



# Adaptation of the Intensity-Scale Verification Technique for Precipitation to Hungary

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# -Introduction

- Problems with the adaptation to Hungary
- Database and domains
- Case studies
- Results
- Conclusions



- Theoretical background of the technique (Barbara Casati)
- Adaptation of the technique to the ECMWF (Sep - Nov. 2005. Reading)
  - comparing the models T511 and T799
  - Results (Operations Department Memorandum ECMWF, 2006) – Anna Ghelli

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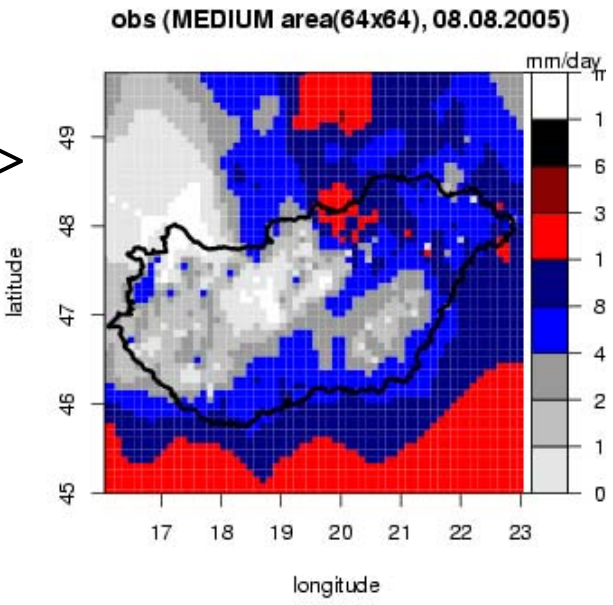
- Results

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- Special requirement of the area:
  - domain:  $2^L \times 2^L$  gridpoints  
(wavelet decomposition)
- Dense database
  - only for Hungary (not a square area)
  - only 24-hour accumulated precip.data
- Recalibration  $\rightarrow Y' = F_X^{-1}(F_Y(Y))$   
(X:anal, Y: fc, Y':rec. fc,  $F_X$  &  $F_Y$ :  
empirical cumulative distribution functions  
of analysis and forecast)

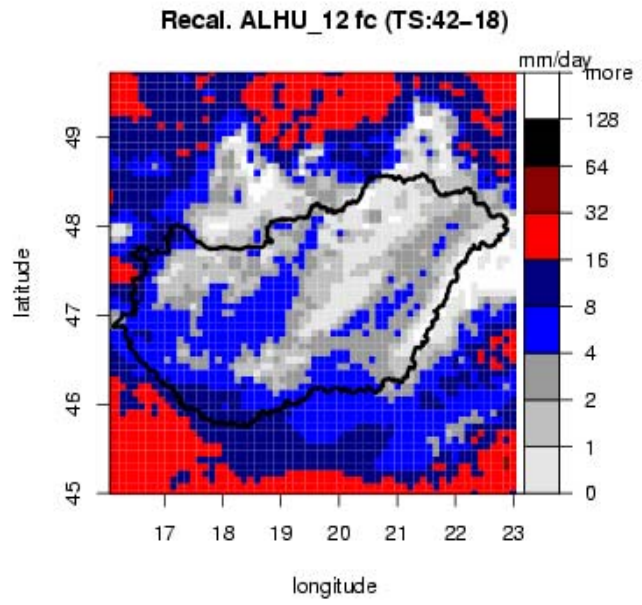
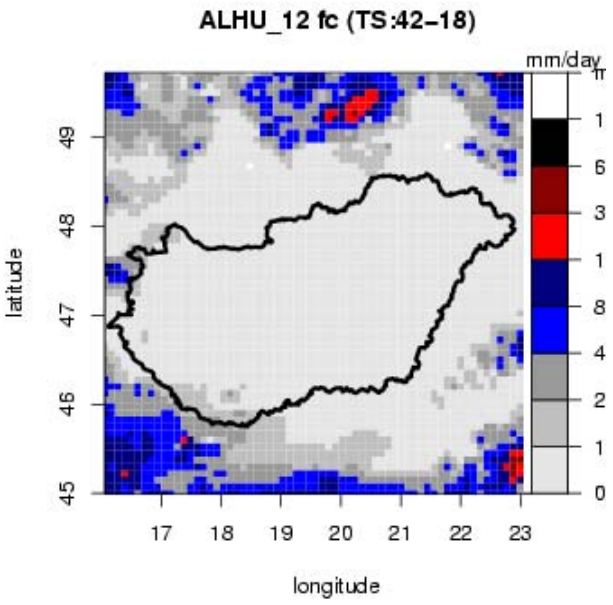
Obs. ->



ALHU\_12 (06.08.2005.)  
ALHU\_12 recalibrated  
TS: 42-18  
Obs: 08.08.2005. 06 UTC

Recal.fc.

