Physical Property Correlations from Cascadia Great Earthquakes: What Are They Telling Us About The Triggering Events?

Details

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Abstract

We have found that it is possible to correlate the physical property signatures of probable earthquake-generated turbidites from locale to locale down individual channels. This indicates that the details of the turbid flow that are relevant to deposition of the turbidite, apparently maintain their integrity for long distances within channels. This in itself is somewhat surprising, but we have been able to correlate event signatures not only down individual channels, but between channel systems, some of which never meet. We see a general correspondence of turbidite size that is reflected in these separate channels, as well as correlatable details such as the number of coarse pulses (density and magnetic peaks). For example, Cascadia events T5, T10, and T12 are small events in all cores at all sites. T6, T8 and T16 are large triplet events in all cores, and most other events follow similar size patterns across the margin. We observe similar patterns in our SAF cores thus far. This suggests that there may be some fundamental relative size relationship to the underlying earthquakes, or alternatively perhaps to sediment supply events such as major storms or volcanic eruptions. The correlation we see between events also suggests that there may be some persistent signature of individual events that is recorded in the cores. Why should this be the case? One might expect that such correlation could be due to details of how the turbid flow initiated in the canyon's upper reaches. An earthquake, unlike other triggers for submarine landslides, is likely to trigger multiple failures within a canyon. Thus the turbid flow should contain multiple inputs, each perhaps containing a coarse fraction pulse,

which coalesce down-channel. In fact we do see this effect in some cores, however we commonly see correlation between channels that never meet, where persistent multiple input signature cannot be the cause. We suggest that the only plausible commonality in such cases is the original earthquake itself, in effect they the signatures may be crude paleoseismograms.

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