

HYDROGRAPHIC FEATURES OF THE COASTAL WATERS OF KAKINADA

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ABSTRACT

The physical characteristics of coastal waters - temperature, salinity and currents at the surface and subsurface levels - off Kakinada in the Bay of Bengal at 4 stations (bottom depth 5, 12, 22 and 42 m) along 17°N latitude during January, 1985 were presented in this paper. Temperature and salinity increased from coastal to offshore regions. A dome of high saline (33×10^{-3}) water is observed at 25 m depth while low saline (31×10^{-3}) water occupies the surface layers. The currents observed at all stations indicate the predominant influence of tide varying in direction by 180° and speed 6 to 27 cm sec⁻¹ with tide. The seaward flow at the bottom and shoreward flow at surface at station III indicate the sinking during this period.

INTRODUCTION

The study of coastal currents at Kakinada is important from the point of knowing the drift of the effluent discharges from the local industries and municipal wastes. Studies on currents off Visakhapatnam, an industrial city on the east coast of India have been reported by several workers (Rao, 1956; Murthy and Sastry, 1957; Prabhakara Rao and Ramesh Babu, 1986; Prabhakara Rao, Ramesh Babu and

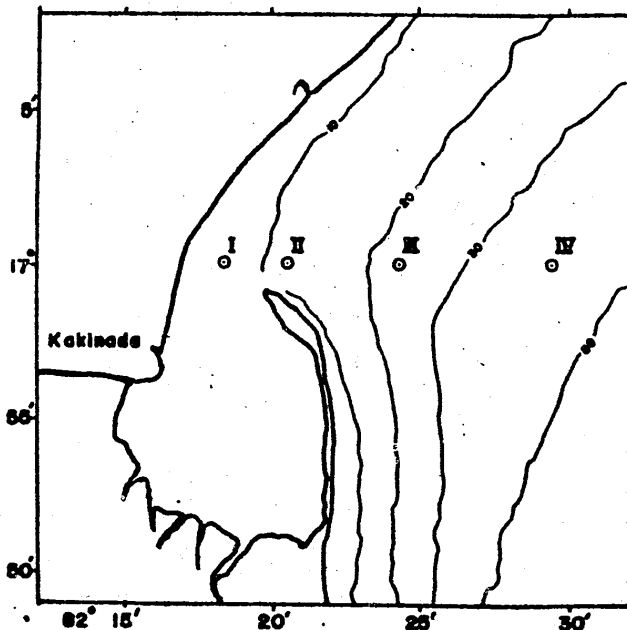


Fig. 1. Station location map.

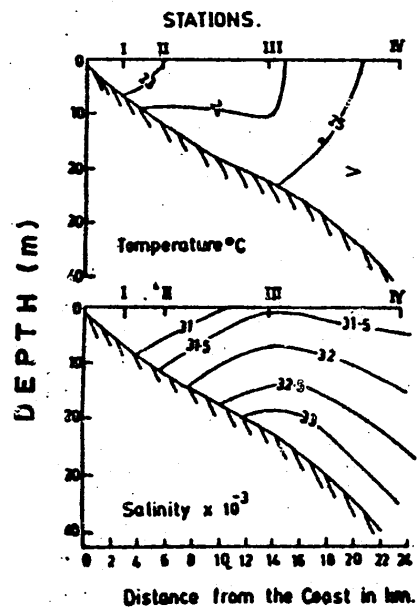


Fig.2. Variation of temperature and salinity with depth.

Chandramohan, 1987 and Narasimha Rao and Prabhakara Rao, 1989). However, such studies in the coastal waters off Kakinada are meagre.

