URS Corporation, Oakland, CA USA, ; ZACHARIASEN, J., URS Corporation, Oakland, CA USA, ; DOBER, M., URS Corporation, Oakland, CA USA, ; GOLDFINGER, C., OSU, Oceanic and Atmospheric Sci, Corvallis, OR USA, ; LAWRENCE, M., British Columbia Hydro & Power, Burnaby, BC CAN,

Several investigators have suggested that full-length ruptures along the Cascadia subduction zone exhibit temporal clustering. Goldfinger et al. (in press) observes a repeating pattern of clustered earthquakes that may be interpreted as 4-5 Holocene cycles of 2-5 earthquakes each separated by unusually long intervals in the turbidite record. We performed statistical analyses on the turbidite event record to test the temporal clustering model, calculate time-dependent recurrence intervals, and evaluate its implications to hazard. Assuming the turbidite record reflects a complete record of full rupture $M \sim 9$ megathrust events, we used a Monte Carlo simulation to determine if the turbidite recurrence intervals follow an exponential distribution consistent with a Poisson (memoryless) process. The Poisson hypothesis was rejected at a statistical significance level of 0.05. We performed a cluster analysis on 20 randomly simulated catalogs of 18 events, using ages with uncertainties from the turbidite dataset, to assess whether the events occur in clusters. Results indicate 13 catalogs exhibit statistically significant clustering behavior, yielding a probability of clustering of 13/20 or 0.65. Most (70%) of the 20 catalogs contain 2 or 3 closed clusters and the current cluster T1-T5 appears consistently in all catalogs. The appearance of older clusters varied among the catalogs, likely due to larger uncertainties in their ages. The consistent occurrence of the same recent clusters suggests that clustering of recent events is stable despite the uncertainty in ages. Analysis of the 13 catalogs that manifest clustering indicates the probability that at least one more event will occur in the current cluster is 0.82. Last, we calculated time-dependent equivalent recurrence intervals; the median intracluster interval was 260 yrs, and the intercluster interval was 1759 yrs.

This abstract appears in *Seismological Research Letters* Volume 81, No. 2 on page 290.

[\[Back\]](#)

Posted: 18 February 2010