Current regime over the continental shelf infront of the Nile Delta

by

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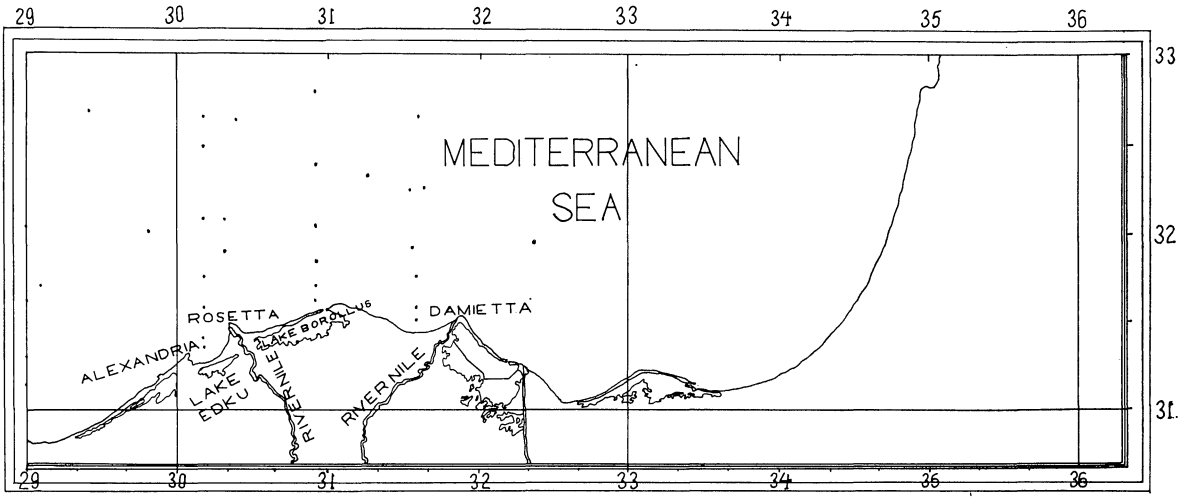
Seasonal observations of temperature and salinity were used to calculate the geostrophic current over the continental shelf, seaward of the Nile Delta. The values of the calculated geostrophic current does not seem to constitute the principal component of the total current.

Introduction

Direct current measurements over the continental shelf seaward off the Nile Delta and lake inlets are not adequate. At Rosetta and Damietta branches of the River Nile, current measurements were made by the Suez Canal Authority during the period 1964 to 1970 at scattered intervals.

Over the continental shelf seaward of the Nile Delta, an Ekman current meter was used at five stations between October 1959 and October 1961. During the summer of 1966, surface and subsurface current measurements using Elman current meter were made between Port Said and Abu Qir Bay by MRV Ichthyolog [HASSAN 1969]. None of these current measurements were properly used to draw the current pattern in the Mediterranean water off the Nile Delta. This is due to the fact that these observations are not simultaneous and were taken from scattered stations.

