WATER MASSES OFF THE EGYPTIAN MEDITERRANEAN COAST AND OFF THE QATARI ARAB GULF COAST

Hassan Mostafa HASSAN

Marine Sciences Department, Faculty of Science,
University of Qatar (Qatar)

ABSTRACT

The water masses of the Mediterranean Egyptian coast were compared with those of the Arab Gulf coast (east of the state of Qatar). The Mediterranean winter (February 1971) and summer (July 1971) conditions were compared with those of the Gulf winter (February 1984) and summer (July 1985). The study showed that although the two water masses have some similarity as a result of the fact that the rate of evaporation exceeds precitation, yet there are some diferrences in the water masses resulting from some differences in the physical conditions.

INTRUDUCTION

As semiclosed water bodies located in more or less similar semiarid conditions, the water masses in the Eastern part of the Mediterranean and the Arabian Gulf must show similar characteristics with some differences as a result of the differences in the physical variables. The rate of evaporation and cosequently the rate of water exchange between the two water bodies on one side and the outer oceanic waters, the difference in depths and the water volume, in additon to the differences in the tidal motion represent some reasons why differences occur between the water characteristics.

WATER TEMPERATURE

The summer water temperature in the area of investigation of the Eastern Part of the Mediterranean Sea varies from 13.00°C below the thermocline to 27.00 ° C, at the surface. The presence of an established thermocline layer is observed clearly btween 30 and 50 meters. The winter temperature of this area ranges between 13.00 and 18.00 °C, where winter covection is very clear (2) & (7). In the Gulf the summer water temperature varies between 24.00 and 28.00 ° C, while in winter it ranges between 22.00 and 23.50° C (4) & (5). Due to the shallowness of the Gulf water it is difficult to recognize a summer thermocline layer.

SALINITY

Generally salinities in both areas are abnormally high resulting from an intensive rate of evaporation. However it is higher in the Gulf where the annual rate of evaporation 203 cm (1). In summer, salinity in the Gulf area varies between 38.50 ‰.near the center of the Gulf and 40.60 ‰.in the inshore waters of the southern part of the area of investigation while in winter and in southern inshore parts of the area it exceeds 41.00 ‰.. The Mediterranean salinity in summer ranges between 38.5 ‰. and 39.9 ‰., in winter it is between 38.80 ‰. and 39.90 ‰. .

TEMPERATURE SALINITY RELATIONSHIP AND WATER MASSES

Fig. (1) shows the T - S diagram for six deep Mediterranean stations, in addition to three deep stations in the Gulf waters for the two mentioned seasons of summer and winter. As can be seen the differences in the characteristics of the water are very clear between the summer and winter in one and the same area. While the water column is more or less vertically homogeneous and salinity is the same in the winter Mediterranean, the summer condítíons reflect two distinct water masses Fig.(2). The first one is high temperature, high salinity surface layer and the second deeper one is of lower salinity and lower temperature. In the Gulf water, the summer conditions show the presence of subsurface high salinity high temperature water mass (as a result of the shallowness). In winter in addition to the decrease of the water temperature the water masses show the maximum annual salinity.

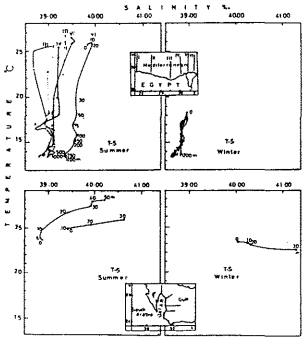

Fig.1 T-S relationship

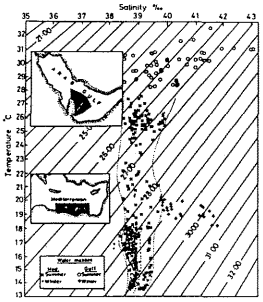

Fig. 2 Water masses

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MATERIAL TRANSFER MECHANISMS IN THE AEGEAN SEA

E. IZDAR, A. MÜEZZINOĞLU and A. AKYARLI

Institute of Marine Sciences and Technology,
Dokuz Eylul University, Izmir (Turkey)

ABSTRACT

An extensive study on the material transfer mechanisms in the Aegean Sea has been undertaken by the Institute of Marine Sciences and Technology.

Water mass movements, stratifications and current patterns in the region are studied as the first step to explain this transport phenomenon by using the data obtained at 126 estuarine, coastal and open sea stations during seasonal cruises starting in 1983 and still going on. Monitored parameters as well as their sampling, preserving and analysis methods are in accordance with UNEP/MED POL II project.

At a large scale, there are two main water inlet/outlet ports in the Aegean Sea: two open sea ports at the east and west of Cretes and the Dardanelles. The evaluation of three dimensional spatial and temporal variations in salinities, clearly indicates the effect of Black Sea origin waters reaching through Bosphorus-Sea of Marmara-Dardanelles system on water mass movements and thermohaline characteristics in the Aegean Sea. This water pouring into the Aegean Sea with an average discharge of 6500 m^3 /sec creates a counterclockwise surface current toward western shores and also a double layered stratification in the Northern Aegean. On the other hand, freshwater inputs of Anatolian rivers and creaks are usually unimportant in a large scale but affect the current patterns and stratification properties of the estuaries or bays they discharge. Besides these findings, by the interpretation of existing current data, the effect of the meteorological factors, topographical irregularites at the sea bottom and discontinuties created by islands on current patterns are discussed.

Finally, material transfer modelling in the Aegean Sea and along with land based sources and material flushing in (and out) from (and to) adjecent seas are studied by using the measured concentrations of some heavy metals, phosphates and nitrates which are used as selected indicators.