

Short Communications

Beach processes between Mulgund and Shiroda, west coast of India

P Chandramohan, B U Nayak, V Sanil Kumar & K C Pathak
National Institute of Oceanography, Dona Paula, Goa—403 004, India
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Study on beach processes for an year shows seasonal changes without annual net erosion. The beaches are stable and regain the maximum profiles during February to April. Distribution of longshore current direction is not uniform along the study region indicating the presence of variable littoral transport environment. This region is subjected to relatively low wave energy during the non-monsoon period.

In spite of abundant resources found over this coastal region, information on the coastal environment is practically absent. The geomorphological studies¹, sea bed surveys in the creek off Dabhol² and wave transformation studies in Mirya bay³ are only the few studies carried out in this region. In this communication, monthly changes in beach levels, longshore current, and beach sediment sizes observed at 10 stations between Mulgund and Shiroda from April 1989 to March 1990, have been reported.

Station locations are given in Fig. 1. The coast between Mulgund and Shiroda is narrow, hilly, highly dissected with transverse ridges of the western ghats and at many places extending as promontories into Arabian Sea. Shoreline is very irregular associated with features like cliffs, notches, promontories, sea caves, embayments, submerged shoals and offshore islands. Numerous west flowing rivers form estuaries, bays, mud flats, creeks, and tidal marshes. In addition to many pocket beaches, long sandy beaches are also present in this region. Tides in this region are predominantly semi-diurnal. The average spring tide range is about 2 m and neap tide range is about 0.6 m. Monthly beach profiles were measured along a transect from backshore dune, till 1 m water depth into the surf zone. Monthly variation of longshore current and direction were measured by releasing Rhodamine-B and noting the distance it travelled in 2 minutes. The sediment samples were collected at beach foreshore and the median size was estimated from the sieve analysis⁴.

Typical variation of monthly beach profiles at sts 1 and 3 are presented in Fig. 2. Beach level variations at other stations are presented earlier⁵. The trend of change in beach levels indicates the seasonal erosion during southwest monsoon and accretion during the fair weather periods. To understand the extent of beach variation in different months, relative change in the volume of sediment at each station was estimated

(Fig. 3). These changes in volume were computed up to 1 m water depth, per unit length measured along the beach. Lowest beach levels over an annual cycle was observed in August at sts 2 and 5-10, and in September at sts 1 and 4, and in November at st. 3. It indicates that except at st. 3, all beaches undergo seasonal erosion during southwest monsoon period. Station 3 is situated in Ratnagiri bay and further protected by the Kushipur Point headland from southwest monsoon waves. However, it gets exposed to directed waves during October and November. The beaches at Munga (st. 5) and Vengurla (st. 8) experienced more

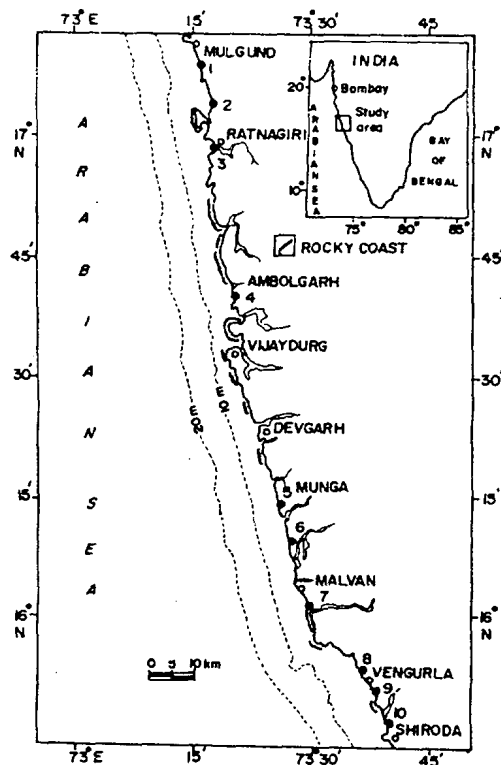


Fig. 1—Location map

changes in beach volume, whereas, the beach at Shiroda (st. 10) experienced less changes in beach volume as it is protected by Redi Point headland. Beaches reach the maximum level between February and April at all stations. The one year study indicates the recovery of original beach profiles at all station, and no net annual erosion was observed along the study region.

The direction of measured longshore current was found inconsistent along the study region (Fig. 4). During the southwest monsoon (June-Sept.), the longshore current direction was observed consistently south at sts 4 and 5, whereas, over the rest of the stations, the direction was changing frequently. During February to April, the predominant longshore current direction was towards south at all stations except st. 3. The longshore current direction was found towards north throughout the year, except during January and August at st. 3. The longshore current velocity varied predominantly between 0.08 and 0.25 m. sec⁻¹ at all stations.

