

Late Holocene geomorphic coastal changes affecting the mutation of bay-facing Harappan sites of the Indus civilization, Gujarat, India
海湾に面するインダス文明の盛衰に影響を与えた完新世後期の海岸部の地形変化

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The Indus civilization is one of the four great ancient civilizations, which developed around the Indus River and along the northern coastal area of Arabian Sea ca.8500 to 3300 years ago. This age is geologically called Holocene which is characterized by the glacio-eustatic sea level change after the last glacial termination. Therefore, the mature of bay-facing Harappan sites was significantly influenced by vertical and horizontal shifts of coastlines. We inspected late Quaternary geomorphic developments related to the relative sea level change around two representative sites, Lothal site and Kanmer site in Gujarat, India, analyzing geological data and Corona satellite images together. The obtained results indicated that the ancient Lothal town developed on the low-lying alluvial flood plain which appeared on tidal flats through about 4 m of relative sea level fall after Holocene transgression peak, acquiring shipping by water. Yet the successive sea level fall around 2 m likely led to impossibility of shipping, therefore the Lothal might rapidly decline as a port town. Most of about 6 m relative sea level fall in late Holocene is probably originated from hydro-isostatic crustal uplift, and it controlled geomorphic evolution and vicissitudes of bay-facing Harappan sites.

The Lothal site (ca.2500-1900 B.C.) is in the Cambay coastal plain which is characterized by geomorphic configuration of present and emerged tidal mud flats locally overlain by flood plains. Two late Quaternary marine terraces (MT1 and MT2) composed of emerged tidal flats are recognizably elevated in 15m and 10m. MT1 is assigned to MIS5 stage and MT2 to MIS1 stage (Prasad and Gupta, 1999). The settlement town, 12 m in elevation, is exactly founded on the artificial mound of flood plain over MT2-forming marine sediments. This geomorphological condition and the dockyard adjacent to the town imply that the ancient Lothal town had located and developed with marine trading by shipping transportation, using the surrounding channel system. As the sea level had relatively fallen several meters afterward, shipping itself had become impossible even at high tide and the town likely declined.

The Kanmer site several thousand years B.C. is situated on the cuesta mound (32m in elevation) about 7 km inland from the Little Rann which is a brackish marsh, especially invaded by sea water in summer wet season. Even though mid Holocene transgression reached to inland further than the present coastline of the Rann, shipping transportation was probably difficult due to relative steep river profile and horizontal distance of about 5 km between Kanmer site and the mid Holocene coastline. The land and shipping transportation was probably used together. As the Rann was reduced by relative successive marine regression, the distance by land transportation increased and shipping trade decayed gradually. Thus, ancient Kanmer town might have been finally abandoned.

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