



Multi-sensor approach for a satellite detection and characterization of Mediterranean Hurricanes: a case study

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The extreme events on the Mediterranean basin are often associated to well-organized mesoscale systems, which usually develop over Northern Africa intensifying in presence of warm sea surface and cold air from the North. Although the synoptic conditions are often well known, the physical processes behind the genesis and development of a particular kind of these mesoscale systems called Medicane or Tropical-like Cyclone (TLC) is not well understood. A Medicane is a Mediterranean cyclogenesis with characteristics similar to those of the tropical cyclones such as spiral-like cloud bands and the presence of an “eye”. The aim of this study is the improvement of the current knowledge on the Medicane structure using a satellite multi-sensor approach. Recent studies (Miglietta et al. 2013) based on the numerical model WRF demonstrate that a Medicane structure can be clearly identified by analyzing its thermal symmetry between 600 and 900 hPa: the presence of a warm core uniquely distinguishes between Mediterranean TLCs from baroclinic cyclones. The challenge of this study is the description of the physical structure of a Medicane only by using the satellite sensors. However, in the current version of the algorithm the wind field required to calculate the vorticity parameter is provided by the WRF model. The computational scheme of the algorithm quantifies the external features and the inner properties of a possible TLC: the geometrical symmetry often but not always spiral-shaped, type and altitude of clouds, and the distribution of precipitation patterns are significant elements to flag an intense Mediterranean cyclogenesis as Medicane. The method also takes into account the electrical activity of the storm in terms of number of strokes during the last 24 hours to refine the TLC identification.

Keywords: Satellite, Microwave radiometry, Medicane, retrieval methods, Remote sensing

Reference

Miglietta, M. M., S. Laviola, A. Malvaldi, D. Conte, V. Levizzani, and C. Price, 2013: Analysis of tropical-like cyclone over the Mediterranean Sea through a combined modeling and satellite approach. *Geophys. Res. Lett.*, 40, 2400-2405, doi:10.1002/grl.50432.