Paper Number: 1049

# RADIOCARBON DATING OF HOLOCENE TIME PLANES: IMPLICATION FOR SEA LEVEL CHANGE ALONG SAURASHTRA COAST, WESTERN INDIA

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The Saurashtra peninsula of Western India is bound in the north by the Gulf of Kachchh, in the south and west by the Arabian Sea and in the east by the Gulf of Khambat. Eustatic sea level changes and active tectonics have played a major role in shaping the coastlines and landforms of the coastal Saurashtra since the Paleocene. The coastal Saurashtra encompasses older tidal flat, paleo-delta, present tidal flat, estuary with barrier bar, present delta, flood plain, dune, beach and pediplain. Geological and geomorphological evidence of sea level changes and neotectonic activity in this area during the Holocene have been reported by previous workers [1, 2 and 3], but the availability of absolute age data is limited.

An extensive study has been carried out along the northern Saurashtra coast focusing on identification and radiocarbon dating of geologic horizons related to Holocene sea level changes. Two paleo-shorelines defined by two beach ridges, one occurring intermittently along the present coastline and another occurring in trench sections, 8 km inland from the present coastline have been identified in the Jamnagar area. The coast parallel beach ridge occurs as 1.5 to 2 m high parallel ridges within the present tidal zone, and consists of marine bivalves and gastropods with about 30 percent sand. The inland beach ridge occurs as a well sorted unlithified cover sequence and consists mainly of medium to fine sand with marine bivalve and gastropod shells. An impressive raised tidal flat, up to 12 km wide, occurs to the east of the coast parallel beach ridge. A fluvio-marine sequence along a deep canal section has been identified to the southeast of the inland beach ridge section, about 10 km from the present coastline. It is represented by a 6m thick unlithified sediment package, starting with a cross bedded fluvial sediment unit, followed by a 10cm thick lag deposit indicating a brief period of hiatus in sedimentation, followed by a laminated sand-silt marine sediment unit. A peat layer occurring above the unit relates to a period when the area was submerged under water.

Eighteen samples of shells [bivalves and gastropod], wood, peat and corals were collected from these geologic horizons and were subjected to conventional $^{14}C$ dating. It is concluded that a high stand marks transgression of the sea at least 8 km inland during Cal BP 8,440 – 12,330 as defined by the inland beach ridge; this correlate with the 11 ka worldwide high stand [4]. Coralline beds occurring above Tertiary and Quaternary limestone units in the Dwarka area also yield an age of Cal BP 10,940-11,350. This age for light-weight branching coral samples from unit III of Chaya Formation [2] also corroborates a high stand around Cal BP 11,000. After that the sea assumed its near present coastline during Cal BP 7,320 – 8,020 as represented by the coast parallel beach ridge. $^{14}C$ dating of polystrate mangrove wood from the raised tidal flat (Rann), indicates a second transgressive phase during Cal BP 6,740 – 6,850, related to the fluvio-marine deposit about 10 km inland from present coastline. The regression after that probably lasted up to Cal BP 5310, as peat formed above the sand-silt marine sediment unit due to stagnation of

water between Cal BP 5,310 – 5,450. The study reveals that along the northern Saurashtra coast at least two phases of transgressions followed by two phases of regressions occurred during Holocene.

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