CASCADIA GREAT EARTHQUAKE CHRONOLOGY BASED ON THE TURBIDITE EVENT RECORD

GOLDFINGER, Chris, Oregon State Univ, 104 Oceanography Admin Bldg, Corvallis, OR 97331-8563, gold@oce.orst.edu, NELSON, C. H., Department of Oceanography, Texas A&M Univ, 3146 TAMU, College Station, TX 77843-3146, and JOHNSON, Joel E., Oregon State Univ, 104 Ocean Admin Bldg, Corvallis, OR 97331

The turbidite record from numerous channels along the Cascadia margin reveals a Holocene record of events that we attribute to great earthquakes and show were synchronous for a ~600 km length of the Oregon and Washington margins. In this segment, 13 events have occurred following the Mazama eruption at 7627± 150 cal. yr BP. The average recurrence interval, given the known age of the last event at AD 1700, is ~600 years. We find 18 events younger than a 12,700 cal. yr BP "Holocene" datum defined by radiolarian and foram biostratigraphy and sedimentary characteristics, yielding an average Holocene repeat time of ~690 years. The remarkable correlation of these events over time and space makes great earthquakes the most likely trigger for these events. While other triggering events may be responsible for individual events in any given canyon system, such widespread correlation and similarity of the records through time effectively eliminates other triggers. The cores from the northernmost Vancouver Island margin have 15 Holocene events, with no events younger than ~3500 years. Given the onshore paleoseismic evidence for the AD 1700 event on the adjacent coast, we suspect that these cores are biased. Investigation of multibeam bathymetric data suggest that Barkley Canyon has recently been blocked by growth of a landward vergent thrust fault that could be responsible for the cutoff of Holocene turbidites to the abyssal plain. We have dated all Holocene events in three key cores from Juan de Fuca, Cascadia, and Rogue channels, and are now establishing the recurrence statistics and onshore correlations for these events. The southernmost segment, between 40°N and 42°N may or may not have ruptured synchronously with the rest of the margin. Cores from the Smith, and Klamath systems most likely also contain 18 Holocene events, while Eel channel records 51 events. The high-frequency of events in the Eel channel most likely records a mixture of storm and seismic events, as the Eel discharge is not buffered by slope basins as are most of the other Cascadia channels. The low-resolution of the "Holocene" datum and lack of ash stratigraphy in this region presently add to the difficulty of resolving this issue. Cores adjacent to the northern San Andreas fault contain turbidites triggered by M~8 events, implying that the Cascadia record is probably nearly complete at the M=8 level.

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