Application of Latent Heat Nudging in ALADIN Model

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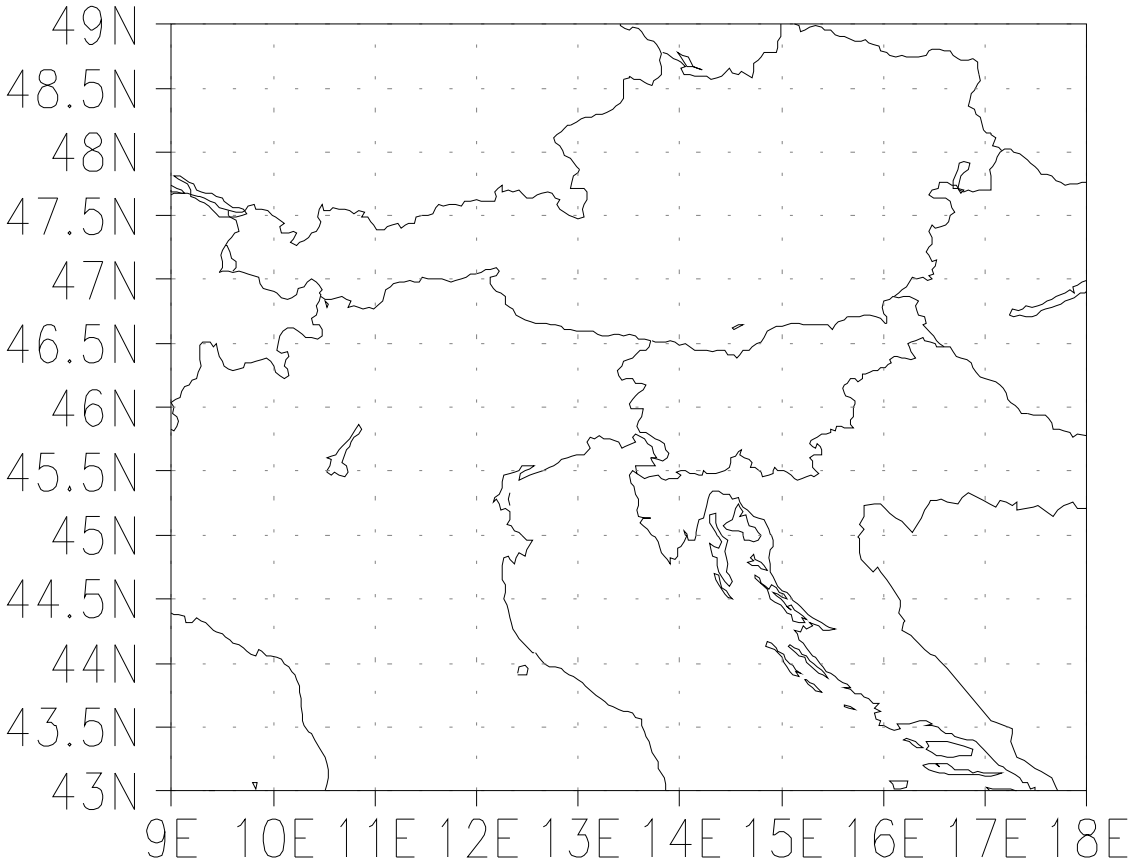
Motivation

- Need to assimilate local observations in a LAM,
- Improvement of precipitation scores,
- Nowcasting with ALADIN on demand,
- Is nudging nothing?

