



Thermodynamic structure of medicanes against hurricanes

Kostas Douvis, Iliana Polychroni, Markos Mylonas, Nadia Politi, and Panagiotis Nastos

Laboratory of Climatology and Atmospheric Environment, Faculty of Geology and Geoenvironment, National and Kapodistrian University of Athens, University Campus, GR 15784 Athens, Greece (cdouvis@geol.uoa.gr)

A new approach for the detection and certification of Mediterranean tropical-like hurricanes (TLCs) is described, in the frame of the research program MEDICANE, undertaken by the Laboratory of Climatology and Atmospheric Environment (LACAE) of the National and Kapodistrian University of Athens. A number of TLCs, also known as medicanes (i.e. Mediterranean hurricanes), have been identified in recent decades. These phenomena occur similarly to sub-tropical storms, when a baroclinic system undergoes a transformation by acquiring axial symmetry and losing its fronts. The determination of whether a system has acquired tropical characteristics is typically performed using Hart diagrams, a set of phase-diagrams of the axis-symmetry and thermal wind in different elevations. Hart diagrams, although they are the established way of answering this question for the phenomena of the tropical oceans, seem to function moderately well over the Mediterranean. This is in part due to the smaller size of the Mediterranean systems, but also because of differences in the thermodynamic structure. Most notably the determining factor for the development of TLCs is not the sea surface temperature but rather the existence of a cold lake aloft which causes instability and intense vertical motions. Preliminary results have shown that TLCs have different structure and behavior than the oceanic sub-tropical systems. This study is part of an effort to develop a variant of the Hart diagrams that is more suitable for the detection of TLCs. The objective is to produce a method suitable to detect TLCs in gridded data. Such a method could be applied to produce a detailed catalog of historic TLC occurrences based on re-analysis datasets, allowing for a more accurate climatology of the phenomenon. Also, it could be used to enhance our ability to recognize the tropical characteristics in current events and improve our ability to simulate them.

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