



## **Synoptic analysis of some tropical-like cyclones over the Mediterranean Sea using ECMWF reanalysis data**

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Earlier studies suggested that tropical cyclones develop only over warm sea surface from convective systems. In the last decades satellite observations confirmed that sometimes tropical cyclones develop from extratropical cyclones over the mid-latitude part of the Atlantic Ocean. Since this process occurs over cooler sea, these 'hybrid' tropical cyclones are smaller and weaker than the usual ones. In the last years, such cyclones developed in autumn and in winter over the Mediterranean Sea also, although the sea surface temperature was only in autumn so warm as over the Atlantic ocean.

A comparative analysis of the Atlantic Hurricane Vince (2005) was accomplished together with four tropical-like Mediterranean cyclones, Callisto (1996), Zsanett (2007), Rolf (2011), and Tünde (2015), which all occurred in autumn when the sea surface temperature was around 20 °C. This current work is based on satellite and land observations and ECMWF model analysis data with 0.125° resolution. The following parameters have been examined from the reanalyses in details: thickness between 500-1000 hPa and 200-1000 hPa geopotential height at 925 hPa, equivalent potential temperature, winds, relative vorticity and vertical speed at 850 hPa, divergence, winds and potential vorticity at 300 hPa. These parameters are typically very different from each other in case of extratropical and tropical cyclones. In case of the analyzed cyclones, extratropical and tropical development stages were well identifiable during their life-cycle.