

**1999 Fall Meeting****Search Results:**

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HR: 11:20h

AN: T41E-11

TI: [Holocene Recurrence of Cascadia Great Earthquakes based on the Turbidite Event Record](#)

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AB: Submarine paleoseismology has the potential to address long-term history of subduction earthquakes in Cascadia and elsewhere using precise dating of earthquake-generated turbidites. In Summer 1999, we collected 50 piston and box cores from all major and some minor canyon/channel systems draining the Cascadia continental slope from Vancouver Island to Cape Mendocino. These included (from the north) Barclay, Juan de Fuca, Willapa, Grays, Astoria, Rogue, Smith, Klamath, Trinidad, Eel and Mendocino canyon/channel systems. We carefully sampled channel systems using SeaBeam swath bathymetry and sidescan sonar to place the core stations. Analysis of these data proved essential to successfully capturing the event record, while avoiding difficulties such as channel gravel and erosive effects that can complicate and bias the record. We employed the OSU coring gear, a 4" diameter piston corer, to maximize sample quantity and depth of penetration. Preliminary results indicate that for the Vancouver Island, Washington, and Oregon margins, 12-13 major turbidite events took place subsequent to the deposition of Mazama ash at 7500 yrs bp. The similarity in number of events in these canyon/channel systems is remarkable, and precludes virtually all non-earthquake triggers, since we can think of no other plate-wide events that could cause such similar records in time and space. This result substantiates Adams (1990) who made similar inferences from existing core data. We found that Astoria channel also had 12 post-Mazama turbidites, while previous evidence for the presence of these events for the Oregon margin was weak. Thus for the northern 2/3 of the Cascadia margin, large magnitude earthquakes occurring every  $\sim$  655 years is the best explanation for the turbidite record. The regularity of this record throughout the Holocene strongly suggests a characteristic earthquake model for most of Cascadia at least with respect to the largest turbidite-generating events. For the northern California margin, the record is more complex. The record is dominated by a southward increase in the number of Holocene events from 25 in Trinidad Canyon, to 50 in Eel channel, and probably more than 50 in Mendocino channel, though we could not sample the entire Holocene there. The

northern California segment has several more potential seismic triggers, including Gorda interior, Mendocino Fault, and possibly San Andreas events. Accretionary wedge events play an unknown role, but apparently have little effect along the rest of the margin. Assuming these events are also seismically triggered (an assumption under consideration), the northern California segment of the Cascadia margin may be operating independently of the rest of the margin, or it may be synchronous, with the additional events representing a mix of other sources. Further analysis of the data may help distinguish between these models. We plan to AMS radiocarbon date many of the events from these cores to establish timing of individual events through the Holocene, and also to test synchronicity between northern and southern segments.

DE: 3040 Plate tectonics (8150, 8155, 8157, 8158)

DE: 7221 Paleoseismology

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