



An analysis of consensus and disagreement among different cyclone tracking methods on the climatology of cyclones in the Mediterranean region

Piero Lionello (1,11), Isabel F. Trigo (2), Victoria Gil (3), Margarida M.L. Liberato (4), Katrin M. Nissen (5), Joaquim G. Pinto (6,7), Christof C. Raible (8), Marco Reale (9), Annalisa Tanzarella (10), Ricardo M. Trigo (3), Sven Ulbrich (7), and Uwe Ulbrich (5)

(1) University of Salento, DISTEBA, Lecce, Italy (piero.lionello@unisalento.it), (2) Instituto Português 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) Institute for Meteorologie, Freie Universität Berlin, Germany, (6) Department of Meteorology, University of Reading, United Kingdom, (7) Institute for Geophysics and Meteorology, University of Cologne, Germany, (8) Climate and Environmental Physics and Oeschger Center for Climate Change Research, University of Bern, Switzerland, (9) OGS, Osservatorio Geofisico Sperimentale, Trieste, Italy, (10) ARPA Puglia, Taranto, Italy, (11) CMCC, Euro Mediterranean Center on Climate Change, Italy

Small but intense features and frequent cyclogenesis characterize the Mediterranean storm track (a well-defined branch of the North Hemisphere storm track) and pose a challenge for cyclone detection and tracking methods. Because of this, the analysis of the climatology of cyclones in the Mediterranean region is an ideal case study for investigating consensus and disagreement among methods. To identify robust features and sources of disagreement is important for giving the correct weight to the results of several studies that considered trends and future change of cyclone number and intensity in the Mediterranean region. In this study a set of 14 cyclone detection and tracking methods has been used and applied to the ERA-Interim dataset for the period 1979-2008. Results show large differences in actual cyclone numbers among different methods, but a substantial consensus on location, annual cycle and trends of cyclone tracks. In general, methods agree on cyclogenesis areas, such as the north-western Mediterranean, North Africa, north shore of the Levantine basin, as well as the seasonality of their maxima. Disagreement among methods is largest when counting weak and slow cyclones. It is substantially reduced if cyclone numbers are transformed to a dimensionless index, which helps to focus on sign and significance of trends by separating information on time behaviours and spatial structures from the differences of mean values and interannual variances. Results show significant negative trends in spring and positive trends in summer, which compensate each other at annual scale, so that there is no significant long-term trend in total cyclone numbers in the Mediterranean basin in the 1979-2008 period.