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# Air-Sea physics parameterizations and assimilation of sea surface satellite temperatures for the Mediterranean Forecasting System (MFS)

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As a step to improve forecasts of the Mediterranean Sea state variables, a new air-sea physics is developed and implemented in the Mediterranean Forecasting System (MFS) general circulation model. The new air-sea physics, based on heat and water budgets considerations, is composed of two main parts: the modification of the standard bulk formulas for the computation of the radiative part of the heat balance and the use of a bias reduction methodology for the basic ECMWF (European Center for Medium Range Weather Forecast) near surface products used to force the MFS model, including radiation. Various satellite and in situ data sets are used to construct these time and spatially varying corrections. Yearly averaged, their effects are to increase incoming shortwave radiation by 15%, increase wind speed by 20% and rise the specific humidity by about 1g/Kg over the Mediterranean Basin in ECMWF estimates.
The impact of the new parameterization is evaluated by twin experiments done with the MFS Ocean General Circulation Model and by comparison of the model sea surface temperatures with observed satellite temperatures. It is shown that the effect of the new air-sea physics is to change an existing warm bias, obtained with the standard MFS settings, into a cold one during this period of the year.
The model is then further corrected by introducing a novel data assimilation methodology for the satellite SST and this is shown to increase the model skill and partially correct the model cold bias obtained with the new air-sea physics.