

Paper Number: 1021

HOLOCENE CLIMATE CHANGE IN SW INDIA – A MULTI PROXY STUDY USING COASTAL SEDIMENTS AS AN ARCHIVE

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The coastal areas of south western India, south of the Achankovil Shear Zone, host a series of coast perpendicular estuarine basins which are entrenched over the uplifted Neogene sedimentary formations. These estuarine basins enfold a full record of Holocene transgressive-regressive events in its 30-40m thick sediment fill. Borehole cores retrieved from the fluvial end of the estuarine basins reveal a coarsening upward sequence with high organic matter input in the lower silt and clay dominated

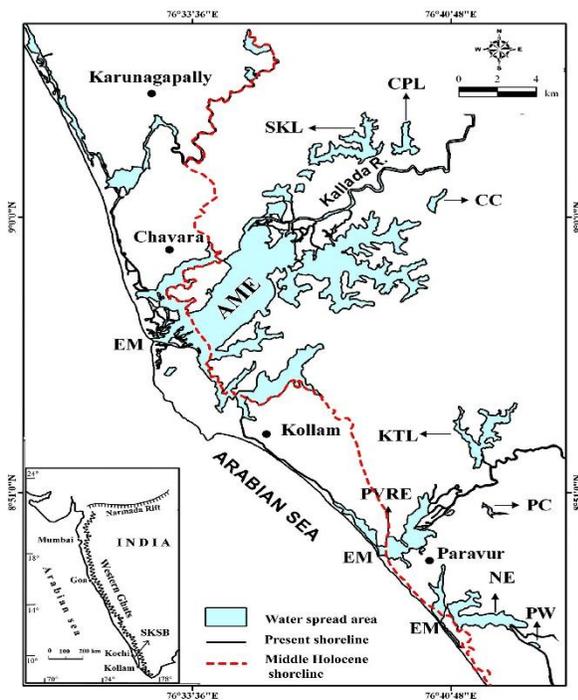


Figure 1: Study area showing the present and Middle Holocene shoreline positions. AME Ashtamudi estuary; SKL Sasthamkotta lake; CPL Chelupola lake; CC Chittumala chira; PVRE Paravur estuary; KTL Kota lake; PC Polachira; NE Nadayara estuary; PW Povankal wetland; EM Estuarine mouth. SKSB

sediments. A multi-proxy analysis of the borehole cores shows that sedimentation in these basins took place under fluctuating climate and sea level conditions of Holocene epoch. Similarity in the radiocarbon ages of the uprooted, buried riparian plant remains (7490 ± 90 yrs BP) with that of the embedding sediments (7480 ± 80 yrs BP) indicates rapid sedimentation in the river confluence zones during Early Holocene [1]. The progradation of sediments, in the form of a Bay Head Delta, during Early Holocene under the heavy rainfall conditions were responsible for the separation of some of the prominent arms of the pre-Holocene basins into discrete fresh water lakes around the upstream end of the basins of these estuaries [2]. Among the fresh water lakes, the Lake Sasthamkotta evolved from the cut-off of a prominent arm of the pre-Ashtamudi basin is the largest of this kind in the southwestern coast of India (Fig. 1). The upper part of the deltaic plains of the estuaries is blanketed by 2-3m thick yellowish brown, mud dominated sediments with higher $\delta^{13}\text{C}$ (-19.56‰) and $\delta^{15}\text{N}$ (8.85‰) values than its lower part ($\delta^{13}\text{C}$ -28.17‰ ; $\delta^{15}\text{N}$ 3.92‰). This is indicative of marine origin of the sediment blanket

which is later subjected to sub-aerial weathering and chemical alteration of organic matter. This, together with the colouration of the exposed sediments, occurrence of calcareous nodules in the sediment cores retrieved from the marginal areas of the basins etc., are indicative of dry phase at around 5-4 kyrs BP.

References:

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- [2] Padmalal D, Nair K M, Kumaran K P N, Sajan K, Vishnu Mohan S, Maya K, Santhosh V and Anooja S, (2013) In: Climate change and island and coastal vulnerability: Springer, Netherlands, 191-208

