Geophysical Research Abstracts
Vol. 18, EGU2016-9512-1, 2016
EGU General Assembly 2016

Simulation of the effect of diabatic heating in a case of explosive cyclogenesis in the Eastern Mediterranean with the aid of the model COSMO-GR

John Kouroutzoglou (1,2), Evripides Avgoustoglou (1), Helena A. Flocas (2), Maria Hatzaki (3), Haralambos Karvelis (1), and Kevin Keay (4)

(1) Hellenic National Meteorological Service, Athens, Greece, (2) Department of Atmospheric Physics-Meteorology, Faculty of Physics, National and Kapodistrian University of Athens, Athens, Greece, (3) Department of Geography and Climatology, Faculty of Geology of Geoenvironment, National and Kapodistrian Univeristy of Athens, Athens, Greece, (4) School of Earth, Atmosphere & Environment, Monash University, Victoria, Australia

The effect of low-level diabatic heating is considered as an important factor in the development and evolution of explosive cyclones in the Mediterranean that, however, presents significant differences among different sub-areas and cases. The objective of this study is to assess the ability of the parameterization scheme of the regional non-hydrostatic atmospheric model (COSMO-GR) to simulate the spatial and temporal variations of low-level diabatic heating in a case of explosive cyclogenesis that occurred in the Cyprus area. Model runs are performed for a series of different values of the model parameter "sea roughness" that has proved to significantly affect the simulation of the sea surface fluxes. Then, the derived sea pressure values for each run are compared with observations from surface meteorological stations and ECMWF analyses. It was found that smaller values of the sea roughness parameter compared to the default parameterization, lead to significant enhancement of the magnitude of the surface deepening rates during the explosive deepening period and, thus, to lower minimum pressures that are closer to the observed values. Moreover, the tests demonstrated that the inclusion of latent heat release in the middle troposphere is required to determine a more suitable parameterization of the model physics in order to avoid the underestimation of the thermodynamic mechanisms and, thus, the non-effective evolution of the surface cyclone.