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SAL - a novel quality measure for the verification of high-resolution precipitation forecasts

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Current regional NWP models produce precipitation forecasts with high spatial and temporal resolution, frequently showing pronounced small-scale structures (e.g. individual convective cells, narrow rainbands, convective systems). Conventional grid-point based verification techniques do not provide a meaningful guidance when assessing the quality of QPFs from high-resolution models. Therefore, several approaches for QPF verification are currently developed that identify distinct precipitation objects, associate the objects found in the observations with those from the model and quantify the errors in the prediction of these features. However, in the presence of several small-scale precipitation cells, it becomes difficult to link individual objects in the observations and model forecast.

Here an alternative approach is suggested, that considers the general structure of finite precipitation objects both in the observations and model forecast, but is independent from a direct linking of objects in the two fields. The novel error measure is termed "SAL". It separately considers aspects of the structure, amplitude and location of a QPF in a certain region of interest, for instance a (larger) river catchment. Relatively simple measures are specified for the aspects of amplitude and location, based upon the domain averaged precipitation and the center of mass of the precipitation fields. The structure component S is calculated as the averaged volume of the normalized precipitation objects. Defined in such a way, S is able to distinguish between large and small, as well as flat and peaked objects.

SAL has been implemented so far for the evaluation of the performance of the

ECMWF global model and of the COSMO-aLMo model with 7 km horizontal resolution, the operational limited-area NWP model at the Swiss weather service. Application of SAL to the 24-hour accumulated precipitation fields from these models indicates that in a statistical sense they perform similarly in terms of amplitude and location (A and L components), but that the higher-resolution COSMO-aLMo is better able to capture the structure of the precipitation field (S component), in particular during summer. If possible, first results will also be shown of the performance of the newly developed model version COSMO-LMK, that runs with a horizontal resolution of 2.8 km and without parameterized deep convection.