



Extratropical transition in ECMWF ensemble forecasts: case studies and sensitivity experiments

D. Anwender (1), M. Leutbecher (2), S. Jones (1) and P. Harr (3)

(1) Institut für Meteorologie und Klimaforschung, Universität Karlsruhe / Forschungszentrum Karlsruhe, (2) ECMWF, Reading, (3) Department of Meteorology, Naval Postgraduate School, Monterey, CA

The extratropical transition (ET) of tropical cyclones often has a negative impact on the predictability of the atmospheric situation both around the ET event and further downstream. Guidance with respect to this uncertainty can be obtained from ensemble prediction systems. We investigate the representation of several tropical cyclones that underwent ET in the ensemble prediction system of the ECMWF.

Investigating the variability in association with an ET in the ensemble members in terms of the standard deviation of the 500 hPa geopotential we find that plumes of high uncertainty spread downstream of each ET event. With the aid of EOF analysis combined with clustering of the principal components, a characteristic variability pattern could be found in these regions of high uncertainty. Relations between the contribution of the individual clusters to this pattern of variability and their ET development could be seen.

Furthermore, we present sensitivity experiments using the ECMWF EPS to investigate the impact of the perturbations targeted around tropical cyclones on the predictability of the extratropical transition and the downstream flow. Ensemble forecasts with no stochastic physics are compared with experiments that are identical except that the targeting for a specific tropical cyclone is switched off. In addition, ensemble forecasts without targeted perturbations are compared for runs with and without stochastic physics. Finally, the impact of higher resolution in the EPS is investigated.