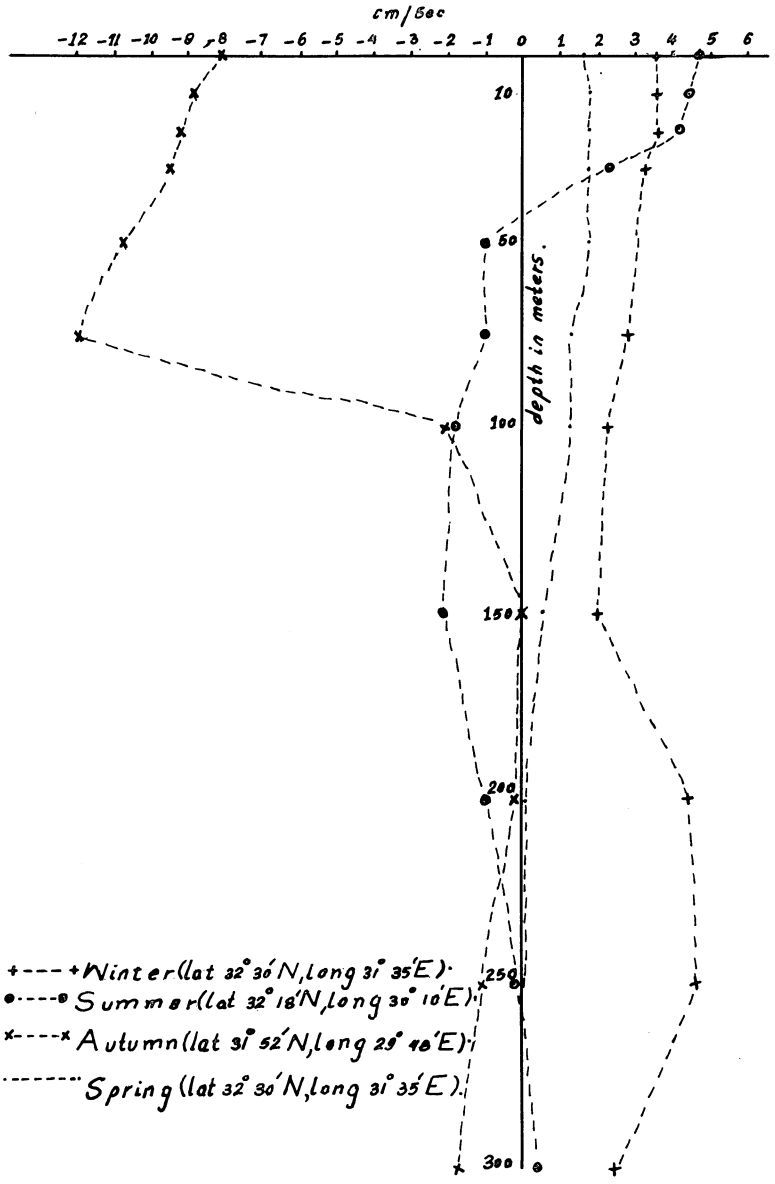
In this paper the temperature and salinity observations are used to calculate the geostrophic current every season at some stations infront of the Nile Delta. The data used in the analysis were taken by Ichthyolog during 1966 and 1971.



Rapp. Comm. int. Mer Médit., **23**, 5, pp. 71-73, 2 figs (1976).

Current regime deduced from the dynamical computations

Using the dynamic computations, the geostrophic current was calculated between each set of two stations taken over the continental shelf seaward of the Nile Delta (Fig. 1). These computations were repeated every season. Figure (2) shows an example of the geostrophic velocity profiles between each part of stations taken every season.



During winter and spring seasons, the geostrophic velocity profile from surface to bottom is in the East direction. The geostrophic current off the continental shelf infront of the Nile Delta during these two seasons is not always directed to the east as this current is resulted from the interaction of the oceanic flow with the coastal one. This was indicated from the computation of the geostrophic current at the other locations (Fig. 1). In summer, the velocity profile give an east flow from surface to 42 m depth and a westerly flow below that depth. The geostrophic current is directed to the west from surface to bottom.

A general conclusion can be stated that the geostrophic current can be directed to either the two direction (East or West) on and off the continental shelf during the four seasons. In the shallow area of the continental shelf, the current takes a random direction with a mean one directed towards the east. This was observed during the summer of 1966 [HASSAN 1969]. The geostrophic current in that area ranges from a few centimeters to about 12 centimeters directed mostly to the east direction.

In the presence of the nile flood a remarkable change occurred in the geostrophic current, in the shallow area of the continental shelf [SHARAF EL DIN 1973].

Comparison between the observed and the calculated current velocity

The magnitude of the calculated geostrophic velocity over the continental shelf and beyond it (2 to 14 cm/sec) is very small in comparison with the observed values. The current in this area increases under the effect of the prevailing wind, as the circulation pattern here is mainly wind driven. During the flood period (the summer season) the atmospheric condition is fairly stable. The calculated velocity during the flood period is similar to the observed one [SHARAF EL DIN 1973], which indicate that the geostrophic circulation constitutes the principal component of the total circulation. After the high dam, and during the other seasons, there is a noticeable difference between the observed and calculated velocity over the continental shelf. This indicates that the geostrophic current does not seem to constitute the principal components of the total current, during that period. In the area under investigation the most predominant circulation that contribute considerably to the complex motion in that area is the wind driven one.

References

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