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Correction to the ERA-40 surface flux products consistent with the Mediterranean heat and water budgets

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A new air-sea physics parametrization is developed along with a correction of the ECMWF Era-40 reanalysis in order to close the heat and fresh water budgets for the Mediterranean basin during the period that ranges from 1958 to 2001. The empirical bulk formulas for the evaluation of the radiative part of the total heat flux has been replaced by the use of the ECMWF ERA-40 reanalysis radiative fields. The latter and the basic forcing fields used to compute the surface fluxes on a standard OGCM have been corrected by comparison with different reliable data sets and in-situ data. The correction method is based on the preliminary evaluation of the best estimate of heat and fresh water budgets for the period 1985-2001 using the benchmark fields in order to validate them, and the computation of bias reduction terms applicable to the ECMWF fields for those 17 years. The obtained space-dependent factors are subsequently extended to the entire ERA-40 reanalysis time window. This method provides a surface total heat flux Q_T of $-7\,W/m^2$ and a deficit E-P of $-0.64\,m/yr$. Interannual and climatological values of Q_T and F_T are presented and related to the North Atlantic Oscillation (NAO) index.