

Motivation

Purpose

- Enables to evaluate historical extreme precipitation events (EPEs) in terms of their sub-daily extremity
- Enables a quantitative assessment of the relationship among properties of EPEs and causal atmospheric (thermo) dynamic conditions

Current status:

- Observations of historical EPEs in a high temporal step with a sufficient level of accuracy are missing

Possible solution:

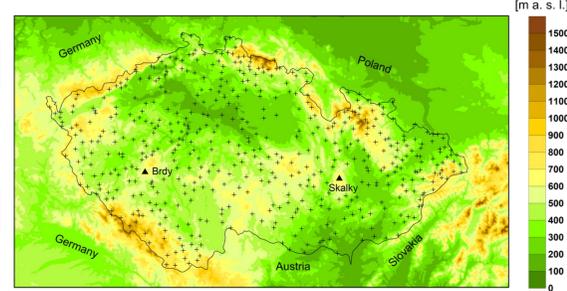
- Combination of rain gauge and NWP model data using an appropriate adjustment method

Data

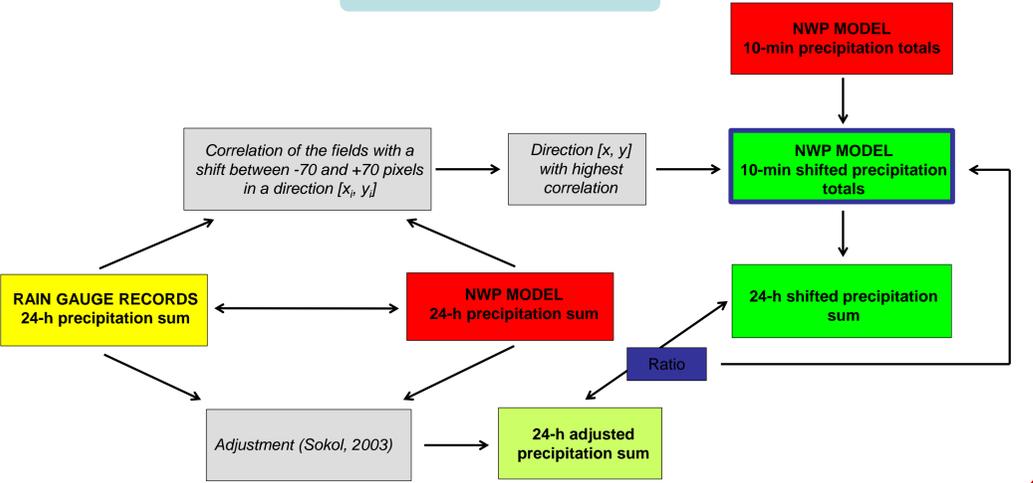
- NWP model COSMO**
- Horizontal resolution: 2.8 km
 - Forecast output: 10 min
- Rain gauge data**
- 650-780 rain gauges
 - Temporal resolution: 24 hours
- Radar reflectivity data**
- 2 Czech C-band Doppler radars - Brdy, Skalky
 - Constant Altitude Plan Position Indicator (CAPPI 2 km)
 - Temporal resolution:
 - 10 minutes (up to May 2009)
 - 5 minutes (since June 2009 onwards)
 - Horizontal resolution: 1 km

