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Heat fluxes at the Mediterranean sea surface and the relation to the atmospheric large-scale dynamics with a regional coupled model

A. Casado-Lopez and L. Li

LMD-UPMC, Paris, France (alberto.casado@lmd.jussieu.fr, +33(0)1 44 27 62 72)

A regional coupled model is constructed to study the Mediterranean climate. The atmospheric component is LMDZ – a global atmospheric general circulation model with zooming over the Mediterranean region. Such a regional model, resulting from the stretching grid capability ensures a good representation of the interaciotn between the zoomed region and the large-scale dynamics. The oceanic component is NEMO8, a regional circulation model of the Mediterranean Sea with a 10 km resolution grid, Somot et al.

A 44 years simulation with the coupled model is performed through nudging the outside the Zoom domain to ERA40 reanalysis. To quantify the effects of the air-sea coupling, a second simulation is performed with the atmospheric model only. The SST is prescribed as in AMIP type runs. The nudging procedure remains unchanged.

Heat fluxes at the air-sea interface are the main focus of this study. In fact, heat fluxes over the Mediterranean Sea and their variability are still not very well known. A special attention is paid to the interaction of heat fluxes with large-scale dynamics. Comparison of the coupled and uncoupled simulations allows us to isolate the effect of the large-scale from that of the Mediterranean Sea dynamics.

When the time series of the integrated heat fluxes are calculated, a certain periodicity is found with maxima and minima determined by the large-scale dynamics. An attempt is made to characterize the atmospheric large-scale circulation patterns into weather regimes. The total heat flux sctructure over the bassin is then related with the large-scale patterns regimes.