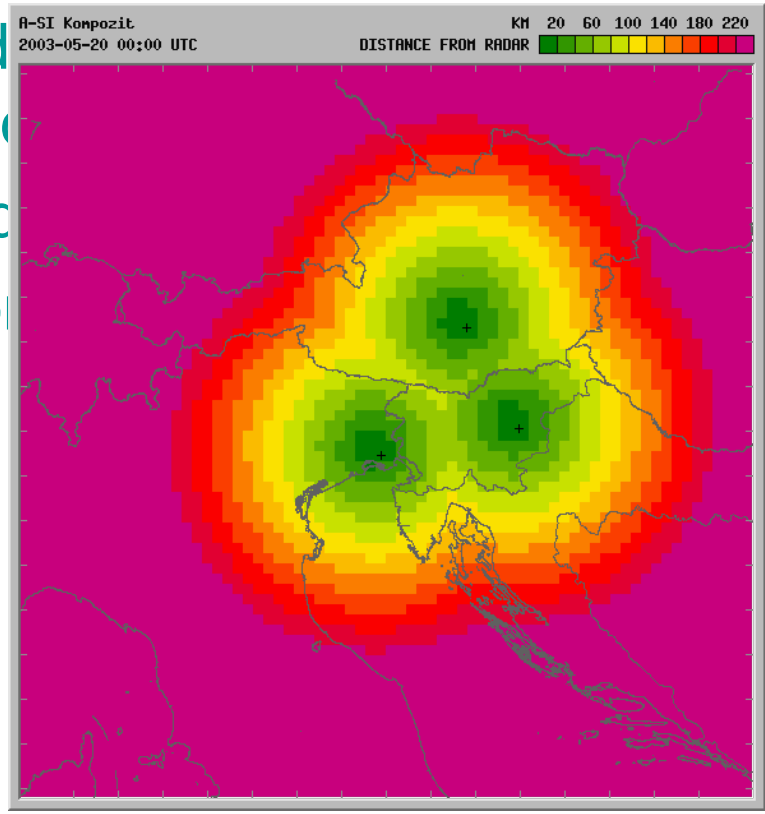
Model Domain Properties



Radar Data

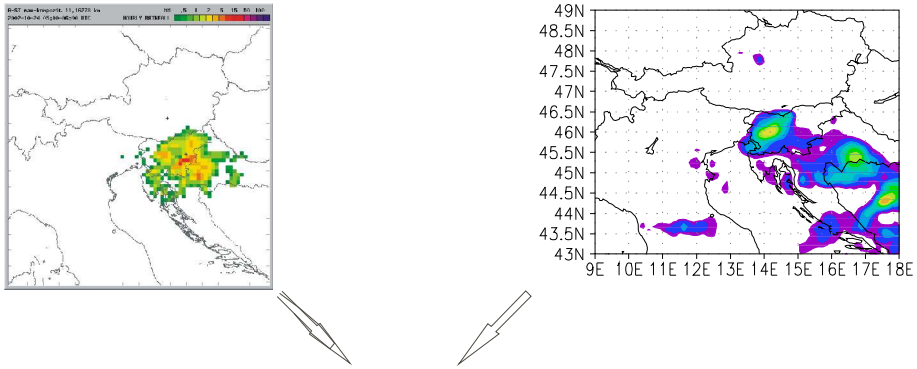
- Radar data from 3 radars

  Lisca - SLO, Zirbitzkogel - A and Fossalon - I
- Interpolation into 1/8 mod
  nearest neighbour metho
- Aggregation to model gric
- Using hourly accumulatio



Latent Heat Nudging

- Using 2D RR fields from radar (hourly accumulations)
- Combining radar and model precipitation,
- Adjusting vertical profiles of latent heat part of temperature tendency



