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Turbidite Paleoseismology: Site Selection, Physiography, Sediment Supply, Current Dynamics and Temporal Considerations as Applied in Cascadia and Elsewhere ()

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Turbidite paleoseismology requires careful consideration of site context, temporal interval of interest, sediment supply, and the flow dynamics before interpretations can be drawn. These factors are predicated on precise navigation so that the context of the core within modern bathymetric, sub-bottom, sidescan, and backscatter data are known. In Cascadia, numerous channel systems exist and cover a range of time intervals since the Early Pleistocene. During high stands, many of these systems are relict, with limited terrigenous sediment supply. Holocene paleoseismic records may depend on recycled materials from failure of local slopes to supply channels, slope basins, or fans. Local failures may serve to supply sediment at any point along a canyon system under expected shaking levels of ~ 1.0 g with or without recent sediment recharge. Recharge by active terrigenous sedimentation is apparently not required in Cascadia or Sumatra, where site locations, without this recharge possibility have excellent records correlable to other paleoseismic sites. By comparison to Pleistocene fan-building currents, Holocene currents are weak, rendering most areas of fan systems inactive. Core and backscatter data show the Astoria and Nitinat Fans have little

Holocene activity outside the main channels. Pleistocene channels are crosscut by active Holocene incisions and levees, restricting their role as depocenters. In the main channels, the most recent currents are largely confined closely within their levees. Recent proposals for alternate Holocene pathways in Cascadia attempt to integrate data from inactive fans, pose implausible pathways over the top of the growing accretionary wedge, or use other inactive channels. Resolution of observations is also critical and simple visual core logging is inadequate when compared to modern CT data. Thus for Holocene paleoseismology, cores must be collected from within main channels or near enough to local slopes (1-2 km) to receive unchannelized sediment flows. High resolution core, site, and regional geophysical data are required. This appears to hold true for both Sumatra and Cascadia. The outcome of paleoseismic investigations depends critically on these considerations, and collecting numerous cores to test these sensitivities is highly desirable.

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