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On the importance of the atmospheric-ocean feedback mechanisms in the Mediterranean storms

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Mediterranean Sea is considered to be a zone of intense cyclonic activity accompanied with extreme winds, waves and heavy precipitation. This can be attributed to several reasons such as the local climatological and geomorphological features. Among the factors related to the development and intensification of such storms, the interaction processes between the air and the ocean surface have an essential role. Both momentum and heat fluxes are highly influenced by the increased winds and waves and their interaction as well as the ocean surface temperature.

In order to describe the complex physical processes taking place in the air-ocean environment under storm events, the interaction effects between the atmospheric and oceanic systems have to be considered. In this study, this is approached by a coupled atmospheric-ocean/wave modeling system. Different expressions of the sea-state conditions are expected to affect the ocean drag and therefore the wind field. Energy fluxes in extreme weather conditions are critical to be estimated on an accurate way. For this reason, the coupling is essential to be for both dynamic and thermodynamic processes. Particular emphasis is given in the treatment of SST. The assimilation of modeled and satellite-derived SST in the system was found to be critical in boundary layer formation.

To study the sensitivity of these air-sea exchange processes, high resolution simulations for characteristic cyclonic events over the Mediterranean Sea are performed, indicating alterations in the development and evolution of the storms.