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Weather-type stratified verification of quantitative precipitation forecasts with the feature based technique SAL

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Recently, a new generation of NWP models has been developed with a horizontal grid spacing that allows the explicit simulation of deep convection. In this study, we investigate whether this new category of models produces better precipitation forecasts than the previous model generation with parameterized deep convection - and in particular, we like to investigate whether the differences are more pronounced during certain weather types.

Quantitative precipitation forecasts (QPF) from 20 deterministic forecast models from the MAP D-PHASE experiment are analysed with the feature-based verification technique SAL during the DOP (Demonstration Observation Period; June till November 2007). SAL contains three independent components that consider aspects of the structure (S), amplitude (A) and location (L) of the precipitation field in a pre-defined domain, in this study the German part of the COPS area. The weather type classification is based upon an objective front analysis tool recently developed at the ETH Zurich. This tool identifies fronts as regions with intense horizontal gradients in the equivalent potential temperature field at 850 hPa. It allows to distinguish between quasi-stationary fronts and propagating warm and cold fronts. We will use the objectively identified fronts to classify precipitation events either as pre-frontal, frontal or post-frontal, and in the absence of any significant frontal structures and for warm surface conditions as air-mass convection. The observational data set used for the verification has an hourly time resolution and is based upon a disaggregation technique, which combines the high temporal resolution of radar data with the fairly high accuracy of the amount of precipitation obtained from rain gauge measurements. All precipitation data sets have been transformed onto the same grid with a horizontal grid space of 7 km.

Evaluations of daily accumulated QPFs show that most of the very high resolution models (i.e. those without parameterized deep convection) have smaller structure errors as expressed by the S-Component of SAL. In terms of amplitude, the differences between the two model categories are less systematic. This investigation will be extended to the analysis of QPFs with different accumulation times (e.g. 3 and 6 hours). The weather-type dependent stratification will reveal more specific differences between the two model categories.