



## **The role of Ocean-atmosphere interactions in the description of the lee cyclogenesis events over the western Mediterranean Sea**

Alessandro Dell'Aquila, Sandro Calmanti, Paolo M Ruti, Adriana Carillo, Gianmaria Sannino, Maria Vittoria Struglia, and Vincenzo Artale

ENEA, UTMEA-CLIM, C.R. Casaccia, S. Maria di Galeria, Rome, Italy (alessandro.dellaquila@enea.it)

In this work we analyse the representation of the lee cyclogenesis events developing in the western Mediterranean, as depicted by a regional earth system model compared against the outputs from the corresponding atmospheric stand-alone component.

The Regional Earth System developed by ENEA-ICTP, the PROTHEUS system, is an optimal modelling tool for this purpose as it explicitly accounts for the various components of the hydrological cycle and their interactions. In particular, the PROTHEUS system provides a reliable description of high resolution sea surface temperature and wind fields over the ocean, in close agreement to observations thereby providing a reliable description of air-seas fluxes (particularly the latent heat flux). In this analysis, all the terms of hydrological cycle are computed for different simulations performed by an implemented version of PROTHEUS with interactive river runoff. To assess model performances we show a simulation driven by ERA40 together with a 1951-2050 simulation, driven at the lateral boundaries by ECHAM5-MPIOM global simulation, compared against the corresponding simulations performed by regional atmospheric model RegCM3. The ocean-atmosphere interactions permitted in a coupled system critically affect, among others, the spatial pattern and the amplitude of the rainfall associated with the cyclogenesis events. The differences we have here pointed out highlight the crucial role of air-sea interactions even in the description of high frequency disturbances, especially in the western Mediterranean.

The modelling tools presented in this work, developed in the framework of CIRCE EU Project RL2, will also contribute to the Med-CORDEX activities.