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Seasonal Heat Budget of the Southeastern Mediterranean Waters off the Egyptian Coast during 1983-1986

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Heat-budget components of the Mediterranean waters off the Egyptian coast were studied from August 1983 to July 1986. During this period, eight cruises were carried out to the southeastern Mediterranean between longitudes 29° 45'E and 33° 45'E using RV Noor Ya Nabi. Two separate data sets were used in this study : standard meteorological measurements and hydrographic data. These meteorological measurements were taken every 3h while the ship was on station and used to compute the surface heat budget. During each cruise, temperature and salinity were measured at discrete depths from 24 stations located along eight sections extending perpendicular to the coast. Temperature corrections were made using calibration curves. Salinity was measured on a Beckman induction salinometer (Model RS-7C).

The components of the heat budget of the shelf waters of the Egyptian Mediterranean coast were computed using Timofeev's equations (1970 & 1983), for details refer to Said (1987). From the calculations, the amount of heat loss through the sea surface due to back radiation is not more than -68.11 to -83.73 W m^{-2}. The heat loss due to conductive heat exchange ranged between -0.47 and -50.85 W m^{-2}, and that due to evaporation varied between -91.17 and 205.57 W m^{-2}. Hence, evaporation was the main component affecting the monthly and seasonal fluctuations in the heat budget. Table 1 indicated the quantity of heat loss through the sea surface due to evaporation at the offshore stations.

Table 1 . Heat loss (W m^{-2}) due to evaporation from the sea surface at the stations off the Egyptian coast.

	1983	1984		1985			1986	
	August	February	July	October	April	July	February	July
El-Agami (AG)	-	-98.69	-	-113.88	-113.15	-152.62	-104.46	-165.74
Rosetta (RS)	-153.40	-101.19	-147.15	-112.16	-117.83	-159.80	-108.44	-163.87
Burullus (BR)	-151.68	-102.53	-143.72	-114.19	-126.87	-158.09	-108.44	-
Damietta (DM)	-112.47	-97.35	-123.09	-114.66	-129.62	-134.97	-103.42	-122.78
Port Said (PS)	-121.22	-	-120.13	-114.19	-132.04	-133.40	-104.81	-118.72
El-Tina (TN)	-154.80	-	-154.18	-155.27	-146.73	-173.86	-134.55	-163.87
Bardawil (BD)	-	-	-161.99	-	-150.44	-183.86	-	-154.49
El-Arish (AS)	-	-	-143.56	-	-	-	-	-156.37

Computed values of heat content (expressed as Kg W m^{-2}) from surface to 100m for the offshore stations using the formula described by Pattullo et al (1969) are listed in table 2.

Table 2 . Heat content, surface to 100 m depth, at stations off the Egyptian coast. Values in kg W m^{-2}.

	1983	1984		1985			1986	
	August	February	July	October	April	July	February	July
El-Agami (AG)	-	82.95	-	104.95	83.87	100.77	86.20	104.93
Rosetta (RS)	98.67	83.73	100.81	98.68	86.71	106.64	87.85	106.17
Burullus (BR)	98.02	83.39	97.93	100.42	86.34	98.85	87.58	-
Damietta (DM)	99.72	82.82	95.17	98.45	87.19	100.50	88.64	100.36
Port-Said (PS)	-	-	107.55	102.25	86.62	106.22	89.71	97.68
El-Tina (TN)	104.80	-	105.44	101.44	84.92	101.59	88.48	100.33
Bardawil(BD)	-	-	99.13	-	86.62	118.71	-	104.95
El-Arish (AS)	-	-	96.40	-	-	-	-	100.83

In the present work, the most important results are contained in tables 1 & 2. In order to compare the time series of evaporation and heat content, a mean value was obtained for each parameter for each cruise (Fig.1); the heat loss from the sea surface due to evaporation increases with increasing heat content.

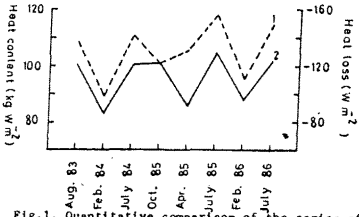

Fig.1. Quantitative comparison of the series of : 1- heat loss due to evaporation (W m^{-2}), and 2- heat content (Kg W m^{-2}) for Mediterranean waters off the Egyptian coast.

References

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