Variation of median size (d_{50}) of the beach sediment at each station in different month are shown in Table 1. The sediment at the foreshore at all stations mostly consist of fine sand. During the monsoon period, relatively larger median size of sediment ranging from 0.16 to 0.25 mm was observed at sts 1, 2, 5 and 8 and relatively smaller size, 0.06-0.15 mm at sts 3,

6, 7, 9 and 10. During fair weather period the median size of the sediment mostly varied from 0.06 to 0.15 mm.

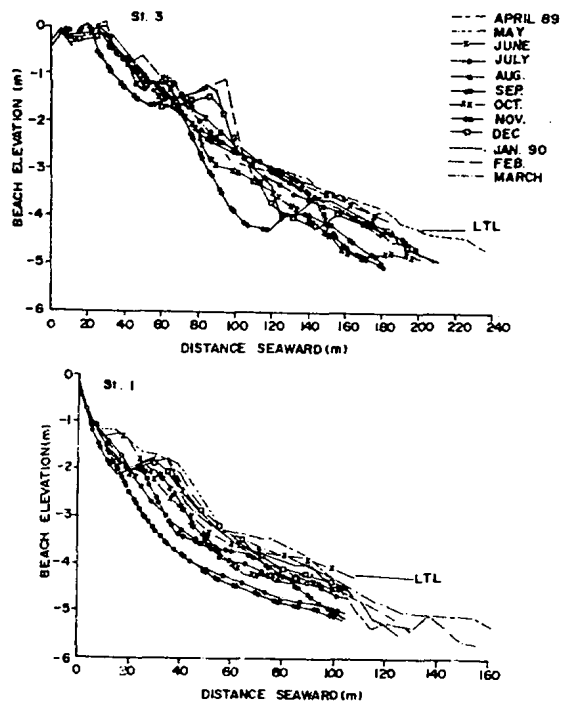


Fig. 2--Beach level variation at sts 1 and 3

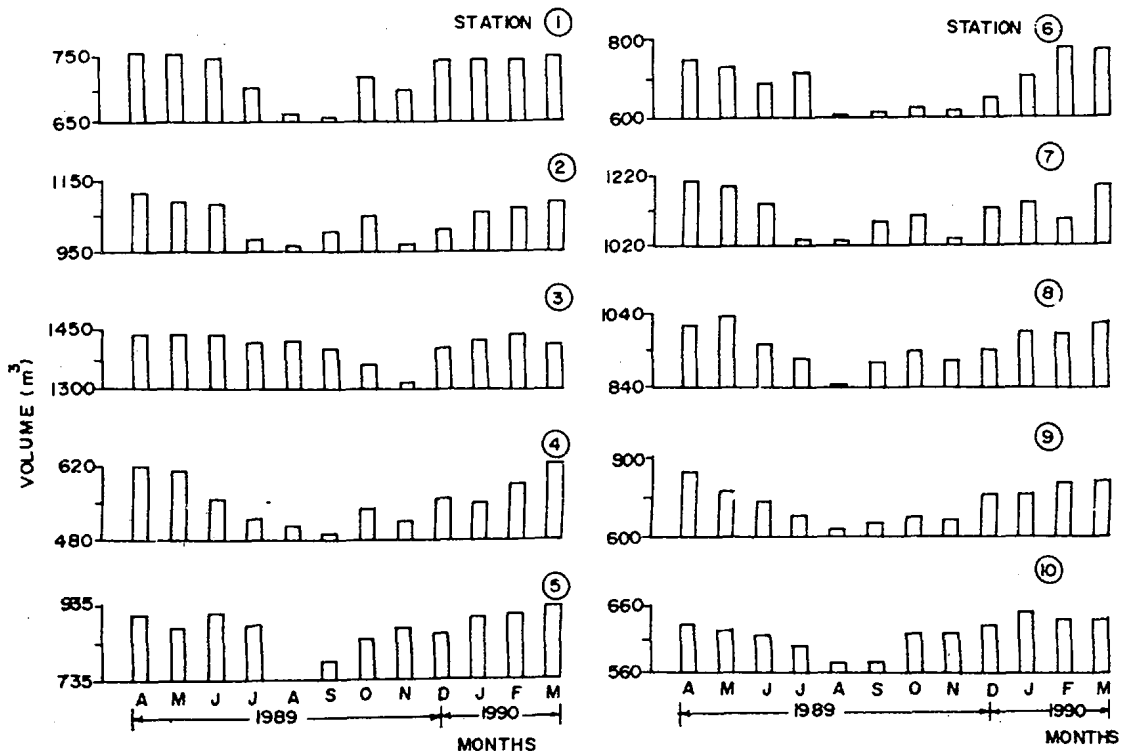


Fig. 3--Monthly changes in beach sediment volume

Table 1—Median size of beach sediments (mm)

