The Importance Of Sea-level Research

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200 million people worldwide live in coastal regions less than 5 meters above sea level. By the end of the 21st century, this figure is estimated to increase to 500 million. These low-lying coastal regions are vulnerable to changes in sea level brought about by climate change, storms or earthquakes. But the historic and instrumental record is too short to fully understand the climate relationships and capture the occurrence of the rare, but most destructive events. The coastal sedimentary record provides a long-term and robust paleo perspective on the rates, magnitudes and spatial variability of sea-level rise and the frequency (recurrence interval) and magnitude of destructive events.

Reconstructions of paleo sea level are important for identifying the meltwater contributions, constraining parameters in Earth-Ice models, and estimating past and present rates of spatially variable sea-level change associated glacial isostatic adjustment, sediment compaction and tidal range variability. Sea-level reconstructions capture multiple phases of climate and sea-level behavior for model calibration and provide a pre-anthropogenic background against which to compare recent trends. Pre-historic earthquakes (Mw>8.0) are often associated with abrupt and cyclical patterns of vertical land-motion that are manifest in coastal sedimentary archives as abrupt changes in relative sea level. Geologic evidence of paleoearthquakes elucidates characteristic and repeated pattern of land-level movements associated with the earthquake-deformation cycle. Tsunamis and storms leave behind anomalous and characteristic sediment that is incorporated into the coastal sedimentary record often as evidence of a high-energy event affecting a low-energy, depositional environment. Records of tsunamis developed from the sedimentary deposits they leave behind improve understanding of tsunami processes and frequency by expanding the age range of events available for study. Reconstructions of paleo storms may reveal spatial and temporal variability of tropical cyclone activity and provided insight into their relationship with global climatic changes.