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Thesis Abstract

Thesis title : Optical Dating of Tsunami Deposits.
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Abstract:
A tsunami generated by a Cascadia subduction zone eathquake deposited sands in marshes on Vancouver Island and the coast of Washington 300 years ago. Similar deposits were left in marshes on Vancouver Island by the tsunami produced by the 1964 Alaska earthquake. Samples of one or more of these and other sand layers were collected from marshes on Vancouver Island at Fair Harbour, Koprino Harbour, Neroutsos Inlet and Zeballos, and at the Niawiakum River in Washington State. At some sites samples of material considered to be analogous to the source material for the sand layers were also collected.
A new luminescence detection chamber was construted for the measurement of these young samples and an improvement in detection efficiency over 4 times that of the old chamber was attained.
The two samples collected from Koprino Harbour yielded optical ages of 60±20 years and 270±50 years, consistent with the known ages of 32 and 300 years respectively. The remaining samples all yielded ages considerably older than the independent age estimates. Optical ages for the 300-year-old sands at the remaining sites were: 920±170 years at Fair Harbour, 2100±500 years at Neroutsos Inlet and 540±90 years at the Niawiakum River. The purported 300-years-old tsunami layer at Zeballos yielded an optical age of 11,700±700 years. At Fair Harbour, a sand layer that was probably deposited by a flood less than 500 years ago yielded an optical age of 5300±700 years. Samples of modern tidal-channel sediments at Fair Harbour and Koprino Harbour yielded near-zero equivalent doses. A non-zero equivalent dose was obtained for modern river bottom sediment at the Niawiakum River.
These and previous results indicate that some of the sands received poor exposure ot sunlight prior to burial whereas others were sufficently exposed . The discrepancy is probably due to the differing depth of tsunami scour of the source sediments at different sites. A correlation is also suggested between sites at which anomalously old ages were obtained and the extent of the mud flats fringing the marsh.