precipitation analysis

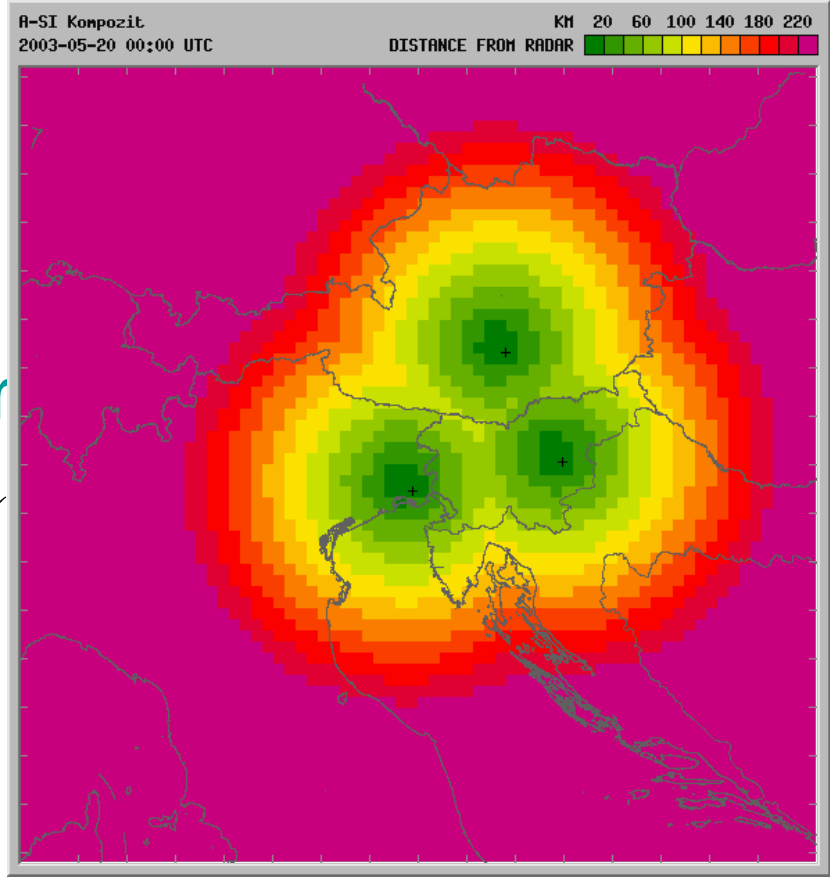
adjustment of latent heat profiles

LHN Procedure

- Radar and model pr

$$RR_{\text{analysis}} = wRR_{\text{radar}} + ($$

$$\left.\frac{\partial T}{\partial t}\right|_{\text{LHN}} = \left.\frac{\partial T}{\partial t}\right|_{\text{model}} .$$

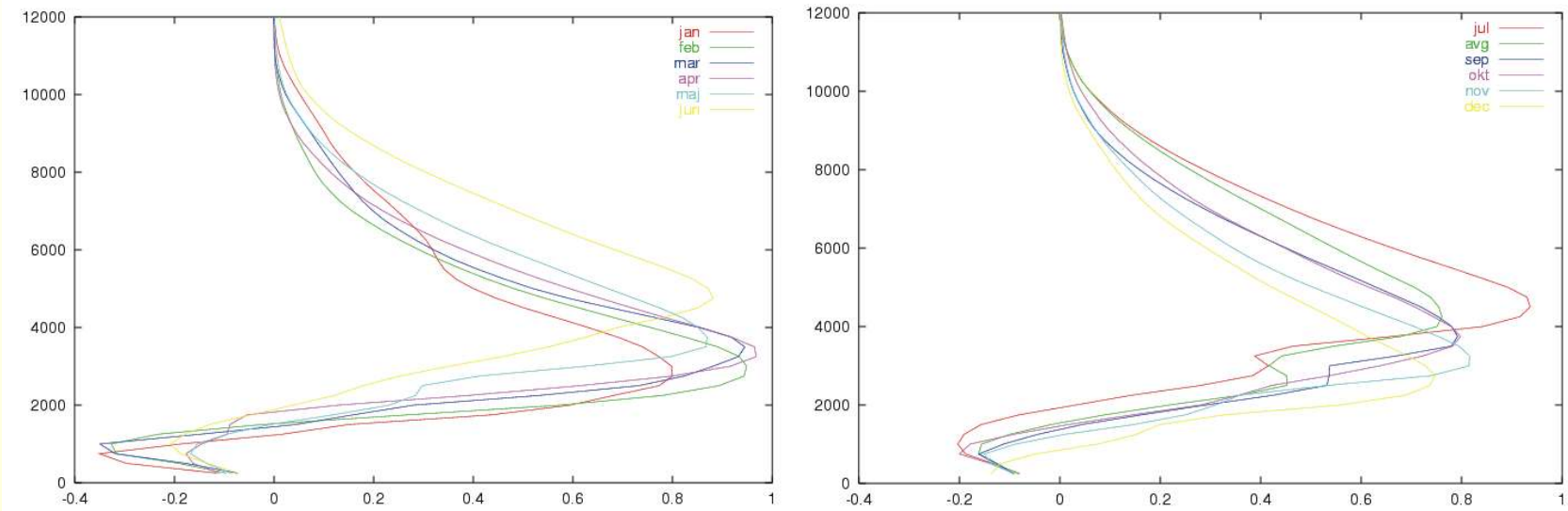


- No model precipitation case:

