



Late Holocene Palaeotsunami Events Archived along the Gujarat Coast, Western India

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Gujarat state is situated in the western most part of India and has the longest coastline of 1600 km facing the Arabian Sea. Historically the coastline has been affected by tsunami waves with the latest one being the 1945 Makran tsunami which had run up height of 11 m along the Gulf of Kachchh coastline. From all over the world, several scientists recognized boulders/megaclasts, presence of mud intraclasts in sand layers and abrupt sand layers between clayey layers as the geological signatures of palaeotsunami deposits. As Gujarat coastline comprise of both rocky coastline of Saurashtra and sandy Coastline of Kachchh, providing a fascinating scenario to study palaeotsunami deposits of varied textural sizes. We studied the rocky coastline of south-western Saurashtra (i.e. From Navibander to Mangrol) and observed the presence of boulder deposits, scattered above the high tide line upto tens of meters inland. Using various physical parameters and numerical models it was estimated that a tsunami wave of 3.5 m wave height had detached and mobilized these boulders to their inland final position. Using optical dating technique, the age of deposition of the dune on which those boulders were lying was estimated to be 3.4 ± 0.23 ka. This suggests the tsunami event took place sometime during the last 3.4 ka. Similarly at the Mundra coastline of Kachchh, a shallow trench of about 2 m was dug at an elevation of 2m from high tide line. This sequence shows a typical tidal flat sedimentation comprising silty – clayey layers (unit-1 to unit 7). However unit 6 and unit 4 were sandy in nature and supported their deposition in form of a high energy marine flooding event. Geochemical analysis of this sequence showed decrease in concentration of major and trace elements at unit 4 and unit 6. Based on sedimentology and geochemical signatures we suggest that the Unit-4 was deposited on account of a storm surge as it showed seaward dipping mega ripples ~ a characteristic feature of strong ebb tide. Whereas Unit-6 is a palaeotsunami deposit characterized by rip-up mudclasts, broken shell fragments and sand layer sandwiched between mud layers which are characteristics features of palaeotsunami deposits. The bivalve shells dated from bottom of unit 6 gave a ^{14}C AMS age of AD 997 – 1107. It is interesting to note that a tsunami has been recorded historically around 1008 AD in Strait of Hormoz, Iran. This sand layer (Unit-6) most likely is geological signature of the 1008 Strait of Hormoz Tsunami.