Temporal reconstruction

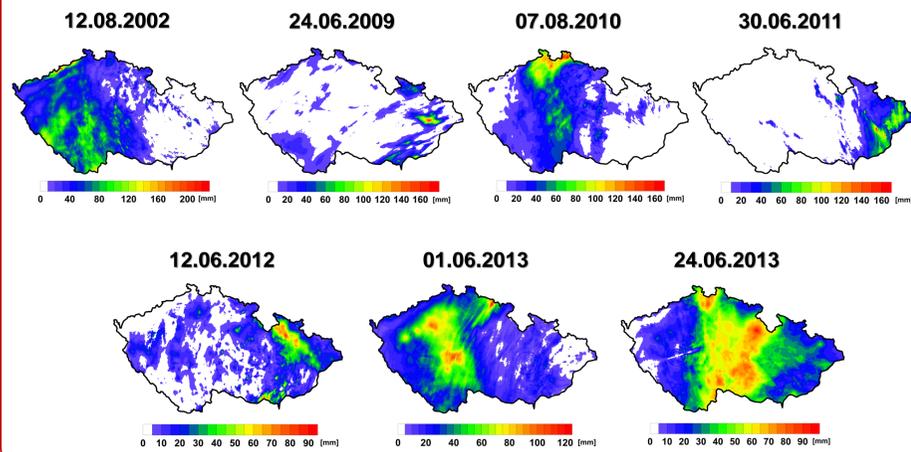
Verification



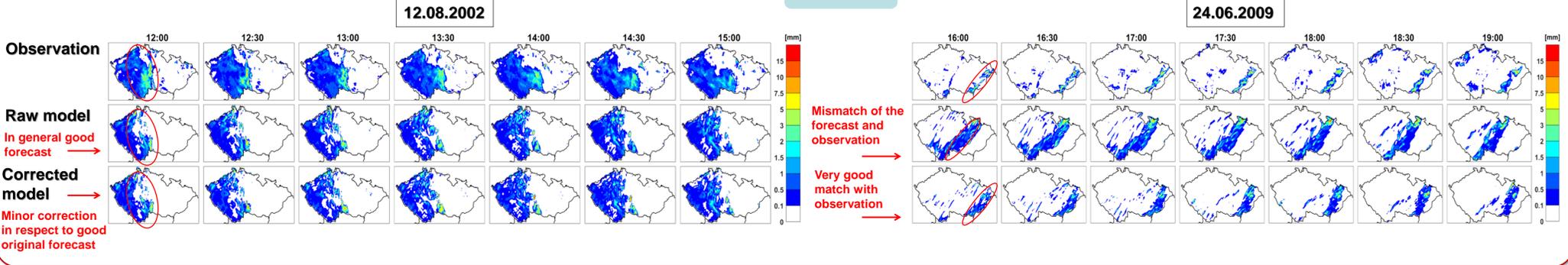
Temporal reconstruction



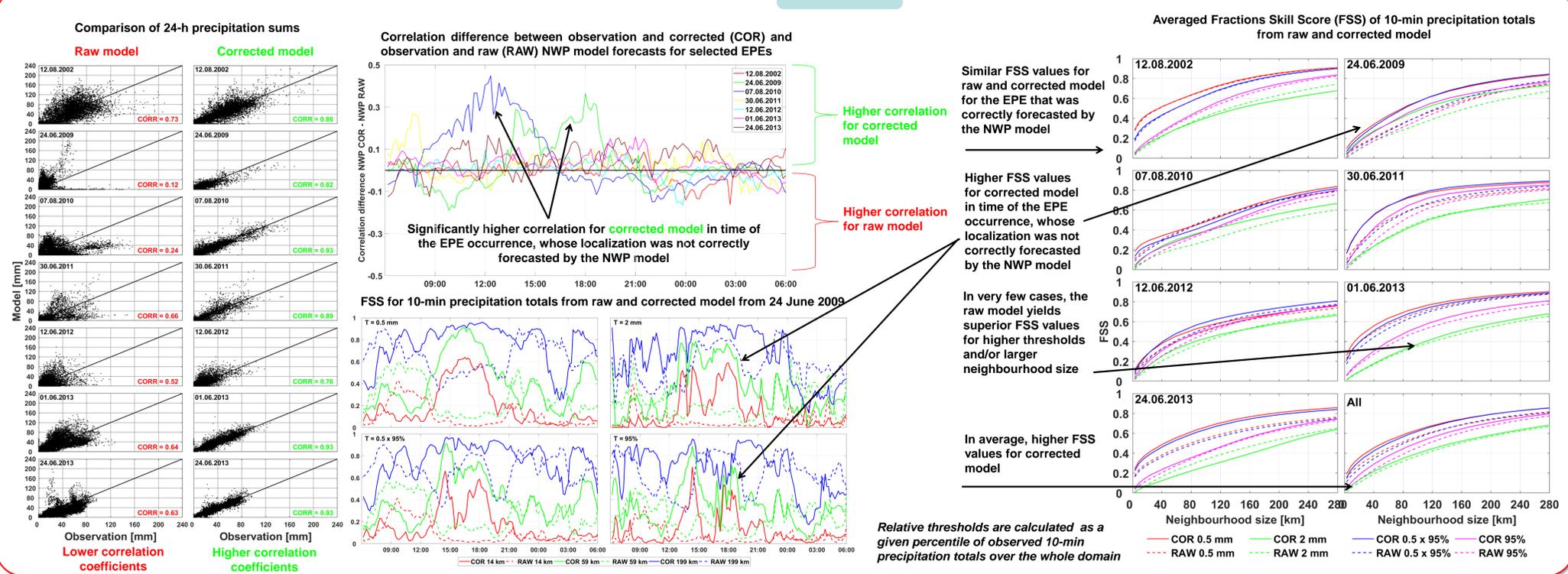
Selected EPEs



Results



Verification



Conclusions and outlook

- The NWP model COSMO usually well predicts the occurrence of EPEs but its spatial localization is not always accurate - this is usually a case of spontaneous or thermal convection (especially with more localized precipitation) => the most evident impact of the applied correction procedure
- Significant improvement of the forecast accuracy is observed in a time, when the highest precipitation within a given EPE occurs; beyond this time the effect of the correction is insignificant
- Large-scale precipitation is generally well forecasted and, therefore, the impact of the correction is rather negligible because raw and corrected forecasts are very similar
- Suggested correction method will be later applied on numerous historical EPEs that occurred over the Czech Republic since half of the 20th century until present
- Each EPE will be also evaluated by return periods of respective maximum precipitation totals utilizing return levels of given time intervals.

References

[1] Ebert, E.E., 2009. Neighborhood verification: a strategy for rewarding close forecasts. *Weather Forecast.*, 24, 1498–1510.
 [2] Sokol, Z., 2003. The use of radar and gauge measurements to estimate areal precipitation for several Czech river basins. *Stud. Geophys. Geod.*, 47, 587–604.