Fc ->



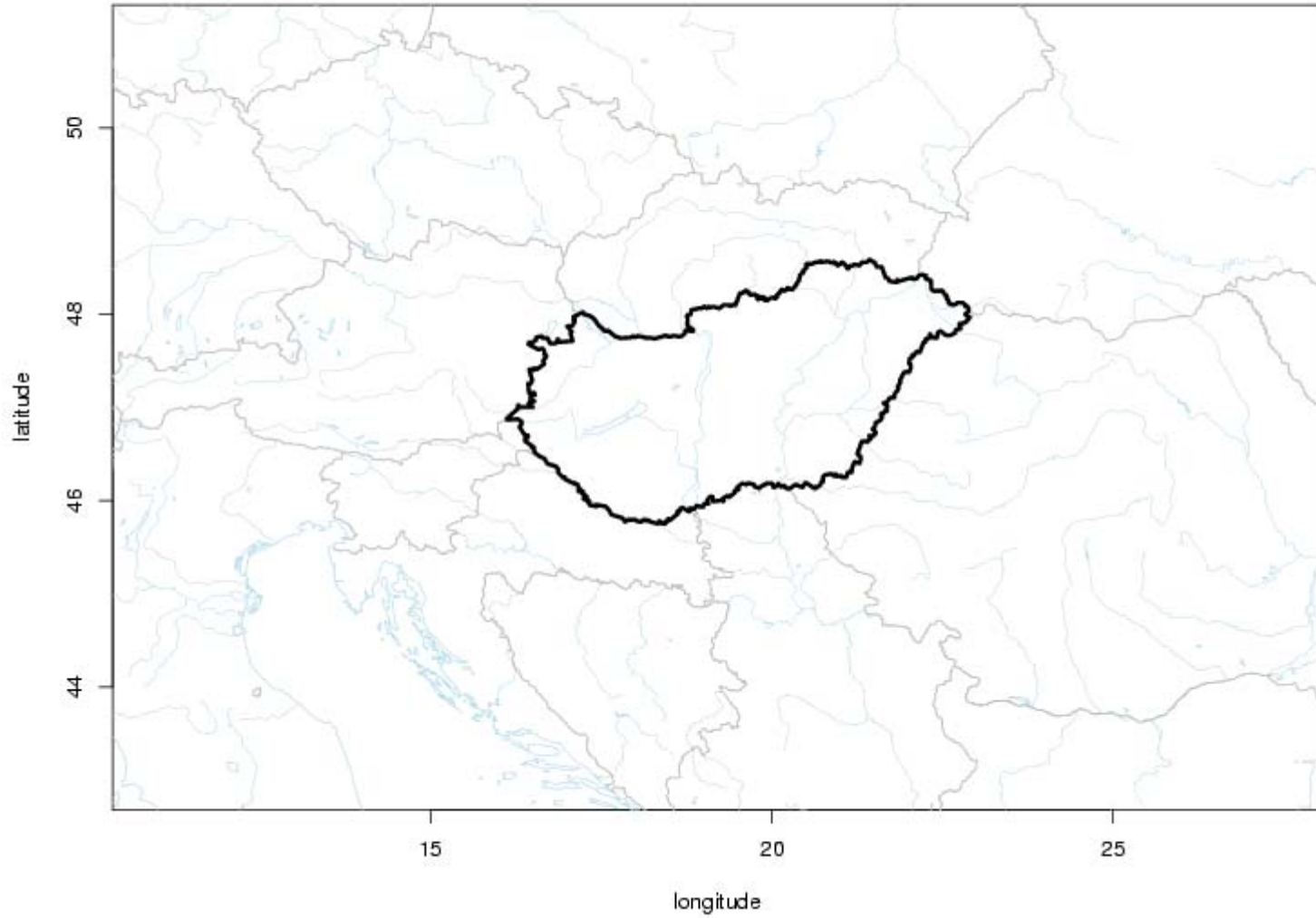
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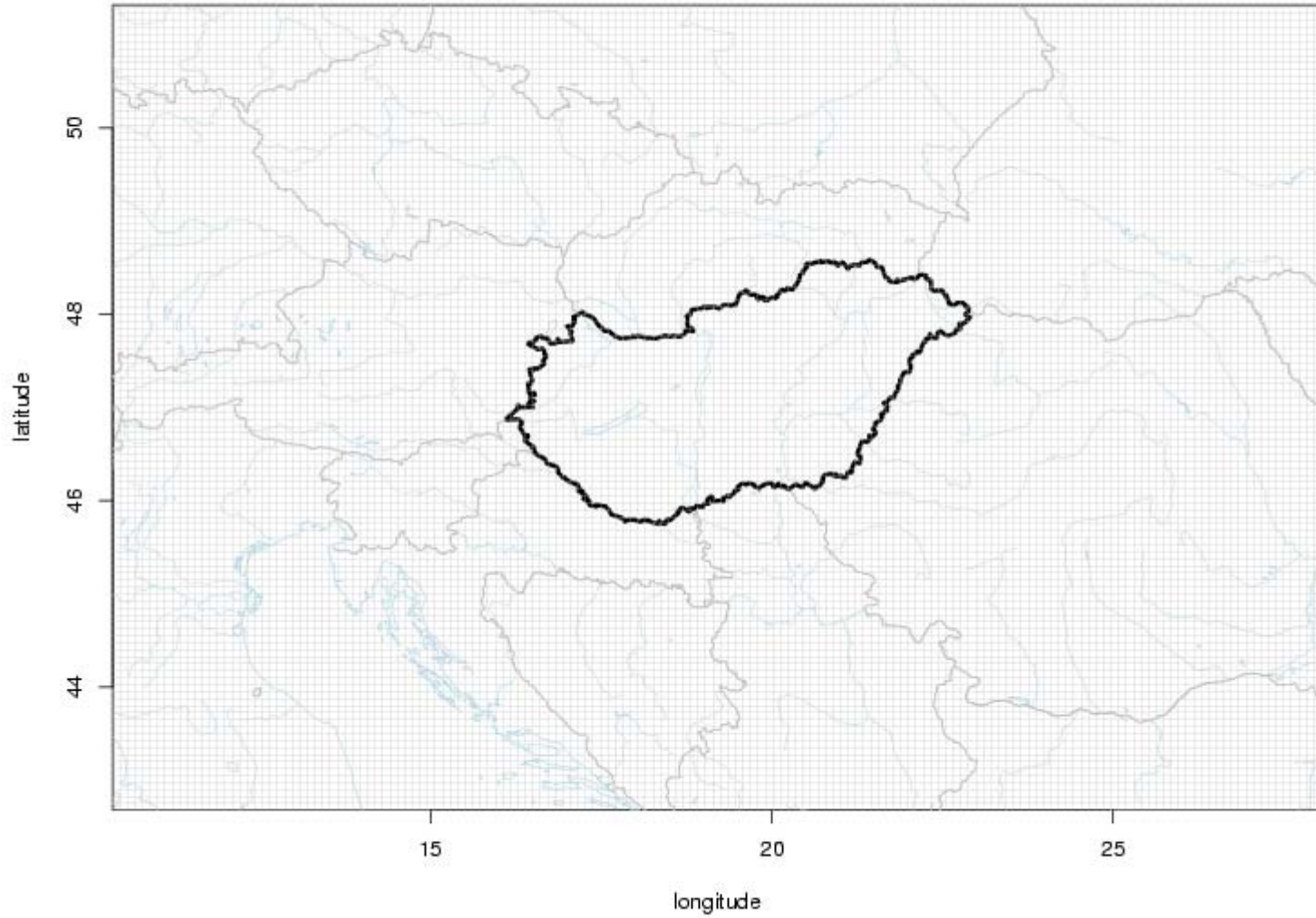
- Periods: Aug. 2005. (wet)  
Aug. 2006. (extreme events)
- Data: - precip. network of Danube-Tisza  
catchment area (mm/day)
  - dense Hungarian precipitation  
network (mm/day)  
(- Hungarian radar data)
- Domains: "Large": 25km resolution  
(ECMWF ↔ ALADIN)  
"Medium" , "East" , "West" : 8 km res.  
(between the Aladin versions)



