

# COMPARISON OF NOWCASTING AND COSMO MODEL FORECAST OF CONVECTIVE STORMS OVER THE CZECH TERRITORY

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## I. INTRODUCTION

The forecast of deep convection is always the challenge despite of which nowcasting technique we are using (e.g. the extrapolation of radar echo or nonhydrostatic NWP models).

Nowcasting systems are widely used for very short range forecast of rapidly evolving weather phenomena, namely the precipitation processes and convective events. The systems are usually based on extrapolation of radar echo using either the NWP forecast of wind in the middle of the troposphere or the wind field based on the comparison of the successive radar images (Kitzmler, 1996).

The NWP models are usually used for general weather forecasts. As the development of models has been going very fast and the area resolution has been growing, the contemporary models with a horizontal resolution of the order of several km are able to forecast the development of convective events quite satisfactorily.

Thanks to the more and more powerful computers the nowcasting procedures as well as NWP forecasts for limited areas can be calculated very fast and without the necessity of using the supercomputer centers.

## II. PRESENTATION OF RESEARCH

Nowcasting system has been developed in the Institute of Atmospheric Physics ASCR (IAP) (Sokol, 2006). It is used for 0-3 hours forecast of precipitation and uses radar, NWP, satellite and lightning network data. The NWP outputs are taken from the forecast of Aladin model operated by the Czech Hydrometeorological Institute (CHMI). The radar predictors are calculated from the CZRAD radar network. For satellite predictors the data from MSG are used. Lightning data are provided by the Central European Lightning Detection Network. The regression model is used to forecast the probability of certain rain amounts in the next 3 hours in squares 9x9 km.

The COSMO model has been used in IAP for the research purposes; the main topic is modeling of convective events connected with large precipitation amounts. At the territory of the Czech Republic the model is run with a horizontal resolution of 2.8 km.

The assimilation technique of radar reflectivity has been developed, implemented and tested in IAP (Falkovich et al., 2000, Sokol, 2006). The water vapor correction method (WVC) proved the ability to improve the forecast of significant precipitation in cases when the first evidence of the convective system is detected by radars. The assimilation enables that the model precipitation forecast is meaningful immediately after the end of assimilation period and no model setup period is necessary.

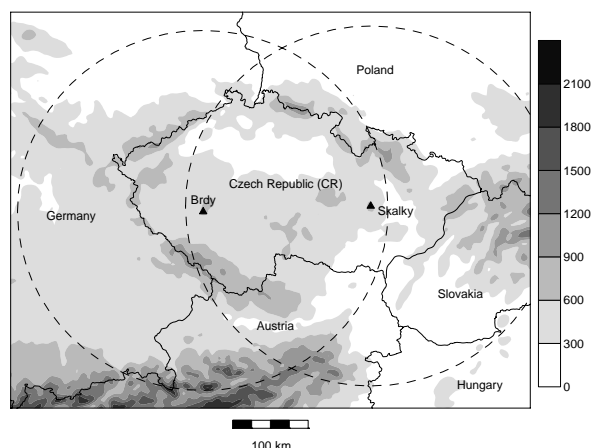


FIG. 1: The area of nowcasting and COSMO model comparison

## III. RESULTS AND CONCLUSIONS

The forecasts of rainfall amounts for the selected cases of deep convection over the Czech territory by the nowcasting technique and COSMO model are compared.

It seems to us that the forecasts of nowcasting system and the COSMO model in conjunction give more information than separately. The NWP model is better in cases when no radar evidence of the development of convection is present but the model atmosphere is unstable enough to trigger the convective processes. The nowcasting method is valuable when the convection is observed while the NWP model forecast is shifted or not accurate.

## IV. ACKNOWLEDGMENTS

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## V. REFERENCES

- Falkovich A., Kalnay E., Lord S., and Mathur M. B., 2000: A new method of observed rainfall assimilation in forecast models, *J. Appl. Meteorology*, 39, 1282-1298.
- Kitzmler D.H., 1996: One-hour forecasts of radar-estimated rainfall by an extrapolative-statistical method, *TDL Office Note 96-1*, NWS, NOAA, U. S. Department of Commerce, 26 pp.
- Sokol Z., 2006: Nowcasting of 1-h precipitation using radar and NWP data. *J. of Hydrology*, 328(1-2), 200-211.
- Sokol Z., Řezáčová D., 2006: Assimilation of radar reflectivity into the LM COSMO model with a high horizontal resolution. *Meteorol. Applications*, 13, 1-14.