# Assimilation of extrapolated radar reflectivity into a COSMO NWP model and its impact on forecasts of convective precipitation

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## 1. Introduction

Recent high-resolution NWP models are supposed to be able to directly simulate the larger-scale elements of organised convection. These models assimilate the latest data, to have a chance to forecast rapidly developing convective storms. For operational precipitation nowcasting, however, much simpler models based on extrapolation of radar reflectivity are usually used. This paper deals with the nowcasting of convective precipitation, and it proposes a method assimilating observed and extrapolated radar reflectivity.

## 2. NWP model COSMO

We applied the non-hydrostatic COSMO NWP model, version 4.8. The model was run without the parameterisation of deep convection but the parameterisation of shallow convection was included. Initial and lateral boundary conditions were derived from the prognostic fields of the COSMO-EU model, whose horizontal resolution is about 7 km.

## 3. Assimilated data and assimilation method

Two data types were assimilated: (i) measured radar reflectivity; (ii) extrapolated radar reflectivity using the COTREC algorithm (Novak, 2009). The assimilation technique is based on a correction of model water vapour mixing ratio,which depends on the difference of observed and model rain rates (Sokol and Rezacova, 2009).

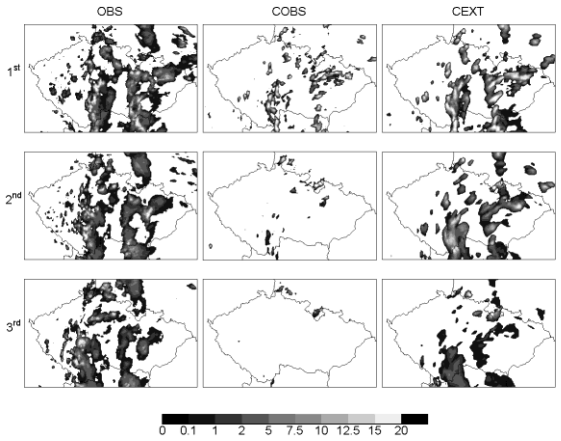
## 4. Results

The assimilation was applied to forecasts for nine days between 24 June and 7 July,

2009. Every day the model started the integration and assimilation at 09 UTC. The assimilation of observed data finished at T UTC and in the interval [T, T+1h] continued the assimilation of extrapolated data; T was 12, ... , 17 UTC. The forecasts were evaluated by using Fractions Skill Score (FSS; Roberts and Lean, 2008) and by eye.

The results can be summarized as follows and they are illustrated by Figures 1 and 2:

- The assimilation of extrapolated data apparently improves the accuracy of precipitation forecasts in comparison with the assimilation of observed data only.
- The assimilation of extrapolated data usually improves precipitation forecasts for the first three hours.



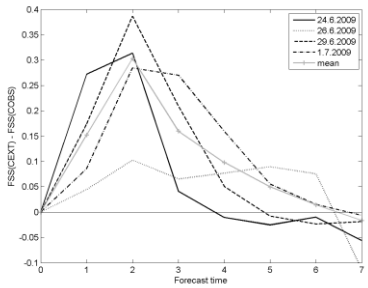




Figure 1 (left): 1-h precipitation observed (OBS) and forecasted (COBS: radar data, CEXT: radar + extrapolated data assimilation) for 29 June 2009, 16-18 UTC. The forecast started at 15 UTC. The 1st, 2nd and 3rd rows correspond to forecasted hours.
Figure 2 (right): Mean FSS differences between forecasts with observed and extrapolated data in dependence on forecast lead time.

**Acknowledgements**

The work was supported by the grants GACR 205/07/0905, OC112 and ME09033.

**References**

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