Feature-based forecast assessment of (extra-)tropical cyclones during the YOTC (2008-2010) period.

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Mid-latitude high impact weather (HIW) is often caused by extratropical cyclones and less frequently but similarly intense by tropical cyclones undergoing extratropical transition. Despite the overall progress in the representation of the general large-scale mid-latitude flow, the correct prediction of individual cyclones, their track, structure and intensity, and their associated HIW is still a challenge for general circulation models.

In this project we systematically assess the quality of deterministic predictions of all cyclones during the YOTC period (year of tropical convection; May 2008 to April 2010). For that period, ECMWF provides a special dataset of its model's analyses and forecasts that includes output of the physical tendency terms. These physical tendencies potentially allow tracking down forecast errors to the representation of physical processes in the model. We focus particularly on the role of diabatic processes in reducing forecast skill for extratropical cyclones.

Although our technique can be applied to both tropical and extratropical cyclones, our focus is on the mid-latitudes. In a feature-based approach, forecast error of individual cyclones are quantified in terms of geographical region, location, size, intensity and extremeness. Extremeness is defined with the help of grid-point based thresholds for 2m temperature, total precipitation, and 10m wind gusts. After compiling this climatology we elucidate (i) if systematic forecast errors on different spatial and temporal scales exist and (ii) if they can be linked to discrepancies in the representation of distinct physical processes. In a future step the novel feature-based diagnostic tools could be applied to datasets covering larger periods, e.g. the ERA-Interim reanalyses and/or to other weather systems (e.g., blocking anticyclones).