EVAPORATION PROBLEM AND LONG TERM VARIABILITY IN THE COASTAL AREA

Branka GRBEC and Gordana BEG PAKLAR
Institute of Oceanography and Fisheries, Split, Croatia

Evaporation is a physical process that takes place at the boundary surface between water and the air above it. Evaporation heigh is usually given in the form :

$$h_e = f_1(p) \, x \, f_2(T) \, x \, f_3 \, x \, (e_s - e_w)$$

where each term represents the effect of one of the meteorological elements (p the pressure, T the absolute temperature, u the wind speed); e_s is the maximum vapour pressure corresponding to temperature and salinity of water, ea is the vapour pressure in the air. Different expressions have been chosen for the functions f_1, f_2 and f_3 and a formula of this type results in the well know formulas for empirical evaporations (JAKOBS, 1958; LAEVASTU, 1965; GILL, 1982) showing the dependence of prevailing weather conditions.

Data used for this work were collected from meteorological stations at three location along Adriatic coast (Trieste, northern Adriatic; Split midlle Adriatic and Dubrovnik, southern Adriatic). Based on the mean monthly values, evaporation was calculated first for the station Trieste for the period 1961-1970 using three different bulk aerodynamic formulas (JAKOBS, 1958; LAEVASTU, 1965; GILL, 1982). As e_w and e_a are not linear function of the meteorological parameters, a difference of more than 15% between the results obtained averaging daily evaporation data and ones obtained computing ew and ea by direct used of monthly mean data are evident (PICCO, 1991). Besides using the same data set different empirical constant K appear in formula for evaporations (PICCO, 1991; STRAVISI and CRISCIANI, 1986; SUPIC, 1993). Values found from preceding formula were also different from evaporation obtained by thermal equlibrium equations (ZORE-ARMANDA, 1968). Figure 1 show results of three different formula.

The influence of each meteo-oceanographic parameters in each formula was checked and results were compared with the evaporation data over land (station Trieste). Finaly, the most suitable formula was chosen and used to calculate long-term fluctuations and linear trend along the Adriatic coast.

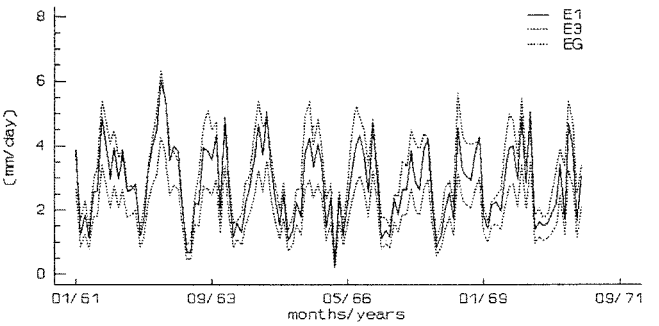

Figure 1. Mean monthly evaporations (mm/day) calculated using three different formula for station Trieste, period 1961-1970. Time series denoted as E1 is calculated using Jacobs formula, E3 using Laevastu and EG using Gills formula.

REFERENCES

GILL A.E.,1982. Atmosphere Ocean Dynamics. Academic Press, New York, N.Y., p. 662

JAKOBSW.C.,1958. On the energy exchange between sea and atmosphere. *J. Mar. Res.* 5 : 37-66

LAEVASTU T., 1960. Factors affecting the temperature of the surface layer of the sea, Merentutkimuslait. Julk. 195, Helsinki.

PICCO P., 1991. Evaporation and Heat Exchanges between the Sea and the Atmosphere in the Gulf of Trieste during 1988. Il Nuovo Cimento, Vol. 14 C, N.4 Luglio-Agosto.

STRAVISI F. and CRISCIANI F., 1986. Estimation of surface heat and buoyancy fluxes in the Gulf of Trieste by mean of bulk formulas. *Boll. Ocean. Teor. Appl.* , IV, I, 55.

SUPIC, N., 1993. Surface Fluxes and Hydrographic characteristics of the Northern adriatic, Sveuciliste u Zagrebu.

ZORE-ARMANDA M., 1968. Evaporation from the Adriatic Sea. Hidrografski godisnjak.