Period	Stations									
	1	2	3	4	5	6	7	8	9	10
April '89	.1814	.2230	.0505	.1644	.2297	.1639	.1486	.1809	.2120	.1595
May	.1308	.0790	.0756	.1477	.1279	.1061	.1011	.1725	.1812	.1014
June	.0841	.1321	.0546	.1637	.1987	.1216	.0606	.1734	.2420	.1067
July	.1518	.1663	.0682	.2240	.1734	.0836	.0730	.2370	.1493	.1370
Aug.	.2449	.1019	.0757	.1713	.1868	.1208	.0983	.2086	.1811	.1208
Sept.	.2747	.1538	.2088	.2651	.2005	.1078	.1013	.1398	.1485	.1010
Oct.	.1874	.0972	.1112	.1937	.1437	.2036	.1117	.1451	.1742	.1677
Nov.	.1190	.1088	.0913	.1836	.1647	.1384	.1010	.1830	.1933	.1609
Dec.	.1233	.2502	.1047	.1697	.1425	.1721	.1510	.2106	.0979	.2428
Jan. '90	.1739	.0934	.1097	.1548	.2678	.1675	.1550	.2794	.1090	.1287
Feb.	.1299	.1028	.0792	.1640	.1714	.1574	.1486	.1467	.2086	.1913
March	.1338	.2056	.1033	.2125	.1623	.1519	.1679	.1354	.2015	.1799

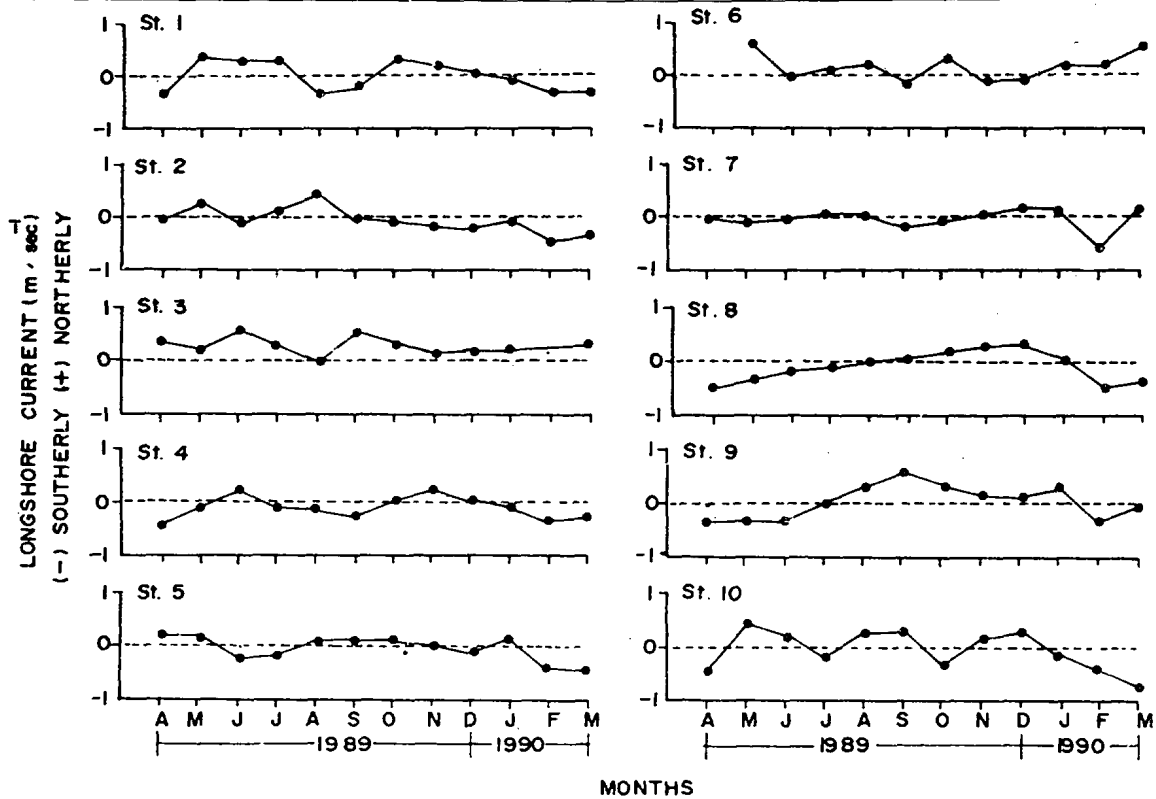


Fig. 4—Monthly longshore current distribution

Changes in beach levels follow the seasonal changes and net erosion over the annual cycle was not observed along the coast between Mulgund and Shiroda. The beaches are very stable and regain their maximum profiles by February to April. The presence of fine sand on the beaches indicates that this coastal region is subjected to relatively low-wave energy other than southwest monsoon period.

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