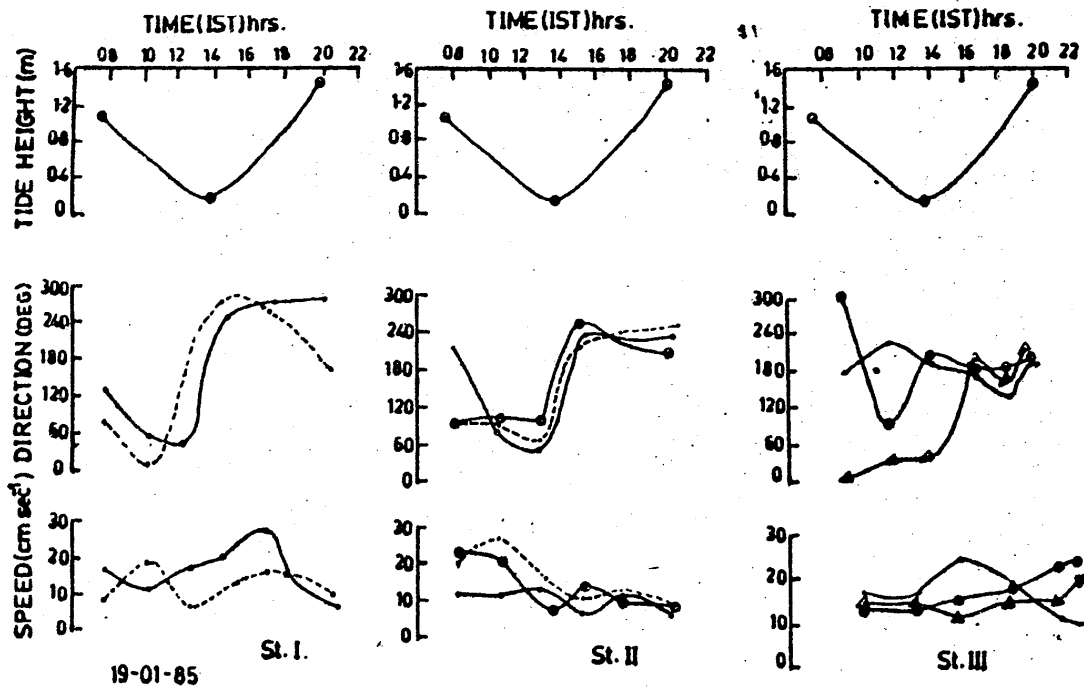


Fig. 3. Variation of current speed and direction (— 0m, -- 5m, -o- 10m, -Δ- 15m)

The coastal waters off Kakinada are under the influence of discharges from Kakinada canai, Coringa and Gaderu rivers which join the Kakinada Bay. The Kakinada Bay which is sheltered from the sea by an elongated 'sand spit' extending from north to south develops rotating flow with the tide. The present paper describes the physical characteristics viz., salinity, temperature and currents of coastal waters off Kakinada.

DATA AND METHODS

Hydrographic data on temperature, salinity and currents have been collected at stations I to IV during January, 1985 from surface to bottom at 5 m interval (Fig. 1). Current measurements were made over a tidal cycle at one hour interval by anchored boat using NIO Rotor current meter. The non-tidal currents were computed by resolving the currents into U and V components over a tidal cycle. Temperature and salinity observations were made using T.S. Bridge.

RESULTS AND DISCUSSION

The temperature and salinity variations at four stations are shown in Fig. 2. The temperature of the coastal waters varied between 23° and 25°C and increased towards offshore. The low temperature nearshore and high temperature offshore are apparently the result of the cold winds blowing in the winter season. The salinity variation also shows increased values towards offshore varying from 31 to

33×10^{-3} with low saline waters occupying the surface layers. A dome structure of salinity is noticeable at a depth of 25 m. The temperature, salinity distribution along the section indicates sinking in the nearshore as the isolines bend downwards towards the shore.

Table 1. Non-tidal current

Depth (m)	Station I		Station II		Station III	
	Speed cm sec ⁻¹	Dir (°)	Speed cm sec ⁻¹	Dir (°)	Speed cm sec ⁻¹	Dir (°)
0	17.1	289	33.6	243	64.0	198
5	19.5	287	40.5	111	73.7	191
10	-	-	35.9	130	78.5	186
15	-	-	-	-	33.4	144
20	-	-	-	-	13.3	90

Currents off Kakinada

In January, the currents observed at station I to III (Fig. 3) indicate the influence of tides as the current directions are reversed by 180° with the tide. The magnitudes of the currents varied between 6 and 27 cm sec⁻¹. As the currents in coastal waters are influenced by the tide, the resultant current for these stations has been calculated for one tidal cycle. The non-tidal currents at the three stations are given in Table 1. At station I which is located in the Kakinada Bay at a depth of 5 m the non-tidal current flows shoreward both at surface and bottom. At station II (depth 12 m) the non-tidal current indicates variable directions from surface to bottom i.e. at surface the current has a shoreward component whereas at 5 and 10 m depth it has an offshore component. At station III which is in the coastal waters at a depth of 22 m the non-tidal current is mostly directed southward from surface to bottom. The component of the non-tidal current at surface is directed southward indicating the shoreward flow at surface. The non-tidal coastal current varies from 13 to 78 cm sec⁻¹. The seaward flow at bottom and shoreward flow at surface at station III indicates sinking. This is further confirmed from the temperature, salinity distribution with increase in the temperature by about 2°C from surface to the bottom and bending of isohalines towards the shore.

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