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Dynamical coupling between the Mediterranean Sea and the atmosphere. Boundary conditions at the air-sea interface

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ABSTRACT

In oceanography, the need of accurate boundary conditions at the air-sea interface is critical. Indeed the coupling between the atmosphere and the sea is intense, especially via the turbulent fluxes of humidity, temperature, and momentum. A parameterization of these fluxes is then required. To achieve this, one needs to couple hydrodynamical and meteorological models.

A 2-D integral coupled ocean-atmosphere model has then been developed to simulate the transient interactions between the two boundary layers. The heat, water, and momentum exchanges at the interface are investigated, notably to analyze the clouds generation, their possible persistence and the resultant feed-back on the oceanic variables. The solar and IR radiative fluxes are parameterized as functions of the temperature and humidity profiles and vary then with the meteorological events.

This model has already been tested in the Tropics where the dynamics of the coupled ocean-atmosphere system has been proved to be highly dependent on the advective rates and the turbulent fluxes at the interface. The model embedded in an atmospheric GCM and in the GHER Oceanic GCM is applied to the Mediterranean Sea, providing more accurate turbulent fluxes as boundary conditions for the modelling of the general circulation, and on the other hand, contributing to the parameterization of the incidence of meteorological conditions upon the formation of dense waters.

The development and the generalisation of this kind of coupled model will therefore give a highly expected tool to the modellers of the Mediterranean Sea.

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