  a climatological profile is rescaled and applied

Climatological Profiles

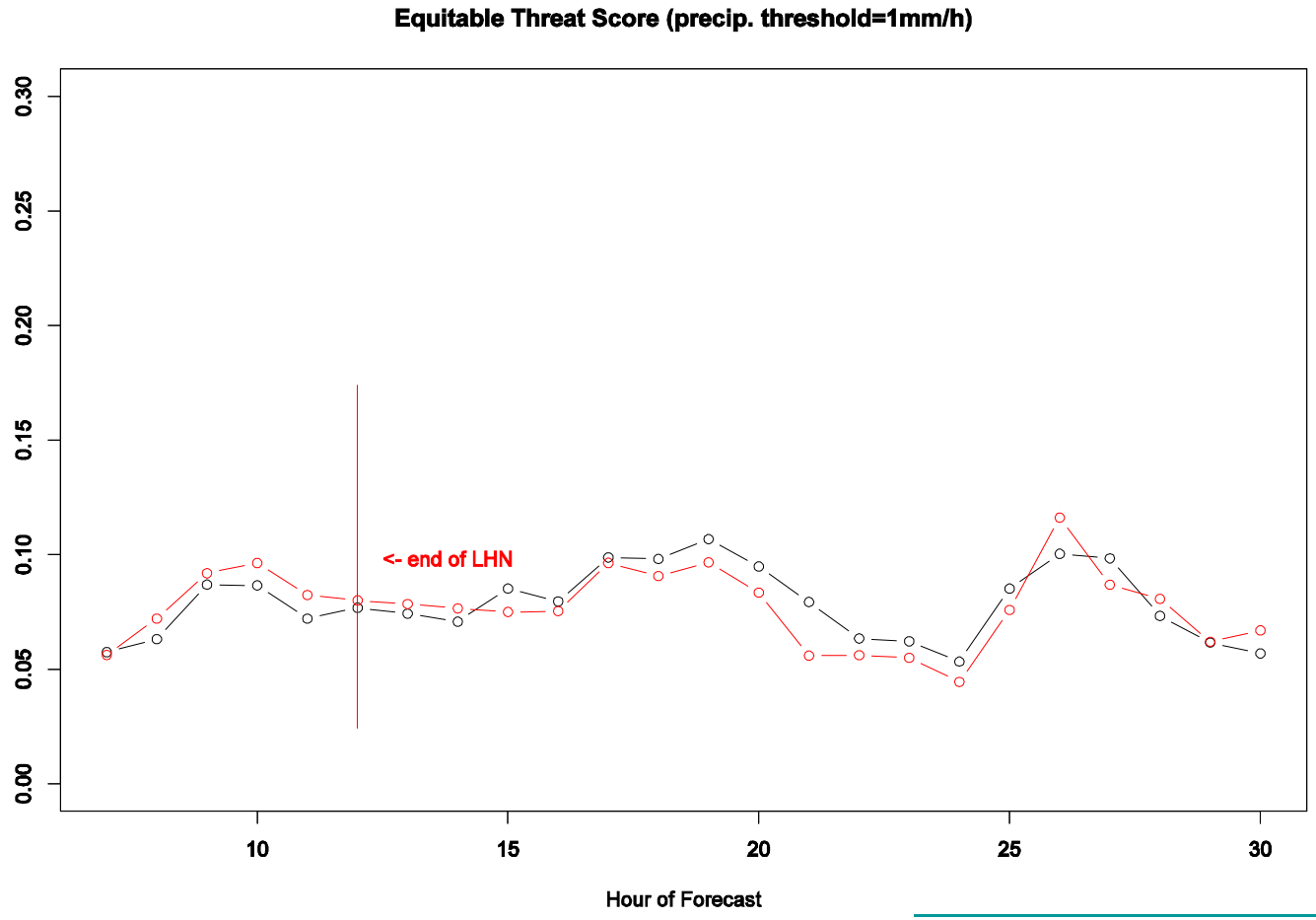
Derived from model control run



Average Monthly Profiles of Temperature Tendency Normalized With Precipitation Flux [(K/h)/(kg/h/m^2)]

