Evaporation from the Mediterranean shelf waters off the Egyptian Coast

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Evaporation from the Mediterranean shelf waters off the Egyptian coast was estimated during the period from August 1983 to 1986, using different techniques. The data used were taken from eight cruises, carried out to the Southeastern Mediterranean between longitudes 29° 45'E and 33° 45'E, using RV Noor Ya Nabi. During each cruise, two separate data sets were collected : standard meteorological measurements and hydrographic data, from 26 stations located along eight sections (Fig. 1). In addition, the recorded monthly evaporation data along the Egyptian Mediterranean coast during the period of study were made available through the Egyptian Meteorological Authority-Cairo, Egypt.
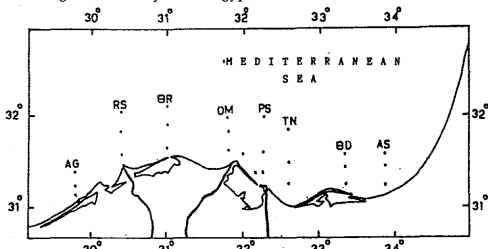

Fig. 1.- Area of investigation.

On the basis of the heat-budget equations, evaporation was computed using Schmidt's ratio R'(1915) and Bowen's ratio R (1926). Also two different forms of the aerodynamic method (SVERDRUP, 1937 and PENMAN, 1956) were used for computing the evaporation. The obtained results were averaged over eight transects and listed in table (1).

The agreement between the observed and calculated values of evaporation by SVERDRUP's formula was good, and considerably better than the cases treated by the other authors. The total evaporation during the year was about 155.6 cm from the observations and 151.5 cm based on SVERDRUP's formula. These values were slightly more than 1450 mm, the mean evaporation for the Mediterranean (SVERDRUP,1942; DAUME,1950; WUST, 1959).

Table (1) Seasonal and annual values of evaporation (cm) from the
Egyptian Mediterranean shelf waters using different techniques

year used method	1983 August	1984			1985		1986		Annual Evaporation
		February	July	October	April	July	February	July	
1. Observations	14.322	11.948	14.353	13.795	12.960	15.624	8.736	14.777	155.60
2. Heat-budget equations using									
a- R' (Schmidt)	16.621	4.225	18.550	6.788	13.978	18.360	4.028	18.492	128.70
b- R (Bowen)	26.200	7.282	32.058	13.864	21.993	27.945	6.618	30.832	216.20
3. Aerodynamic method using :									
a- Sverdrup's formula	14.588	9.379	14.821	12.265	13.375	16.572	9.657	15.338	151.50
b- Penman's formula	20.417	12.765	20.237	17.383	17.951	22.614	13.479	20.788	208.40

The total evaporation from the study area (27,000 km²) amounts to 42 km³/year, of which 3.3 km³ returns to the sea in the form of precipitation and the difference, 38.7 km³, must be supplied by run-off , since the salinity of the water area remains unchanged. The coastal part of the study area receives about 17 km3/year from the northern Delta lakes, fresh water from the Rosetta Nile Branch as well as large amounts of sewage and industrial wastewater. These amounts represent 37.78 % of the total volume of the coastal waters. Within this area the values of most parameters vary both in time and space, particularly those of salinity.

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