

1,500-yr record of paleotsunamis impacting Ahuriri Lagoon (Hawke's Bay), New Zealand

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Presentation Description:

Identifying geologic evidence of past tsunamis helps to forecast the timing, magnitude, and intensity of future earthquakes and tsunamis. This study presents a novel approach using a combination of geological evidence and statistical analyses to help New Zealand coastlines facing the Hikurangi Subduction Zone prepare for impending seismic hazard.

Abstract:

Tsunamis pose great hazards to many of the world's coastlines such as the Cascadia Subduction Zone located offshore Vancouver Island. Subduction zones are responsible for devastating earthquakes and tsunamis such as the 2004 Indian Ocean and 2011 Tohoku events. Historical records of tsunamis along the Hikurangi Subduction Margin (offshore New Zealand) date back to 1855 while indigenous knowledge points to older events for which there are no dates. The sparsity of historical records in New Zealand restricts our understanding of earthquakes and tsunamis over longer timescales. Using the geologic record, this study expands the history of past tsunamis over a 1,500-year interval, filling a significant knowledge gap in our understanding of seismic hazards along the Hikurangi Subduction Margin. My field site in Ahuriri Lagoon experienced a 7.6 magnitude earthquake in 1931 that devastated the city and caused the lagoon to become uplifted above the ground. In this study, two sediment cores were obtained from the uplifted lagoon and were investigated for high resolution grain size and geochronological information. The stratigraphy of the cores displays three distinct shell units that are interpreted to be tsunami deposits because of the abundance of allochthonous marine molluscs. Grain size data generated by this study provides supporting evidence for tsunami inundation while radiocarbon dating provides a recurrence interval of approximately 500 years for large tsunamis.