Process–oriented dynamical evaluation of LM precipitation forecasts

A. Claußnitzer, P. Névir, and U. Cubasch

Institut für Meteorologie, Freie Universität Berlin, Germany
(antje.claussnitzer@met.fu-berlin.de)

In the last years of the development of numerical weather prediction (NWP) models there has been great progress in the short-term and middle-term forecast of temperature, wind speed or direction and cloud coverage, but only little success in the quantitative precipitation forecast. To improve the NWP models, it is necessary to understand the precipitation processes. A central goal is the statistical evaluation of precipitation forecasts with dynamical parameters. Here, the newly designed Dynamic State Index (DSI) is used as dynamical threshold parameter. The DSI theoretically describes the change of atmospheric flow fields as deviations from a stationary adiabatic solution of the primitive equations (Névir, 2004). In the synoptic scale the DSI constitutes ageostrophic and in the meso–scale diabatic and non–stationary processes. These processes are particularly aligned with extreme events. For successive Januaries and Julies the DSI shows a remarkably high correlation with the precipitation analyses of the Lokal–Modell (LM) of the German Weather Service, even without regarding the specific humidity fields. Furthermore, two case studies, representing a "normal" passage of a cold front and a cold front with severe precipitation, show, that the DSI features the frontal structure and convective cells. Especially, the DSI reflects the precipitation pattern. Thus, the DSI opens the possibility as a new dynamical forecast tool for severe precipitation events.