Results – whole year 2002

Contingency tables scores (rain/norain)



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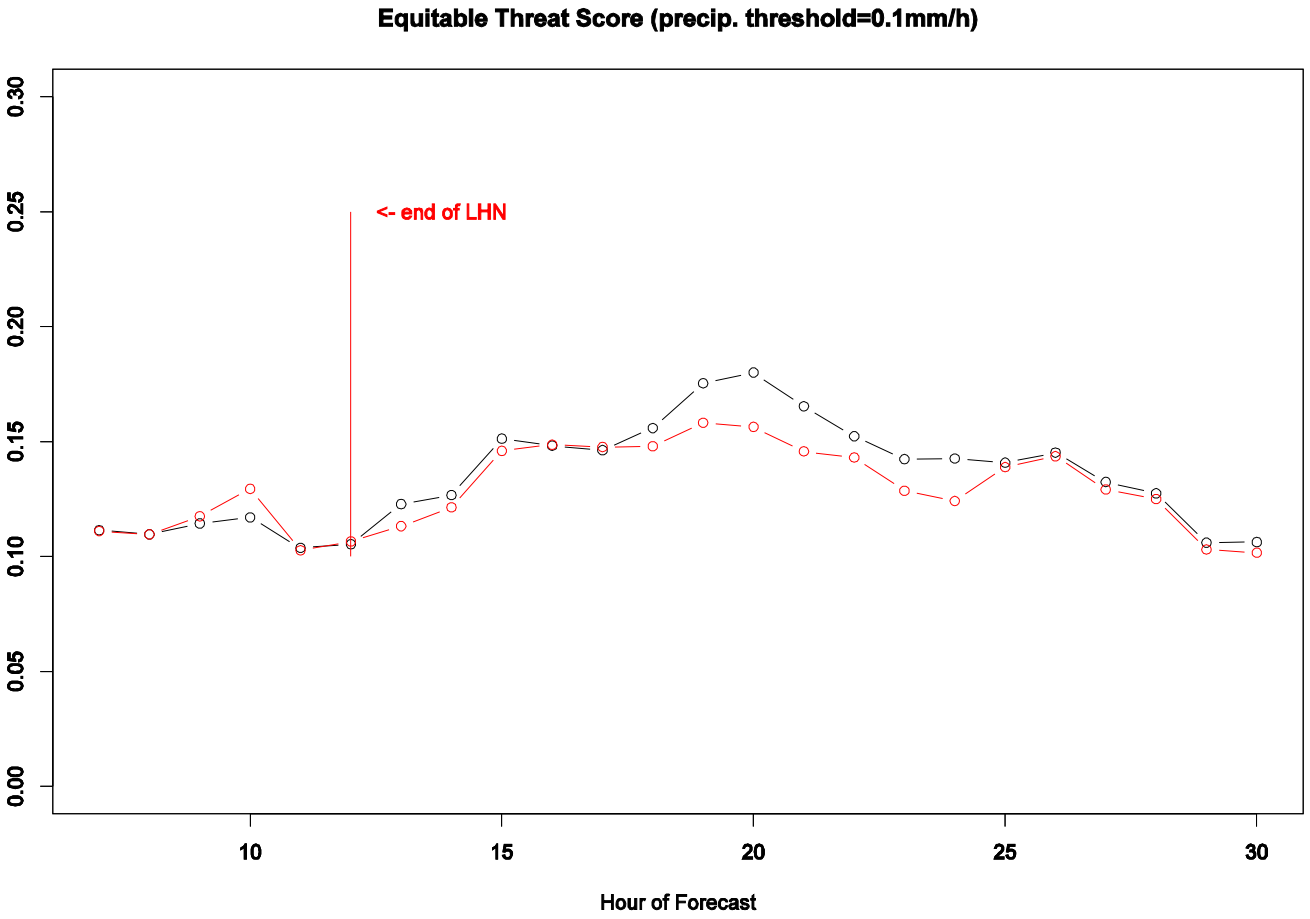
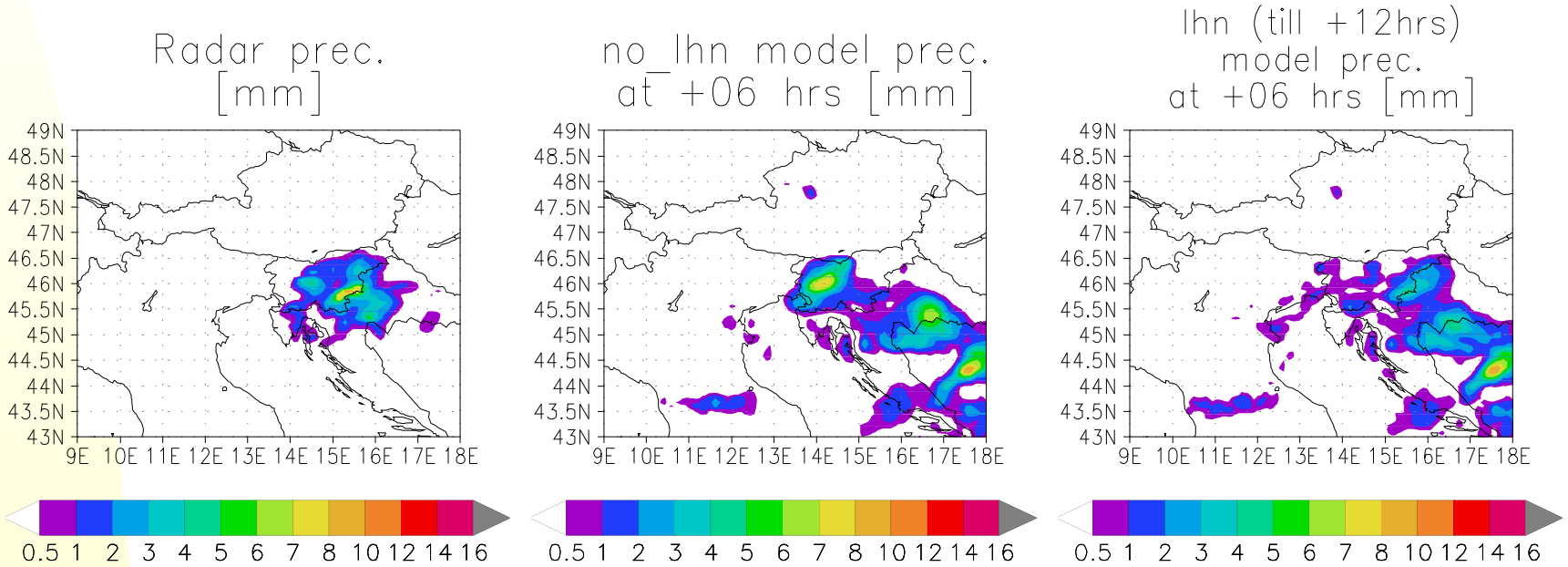


