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Coastal Hazards in the Sedimentary Record: the Search for Tsunamis and Megafloods of California's Past

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The highly developed and densely populated coast of Southern California is at risk for many hazards including wildfires, earthquakes, tsunami impacts, and storm inundation of low-lying areas. Identifying evidence of historical hazards in the coastal sedimentary record would help constrain the frequencies and magnitudes of these events. Carpinteria Marsh, a tectonically active estuary located along the Santa Barbara Channel, has accumulated over 13 m of sediment since 7 ka. These sediments provide a new, expanded record of coastal environmental changes through the middle to late Holocene. Over 20 sediment cores taken since 2012 contain an anomalous sand layer (Sand Facies 1), in the top meter of otherwise muddy sediment in Carpinteria Marsh, which exhibits grain size, mineralogical, and other sedimentary characteristics associated with a high-energy marine inundation event. Here we use a multi-proxy chronological approach, including exotic pollen markers and spheroidal carbon particle stratigraphies, to test the hypothesis that this sand layer was deposited during one of the two most significant inundation events historically recorded in the Santa Barbara region: the tsunami of 1812 (Toppozada, 1981) or the "Great Storm" of 1861-62 (Engstrom, 1996). We also examine the longer sedimentary record for evidence of past coastal hazards including subsidence, floods, and tsunamis.