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The surge variability and its relation to meteorological conditions at Alexandria (Egypt)

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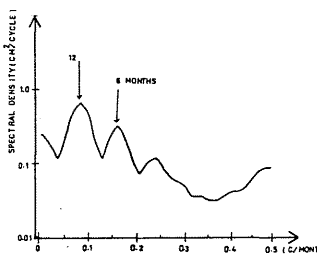
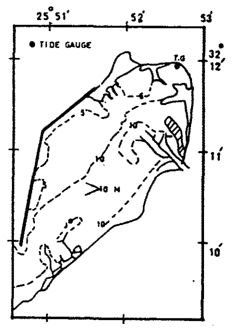
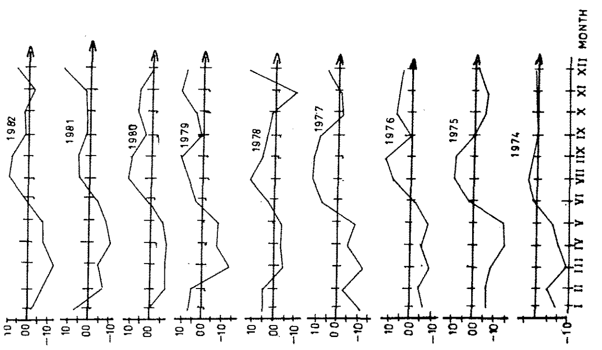
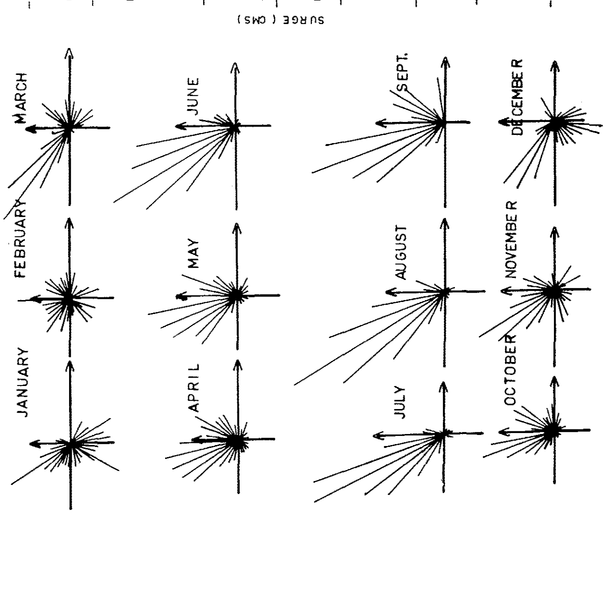
This work presents the general meteorological conditions affecting the surge height at Alexandria. Different time scales are discussed and investigated on the basis of previous studies as well as on analysis of sea level and meteorological data in the Western Harbour. The mechanisms of surge generation in Summer and Winter storms are discussed. The monthly mean surge time series are characterized by one year cycle with high surge in Summer and low surge in Winter, this evidence was explained by the atmospheric pressure gradient in Summer as well as persistent wave action by NW winds. The daily mean surge for a year record showed decreasing spectral denisty from low to high frequency range with no peaks in the range of 2 to 72 days period. The conditions of occurence of strong and moderate storm surge conditions are explained.
Some strong surge events which happens when a deep Cyclone center passes nearby the Egyptian Coastal Zone, with strong W or SW winds are described, and the number of stormy days in Decmber, January, February and March are tabulated for the period (1974-1983), to show the probability of occurence of storm during winter season at Alexandria.



Spectral density of monthly mean surge in the Western Harbour of Alexandria (1974-1983) with 120 data pionts and 30 lags.







