EVAPORATION IN THE NORTHERN ADRIATIC ON THE BASIS OF HYDROGRAPHIC AND METEOROLOGICAL DATA

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ABSTRACT

Evaporation calculated on the basis of hydrographic and meteorological data collected during oceanographic cruises in the Northern Adriatic from 1966 to 1981 is presented. Particular attention was paid to seasonal characteristics of the evaporation.

Evaporation is included in two of the most important aspects of physical oceanography: mass and energy balance. We calculated the evaporation using momentary values of relevant parameters for Sverdrup's bulk aerodynamic model. The formula (Deacon & Webb, 1962), with the supstitution of water vapor quantities by partial pressures (Mc Lellan, 1968), is:

$$E = 0.622 \frac{\rho \, Du_* (e_s - e_z)}{P\left[(D/\kappa).\ln\frac{z+z_o}{d+z_o} + du_*\right]} \qquad (1)$$

Hydrographic and meteorological data were collected at 34 stations and enabled the calculations by the computerized data bank (Kuzmanović & Ukmar, 1984). The data sets with wind velocities larger than 1 m/s were included in the calculations, but we have to say that the cruises were not performed during bad weather conditions. Of all the data sets the useful are 623 with a minimum of 26 for October and a maximum of 86 for May. The results of the calculation were multiplied by 86400 to obtain daily evaporation. Average daily evaporations per month are given in Figure 1.

The surface salinity has a minimum in summer and a maximum in winter which is almost contrary to the evaporation extrema. The eplanation of this fact could be found in stratification of the water column during summer and cyclonic surface currents from the Po River toward the east coast (Rizzoli & Bergamasco, 1983). A brief calculation of the mass balance showed that the Po River brings in enough fresh-

water to compensate the evaporation effect on the whole Northern Adriatic. During winter the current field is characterized with an inflow along the east coast of saline water from the Middle Adriatic, while the water from the Po River flows out along the west coast (Henderschott & Rizzoli, 1976).

For the 21 July, 1978 the highest evaporation (2.1 cm/day) was calculated. This could explain the decrease of surface temperature for several degrees during 24 hours (Bernot, 1966), due to the latent heat for evaporation taken from a thin surface layer.

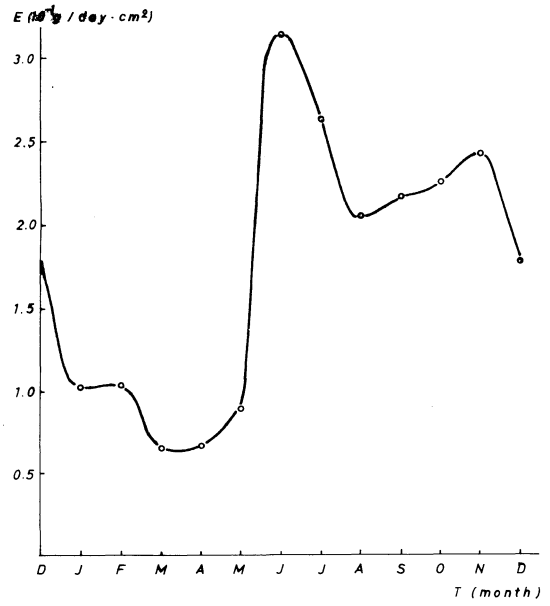

FIGURE 1 Average daily evaporation per month in the Northern Adriatic.

The average evaporation is 62 cm/year and the average depth is 30 m, which means that 2.1 % of the volume of the Northern Adriatic evaporates yearly.

CONCLUSION

Evaporation in the Northern Adriatic has a minimum during spring months (April, May) and a maximum at the beginning of summer (June, July) with lower values in winter (January, February) and higher values in autumn (October, November). The evaporation decreases heating of the surface water during summer, while in autumn and winter it takes part in cooling of the water column. The minimum of evaporation in spring favor heating of the surface layer and the stratification of the water column.

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PS : Cette communication, par suite du changement tardif du programme, a été mise en "affichage".