



Objective Climatologies of Cyclones in the Mediterranean Region: implications of system identification and tracking criteria.

Piero Lionello (1,8), Isabel F. Trigo (2), Victoria Gil Alfonso (3), Margarita L. R. Liberato (4), Katrin Nissen (5), Joaquim G. Pinto (6), Marco Reale (7), Ricardo M. Trigo (3), Sven Ulbrich (6), and Uwe Ulbrich (5)

(1) DiSTeBA, University of Salento, Lecce, Italy, (2) Instituto Portugues do Mar e da Atmosfera (IPMA), Lisboa, Portugal, (3) Instituto Dom Luiz (IDL), Universidade de Lisboa, Lisboa, Portugal, (4) Escola de Ciências e Tecnologia, Universidade de Trás-os-Montes e Alto Douro (UTAD), Vila Real, Portugal, (5) Institut fuer Meteorologie, Freie Universitaet Berlin, Germany, (6) Institute for Geophysics and Meteorology University of Cologne, Germany, (7) University of Trieste, Trieste, Italy, (8) CMCC, Euro Mediterranean Center on Climate Change, Lecce, Italy

The development or re-intensification of low pressure systems is a recurrent phenomenon in the Mediterranean Region. The area favours a wide variety of cyclogenesis mechanisms, such as the deepening of mid-latitude perturbations at the lee of the Pyrenees or the Alps, their fuelling by low level moisture source and/or by low level baroclinicity along the coast, or the formation of thermal lows over warm inland regions. As a consequence, the Mediterranean is prone to the occurrence of cyclones with a broad range of characteristics, from synoptic to mesoscale, and a variety of intensities and depths.

This study analyses a cyclone track database collected within the framework of IMILAST project by 14 different cyclone detection and tracking methods. They are all based on objective criteria applied to fields provided by ERA-Interim reanalysis, available 6-hourly and downloaded at 1.5°x1.5° space resolution. Four methods considered also fields at 0.75° x 0.75° spatial resolution. The various methods for cyclone identification look for signatures near the surface: minima in mean sea level pressure or 1000 hPa geopotential height, or for vorticity maxima at 850 hPa. The tracking is then performed through the analysis of centres identified in consecutive time slots and imposing a set of a priori conditions on the velocity admissible for mid-latitude cyclones.

The cyclone databases contain a high variability in the number of identified systems. Differences among methods are particularly pronounced during late spring and summer and are closely linked to the way stationary thermal troughs are treated by each method. The spatial distributions of identified cyclones and tracks are further analysed on a seasonal basis, together with distributions of cyclone characteristics obtained from the different databases: system duration, intensity and velocity. A number of case studies are also considered to understand the main sources of discrepancies among detection criteria. However, it is acknowledged that all the methods under analysis present advantages and drawbacks. Ultimately, it is the ensemble of cyclone databases collected within IMILAST that allows the robust characterization of the spatial distribution, characteristics and interannual variability of storms in the Mediterranean Region.