EMS Annual Meeting Abstracts
Vol. 8, EMS2011-41, 2011
11th EMS / 10th ECAM

Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Quantification of the impact of extratropical transition on the midlatitude flow using potential vorticity inversion

C.M. Grams and S.C. Jones

Karlsruher Institut für Technologie (KIT), Institut für Meteorologie und Klimaforschung, Germany (grams@kit.edu)

Tropical cyclones (TC) that move poleward often recurve and may transform in an extratropical system. This process is referred to as extratropical transition (ET). The interaction of a TC undergoing ET and the midlatitude flow can alter the midlatitude wave guide and thus have an impact on weather systems downstream in the Atlantic-European and Northwest-American sector. In this study numerical simulations with the COSMO model along with a PV surgery method and trajectory calculations are used to investigate the physical mechanisms which are responsible for the midlatitude impact of ET.

In terms of potential vorticity (PV) thinking a TC is characterised by a strong positive PV anomaly in the TC core and a negative anomaly aloft. A PV Inversion technique allows to remove the PV anomaly associated with the TC undergoing ET in the initial conditions of a COSMO run. Comparing this COSMO run against a model run initialised from the non-modified fields enables to quantify the impact of the ET system on the midlatitude flow. In this presentation we highlight the impact of Typhoon Jangmi (2008) on the midlatitude jet. We identify the advection of low PV air at upper levels by the outflow of Jangmi as the main process leading to an amplification of the downstream ridge and an acceleration of the midlatitude jet. This result is discussed along with a variety of other Pacific and Atlantic ET cases.