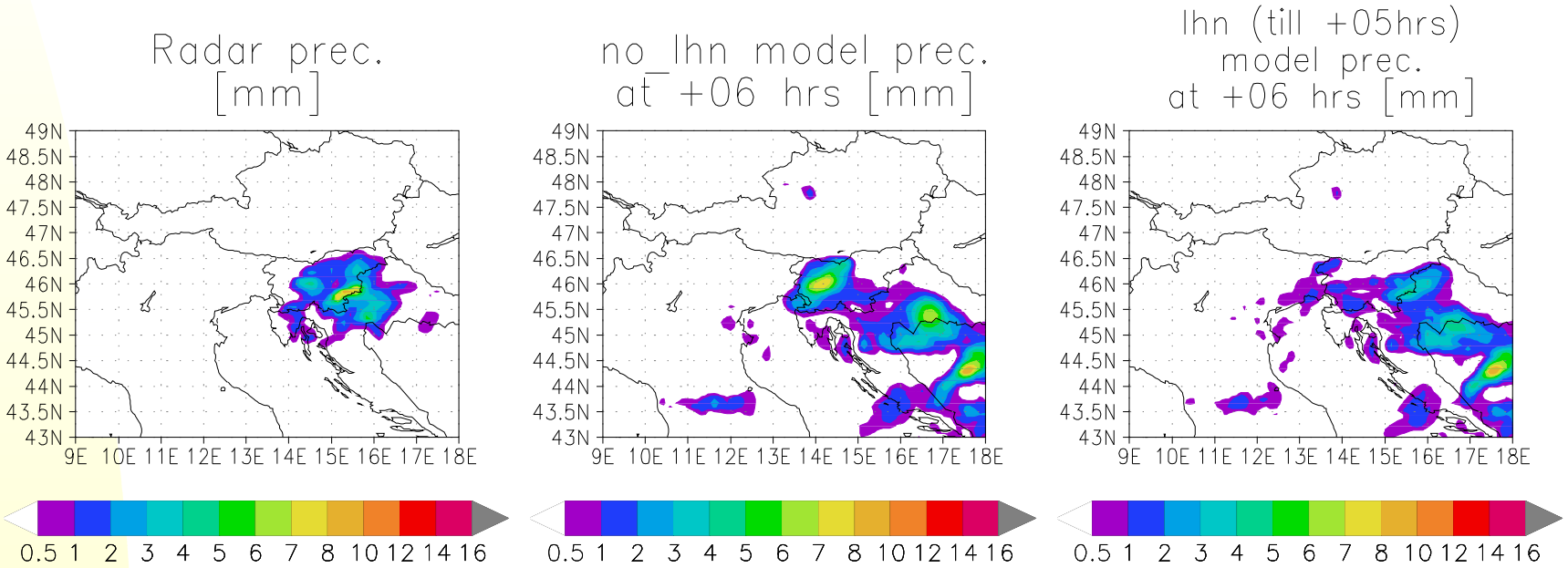
Results – Oct. 24, 2002 (1)

