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Comparison of cyclone climatology from a regional climate model simulation and from two reanalyses

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The weather and consequently the climate of mid-latitudes are strongly influenced by cyclones. Hence the analysis of mid-latitude cyclones is a key issue both in terms of the present and the future climatic conditions. The very first step of a comprehensive analysis is to understand the main determining mechanisms of cyclones in the present, and investigate how well climate models can reproduce the major characteristics of the synoptic scale circulation.
In this study we analyse the climatology of cyclones for the recent past using the 1981-2010 time period on the basis of a regional climate model, namely RegCM simulation, and compare it to two cyclone climatology results from two different reanalyses datasets. For this purpose, we use the ERA Interim reanalysis and the NCEP DOE Reanalysis II with 0.75° and 2.5° horizontal resolution, respectively. The driving field of the RegCM simulation is also the ERA Interim reanalysis, but on a lower resolution (1.5°). The selected domain is the Mediterranean region (i.e. Med-CORDEX domain) being a genesis and reinforcement area for cyclones due to the orography and the presence of the Mediterranean Sea. The cyclones, which evolve here are especially important because most of the hazardous weather phenomena in the Mediterranean are associated with them.
For cyclone identification we used mean sea level pressure (MSLP) and 850 hPa isobaric level vorticity fields. The identification algorithm searches for cyclone centres defined as local pressure minima in the MSLP field, and vorticity maxima at the 850 hPa isobaric level.
The differences between the reanalyses are evaluated. In addition, the comparison of the ERA Interim (0.75°) and the RegCM results shows how RegCM resolves the dynamical system from the boundary conditions.