



Analysis of a subtropical cyclone in the North Atlantic Ocean by means of the HARMONIE-AROME model: evaluation against satellite data

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Subtropical cyclones (STCs) are low-pressure atmospheric systems characterized by having a hybrid structure that shares tropical and extratropical features. Due to their rapid intensification and harmful impacts, sometimes similar to those generated by tropical storms or even hurricanes, the implementation of accurate simulations becomes key for improving their forecast. In this study, a particular STC developed in October 2014 near the Canary Islands is analyzed using the high-resolution HARMONIE-AROME model. This model is developed and operated at 2.5 km resolution through the collaboration of the 10 European National Meteorological Services (NMS) that are part of the international research program HIRLAM together with the 16 countries that comprise the ALADIN consortium. The HARMONIE-AROME model has a convection-permitting configuration and uses a non-hydrostatic spectral dynamical core with a semi-Lagrangian and semi-implicit discretization of the equations, which implies a lower computational cost. In order to evaluate the environment in which the cyclone was formed, several convective tools are used. In addition, the cyclone phase space diagrams (CPS) are used to thermodynamically categorize the STC as a hybrid system. Furthermore, considering the difficulty of obtaining observational data in the vicinity of this type of system, most of the time located in the middle of the ocean, the use of satellite data becomes key for the validation of the model's simulations. Consequently, in this study, the simulated cloud top height is assessed for the October 2014 STC.