On the problem of merging nowcasts into NWP model forecasts

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Precipitation nowcasts, which are based on the extrapolation of observed precipitation patterns and trends, typically produce smaller forecast errors than current numerical weather prediction (NWP) models during the first 2-3 hours of a forecast. Hydrological applications with high update frequency and high temporal resolution ought to be able to benefit from this increased skill without losing forecast quality outside the nowcasting range. The classical method of combining the forecasts is prescribed weighting as a function of forecast time. The time constant(s) of the weighting function are usually optimized based on verification results. This method yields an improvement over the pure NWP forecast but does not take into account the changing quality of the NWP forecast from case to case. Moreover, if the nowcasting part is based on pure translation (no cell initiation) such a static combination also creates the problem of delayed onset of diurnally forced convective precipitation. In search for a better way of combination, a new adaptive method is tested which is based on an assessment of the skill of the latest NWP forecast. Depending on the difference between NWP and observed precipitation, the time constants in the weighting function are recomputed for each forecast. It is shown how much additional forecast skill can be gained by this method, and how the results depend on the choice of scale in the determination of differences between NWP results and observations.