October 24, 2002 at 06 UTC (within nudging period)



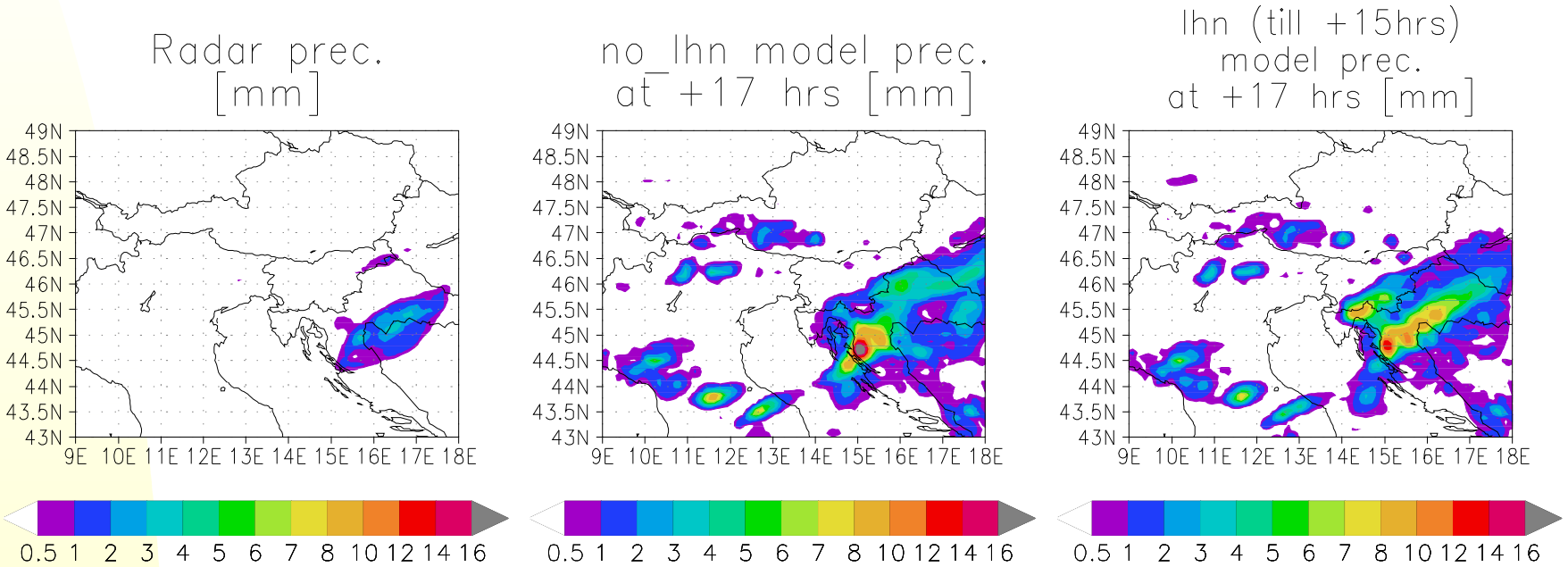
Results – Oct. 24, 2002 (2)

