An estimation of surface heat flux over the Northern Adriatic

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Heat exchange between the atmosphere and sea plays an important role in the Northern Adriatic dynamics. In this note preliminary results of the surface heat flux evaluation at three stations in the region are presented.

Monthly means of conventional climatological data (air pressure, air temperature, wind speed, cloud cover, specific humidity, precipitation) and sea surface temperature were used to compute monthly averages for the period 1966 - 1971 at stations Trieste, Rovinj and Mali Losinj. Total downward heat flux was determined from:

$$Q = Q_s - Q_l - Q_e - Q_c$$

where Q_s is the absorbed global solar radiation, Q_l is the net longwave radiation, Q_e is the latent (or evaporative) heat flux, and Q_c is the sensible heat flux. Terms Q_l, Q_e and Q_c were computed according to GILL (1982). Q_s was computed using theempirical relation (PENZAR and PENZAR, 1991):

$$Q_s = Q_{s0} (1 - (1 - a) N) (1 - \alpha)$$

where Q_{s0} monthly average of the clear sky radiation, is corrected for the cloud cover N and reduced with an albedo $\alpha = 0.08$. Terma represents an empirical coefficient.

Figure 1 shows annual cycle of total heat flux into the sea, at three stations in the Northern Adriatic. The sea gains heat in the warm period, from March/April to August/September. This compares well with the results obtained by COLACINO and DELL'OSSO (1975), but not with those published by STRAVISI and CRISCIANI (1986). There is a maximal heat gain in May or June, whereas the maximal heat loss occurs in December at all the stations.

At Trieste and Mali Losinj the sea loses heat with an annual mean surface flux of 17.7 and 30.1 W/m^2, respectively. Conversely, annual mean heat gain is observed at the Rovinj station (25.9 W/m^2). At all the stations Q_s has an annual mean value of about 120 W/m^2, annual mean Q_l is everywhere close to 70 W/m^2, whereas annual mean Q_c range between 5 (Rovinj and Trieste) and 11 W/m^2 (Mali Losinj). The difference between the total annual mean flux at three stations arises mainly from different amount of heat lost by evaporation. At Rovinj Q_e averaged over the year is only 26 W/m^2, at Trieste 55 W/m^2, while at Mali Losinj it amounts to 72 W/m^2.

Difference between total annual precipitation (about 1 m at all the stations) and evaporation has also been evaluated. The precipitation prevails over evaporation everywhere: the annual mean difference is 146 mm at Mali Losinj, 292 mm at Trieste and 584 mm at Rovinj.

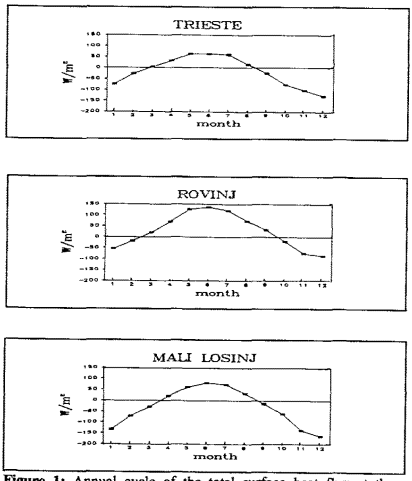

Figure 1: Annual cycle of the total surface heat flux at three stations in the Northern Adriatic.

Acknowledgement

Data were supplied by the Hydrometeorological Institute of the Republic of Croatia (Zagreb) and Istituto Sperimentale Talassografico (Trieste).

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