A comparative verification of high resolution precipitation forecasts using model output statistics

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Verification of localized events such as precipitation has become even more challenging with the advent of high-resolution meso-scale numerical weather prediction (NWP). The realism of a forecast suggests that it should compare well against precipitation radar imagery with similar resolution, both spatially and temporally. Spatial verification methods solve some of the representativity issues that point verification gives rise to. In this study a verification strategy based on model output statistics is applied that aims to address both double penalty and resolution effects that are inherent to comparisons of NWP models with different resolutions. Using predictors based on spatial precipitation patterns around a set of stations, an extended logistic regression (ELR) equation is deduced, leading to a probability forecast distribution of precipitation for each NWP model, analysis and lead time. The ELR equations are derived for predictands based on areal calibrated radar precipitation and SYNOP observations. The aim is to extract maximum information from a series of precipitation forecasts, like a trained forecaster would. The method is applied to the non-hydrostatic model Harmonie (2.5 km resolution), Hirlam (11 km resolution) and the ECMWF model (16 km resolution), overall yielding similar Brier skill scores for the 3 post-processed models, but larger differences for individual lead times. Besides, the Fractions Skill Score is computed using the 3 deterministic forecasts, showing somewhat better skill for the Harmonie model. In other words, despite the realism of Harmonie precipitation forecasts, they only perform similarly or somewhat better than precipitation forecasts from the 2 lower resolution models, at least in the Netherlands.