INTEGRATING ONSHORE AND OFFSHORE PALEOSEISMIC DATA: A BAYESIAN MODEL

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Long and detailed paleoseismic records afford uncommon opportunities to examine recurrence models, clustering, segmentation, interaction with other faults, long term strain history and paleo slip characteristics. With the dearth of historical information, Cascadia has become the incubator of coastal and marine paleoseismic techniques. Building on the coastal marsh records, A 10,000 year onshore-offshore record in Cascadia extended in time using deep water turbidite paleoseismic methods and most recently lacustrine records is yielding new insights into Cascadia seismic behavior. New independent studies using turbidite stratigraphy along the northern (Canadian) margin have recently corroborated our work further south. Similarly, a 16,000 year marine record at the Hikurangi subduction zone also complements a developing onshore and lacustrine record. Sub-aqueous paleoseismology requires inputs from a number of sub-disciplines merged to develop a time and space stratigraphic model. The model then is used to test for origin of the events using both sedimentologic arguments and regional correlation strategies, with consideration of pathways and turbid flow dynamics. We have now incorporated the model into a Bayesian framework to help quantify and evaluate alternatives. The Bayes net is capable of combining a wide variety of information and estimated or calculated uncertainties into an overall assessment of the probability of a given bed being of seismogenic origin using 19 criteria. Probabilities for events that are likely full or near full margin events range from ~ **73-94%,** while thinner beds observed primarily in the south have probabilities in the **48-84%** range, controlled mostly by reduced strike length and less robust correlation. Some recent alternative interpretations rank poorly due to direct contradiction of the data, absence of evidence, and in some cases un-physical pathways. Additional core and subbottom data have clarified the event sequence in southern Cascadia, and new lacustrine data initially appear to be consistent with coastal and offshore data in Washington. New core and analytic data support both the confluence test and a pattern of decreasing recurrence time in at least four segments; from ~ 500-530 years in the north, to ~ 240 years or less in the south.