October 24, 2002 at 06 UTC (one hour after end of nudging)



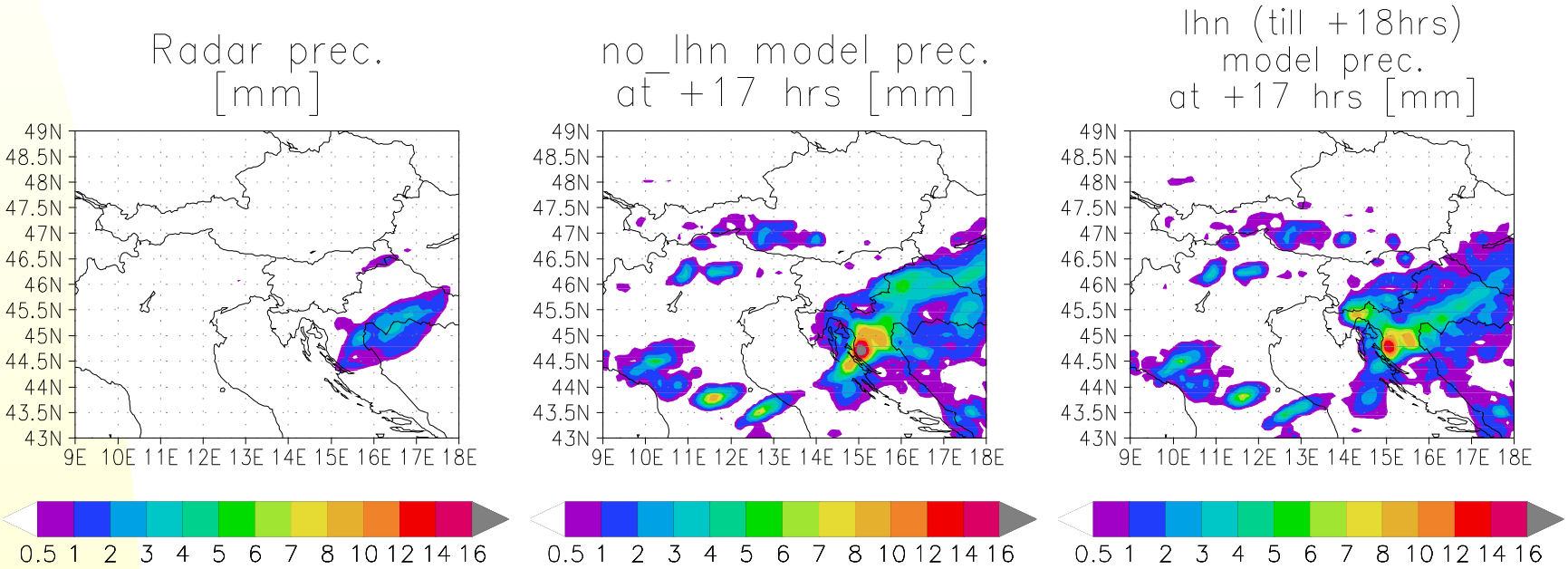
Results – Sep. 22, 2002 (1)

September 22, 2002 at 17 UTC (two hours after end of nudging)



Results – Sep. 22, 2002 (2)

September 22, 2002 at 17 UTC (within nudging period)



Conclusions

- Nudging is a poor man's solution for radar assimilation in LAM
- Repositioning precipitation
- Effect only a few hours ahead – usage in nowcasting
- Powerless in reducing amount
- Small radar nudging area in the domain (in comparison to DWD)