



Storm-tracks interannual variability and large-scale climate modes

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In this study we focus on the interannual variability and observed changes in northern hemisphere mid-latitude storm-tracks and relate them to large scale atmospheric circulation variability modes. Extratropical storminess, cyclones dominant paths, frequency and intensity have long been the object of climatological studies. The analysis of storm characteristics and historical trends presented here is based on the cyclone detecting and tracking algorithm first developed for the Mediterranean region (Trigo et al. 1999) and recently extended to a larger Euro-Atlantic region (Trigo 2006). The objective methodology, which identifies and follows individual lows as minima in SLP fields, fulfilling a set of conditions regarding the central pressure and the pressure gradient, is applied to the northern hemisphere 6-hourly geopotential data at 1000 hPa from the 20th Century Reanalyses (20CRv2) project and from reanalyses datasets provided by the European Centre for Medium-Range Weather Forecasts (ECMWF): ERA-40 and ERA Interim reanalyses.

First, we assess the interannual variability and cyclone frequency trends for each of the datasets, for the 20th century and for the period between 1958 and 2002 using the highest spatial resolution available ($1.125^\circ \times 1.125^\circ$) from the ERA-40 data. Results show that winter variability of storm paths, cyclone frequency and travel times is in agreement with the reported variability in a number of large-scale climate patterns (including the North Atlantic Oscillation, the East Atlantic Pattern and the Scandinavian Pattern). In addition, three storm-track databases are built spanning the common available extended winter seasons from October 1979 to March 2002. Although relatively short, this common period allows a comparison of systems represented in reanalyses datasets with distinct horizontal resolutions. This exercise is mostly focused on the key areas of cyclogenesis and cyclolysis and main cyclone characteristics over the northern hemisphere.

Trigo IF., TD Davies, GR Bigg (1999) Objective climatology of cyclones in the Mediterranean region. *J. Climate* 12: 1685-1696.

Trigo IF (2006) Climatology and interannual variability of storm-tracks in the Euro-Atlantic sector: a comparison between ERA-40 and NCEP/NCAR reanalyses. *Clim. Dyn.* 26: 127-143.