O-IX5

On the radiative Components of the heat Budget over the Sea

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The knowledge of the radiative budget over the sea is very important because it contributes towards the heat surface budget more than other fluxes. Moreover, the knowledge of its components is very important not only for the understanding of many meteorological and oceanographical problems but also because it supplies to biologists and oecologists useful informations for the analysis of the ecosystems.
The sea surface receives the solar and atmospheric radiations from above which are partly absorbed and partly reflected; simultaneously the sea losses heat as long-wave radiation and with convective exchanges, evaporation and other mechanisms of smaller importance. Direct measurements of radiative fluxes over the sea surface are relatively few because of the difficulties of these measurements. Generally the radiative fluxes over the sea regions are estimated on seasonal or monthly scales by empirical formulas which use as "imputs" the meteorological parameters that are more easily measurable. Up to new, the direct measurements of the radiative fluxes were made only in Pacific and Atlantic areas and in some coastal regions in order to determine the surface heat budget over the sea.
The present work reports the measurements of the radiative fluxes made during the oceanographic cruise of the Minerva ship in Sardinian and Tyrrhenian seas on second half of August 1987. The measurements were made with stationary ship and on the 2000 m bathimetric. The downward (↓) and upward (↑) radiation fluxes were measured continuously by means of Moll-Gorczynski thermopiles which were linked to an electronic recorder; the sensors for the incident radiation were installed on the quarter-deck and those for the fluxes coming from the bottom on the end of a boom 6m long and about 3 m above the sea surface. A cardan system has been used in order to keep the apparatus horizontal on average during the pitch and the rolling of the ship. The sensors receiving the short-wave (0.29-2.8 μ) radiation were covered by means of semispherical quartz domes while the surface of the elements for the long-wave (0.29-60 μ) radiation was covered by a moulded polyetilene dome. The calibration of the solarimeters was made before and after the cruise; the constants deduced from the two calibrations differed by only about 1%. The maximum mistake which may concern the short-wave fluxes, G, is smaller than 5% with low solar heights and only 1.5% during the central hours of the day while the mistake for the long-wave radiations, L, can be 10%; this high value is consistent with those generally attributed in literature to measurements of this type. The long-wave radiation in presence of global radiation was determined as difference between the values obtained by thermopiles covered with lupolene and quartz respectively; therefore in the daytime the portion attributable to the long-wave radiation was obtained with these semidirect measurements. The amount of radiation penetrating the sea was obtained by subtracting the reflection loss from the global incoming radiation. All the fluxes are given in W/m^2 and they were considered as positive if downward and negative in opposite way. At the beginning of every hour were measured also the meteorological parameters (atmospheric pressure, air and sea surface temperature, wet-bulb temperature, wind, overcast) in order to determine the surface heat budget.
The surface radiative budget, Q_R, can be expressed by the following relation :

$$Q_R = G\downarrow + G\uparrow + L\downarrow + L\uparrow$$

where : G↓ and G↑ are the incident and reflected solar radiation respectively, L↓ is the long-wave atmospheric radiation and L↑ the long-wave radiation of the sea plus the atmospheric radiation reflected by the sea itself.
The hourly values of G↓ varied between 417.4 W/m^2 (August 20th) and 279.7 W/m^2 (August 27th). The difference is mainly the result of a different amount of clouds; during the 20th August the sky was completely clear while on 27th day at morning the sky was almost completely covered by low and middle-level clouds. The G↑ mean hourly values varied between 28.7 W/m^2 and 18.1 W/m^2. In average, the mean hourly values of G↓ were 383.1 W/m^2 and those of G↑ 25.7 W/m^2. The variations of the global incident mean hourly fluxes were more marked than those of the global reflected solar radiation as showed by the values of the standard dev.. Therefore a great amount (about 94 %) of the solar radiation penetrating the sea increases the water temperature and therefore the long-wave flux outgoing the sea surface. The atmospheric radiation was always smaller, expecially with clear sky, than the long-wave coming from the sea; the first component varied between 345.8 W/m^2 and 354.8 W/m^2 while the L↑ values were between 413.8 W/m^2 and and 429.1 W/m^2; on average during the whole period the values of the incident and outgoing long-wave fluxes were 351.3 W/m^2 and 421.0 W/m^2 respectively; the upward flux was more unchangeable. The measured values of the atmospheric radiation are in reasonable agreement with those estimated from the formula proposed by BRUTSAERT. Measurements of atmospheric radiation made to West of Sardinia by means of Meteosat at 12h GMT April 29th have given a value of 320 W/m^2.
During the measurement period the average short-wave radiation balance, Q_S, was 357.4 W/m^2 while the long-wave balance, Q_1, was negative (-69.7 W/m^2) ; so the average Q_R value was positive and equal to 287.7 W/m^2. These values emphasize the primary importance which the radiative components have in determining the heat balance of the sea surface in August in the central Sardinian and Tyrrhenian seas. Moreover, their knowledge is useful in calibrating the satellite systems.

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