A B S T R A C T

Various aspects of tidal flat sedimentation have been studied by both European and American scientists since early 1920s. However studies on the characteristics of tropical tidal flat are meagre. The present investigation has attempted to fill a void in information on the sedimentological characteristics of a strong monsoon dominated tropical tidal flat which may essentially differ from the tidal flats of temperate regions.

The tidal flat at Chandipur having a macrotidal setting, lies on the east coast of India. The tides are semi-diurnal with a mean tidal range varying between 4.89m (equinoctial spring) to 1.87m (equinoctial neap). The prevailing wind direction during summer (March to June) and monsoon (middle of June to September) is mostly from south to southwest with occasional blows from the east. However, during calm winter months, northerly wind mostly prevails. Cyclonic storms with an average wind speed of 65 knots per hour occasionally invade the area during period from mid-August to early October.

Flanked by the Pre-Cambrian shield of granite gneiss and migmatites with local patches of Neogene and Pleistocene sediments, this coastal stretch of which the tidal flat is a part is underlain by both marine and non-marine sediments.

Based on geomorphic criteria the intertidal region can be broadly subdivided into (a) sandy sloping beach face region (av. width 48m, slope varying from 2.5°-9°) and (b) a wide planar flat region which has been again laterally sub-

divided into non-barred planar flat region and barred planar flat region based on textural and geomorphic characteristics. Geomorphologically the tidal flat bears a strong resemblance with the tidal flats of Taiwan and does not come under 'back-barrier tidal flat facies'. As a result a seaward gradation from mud flat to sand flat through mixed flat is not reflected in this tidal flat.

Beach face sediments show up a distinct gradation in size characteristics from upper beach face (composed mostly of fine sand) to lower beach face (characterized mostly by very fine sand). There is also a gradual easterly coarsening of sediments in the lower bach face. Sediments show a wide range of sorting and skewness character. However sub-surface sediments do not show much variation barring the presence of some coarser layers below 0.25m.

There is a sharp contrast in the texture of sediments between the barred flat and the non-barred flat. Sediments in the non-barred flat are finer than 3.0 phi size where as the sediments in the barred flat are mostly coarser than 3.0 phi size. The crestal part of the intertidal bar is characterized dominantly by medium sand.

A distinct seasonal change in the pattern of sediment dispersal is seen in the silty planar flat region i.e., compare to winter distribution, the mid part of the flat is enriched in very find sand during the monsoon and the lower flat becomes more silty. On the other hand the barred flat records a high percentage of clay all over the region during the monsoon months. This change in textural characteristics has been attributed to high sediment discharge by the river Burahbalang.

A high degree of remixing of sediments through various physical and biogenic processes has been obvserved, which, in turn, has obscured the possibility of discriminating the subenvironments in the light of textural parameters as suggested by earlier workers.

Seasonal variations in the sub-surface sedimentary structures and biogenic activities of the animals thriving in this area have been studied. Study reveals that using combination of different physical and biogenic structures, the different subenvironments can be fruitfully differentiated.

1) The beach face environment is characterized by backwash ripples, horizontal lamination sometimes associated with shell layers and the biogenic structures produced by the ghost crab Ocypode and the bubbler crabs Dotilla, Scopimera.

2) The silty planar flat is marked by climbing ripple lamination (during winter) and wavy/hummocky cross stratification, scour-and-fill structures (during monsoon) together with flattened pipe like burrows of the beach crab Macrophthalmus telescopicus (Owen), tubes of Owenia and burrows of Saccoglossus.

3) The sandy barred flat close to the river is defined by a combination of structures like mega-ripple lamination, horizontal lamination sandwitched between small ripple lamination, laminated mud, flush marking of Loimia, trails and impact markings of gobid fish and irregular burrow orientation of the ghost crab Ocypode.

Since most of the animals thriving in this area show a greater affinity to exposure level rather than substrate characteristics, the various subdivision of this tidal flat can also broadly be identified with the help of the lebensspuren imparted by them. The upper part of the tidal flat including the beach face zone is characterized by the scratch markings and the burrowing activities of the ghost crab Ocypode, as well as by the presence of silty conical mounds made by the polychaete Euclymene. On the other hand the mid-part of the tidal flat is marked off by multi-looped flowery designs and spiral or flattened pipe-like burrows made by the crab Macrophthalmus sp, and flush markings of the tube building polychaete Loimia medusa (Savigny). However, the lower part of the flat is differentiatied by the burrowing activities of the polychaete Owenia fusiformis the enteropneusta Saccoglossus sp and conical resting burrows of the anthozoa Cavernularia sp.

The findings of the present study may serve as clues in identifying ancient tidalites more critically.