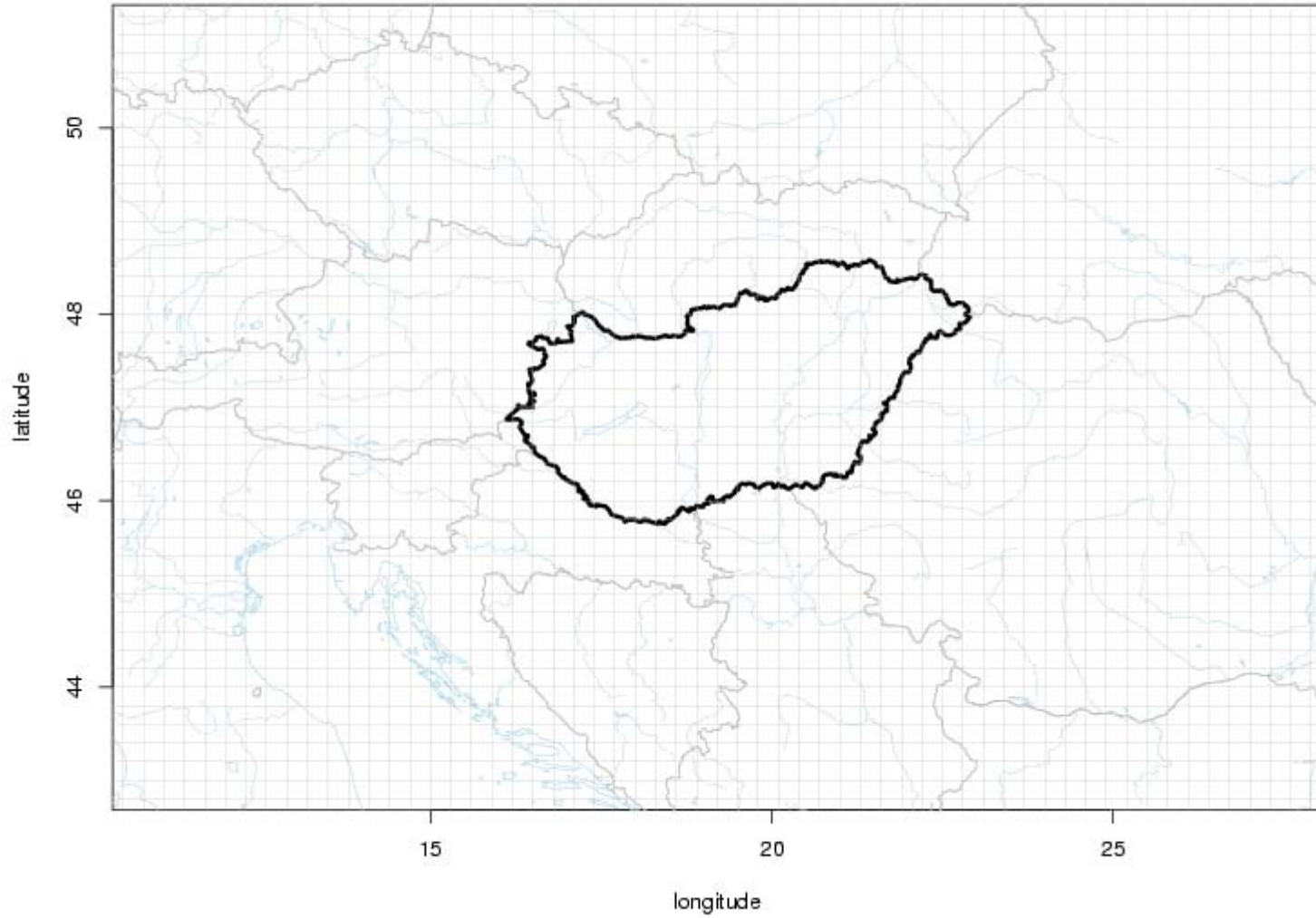
# Hungary



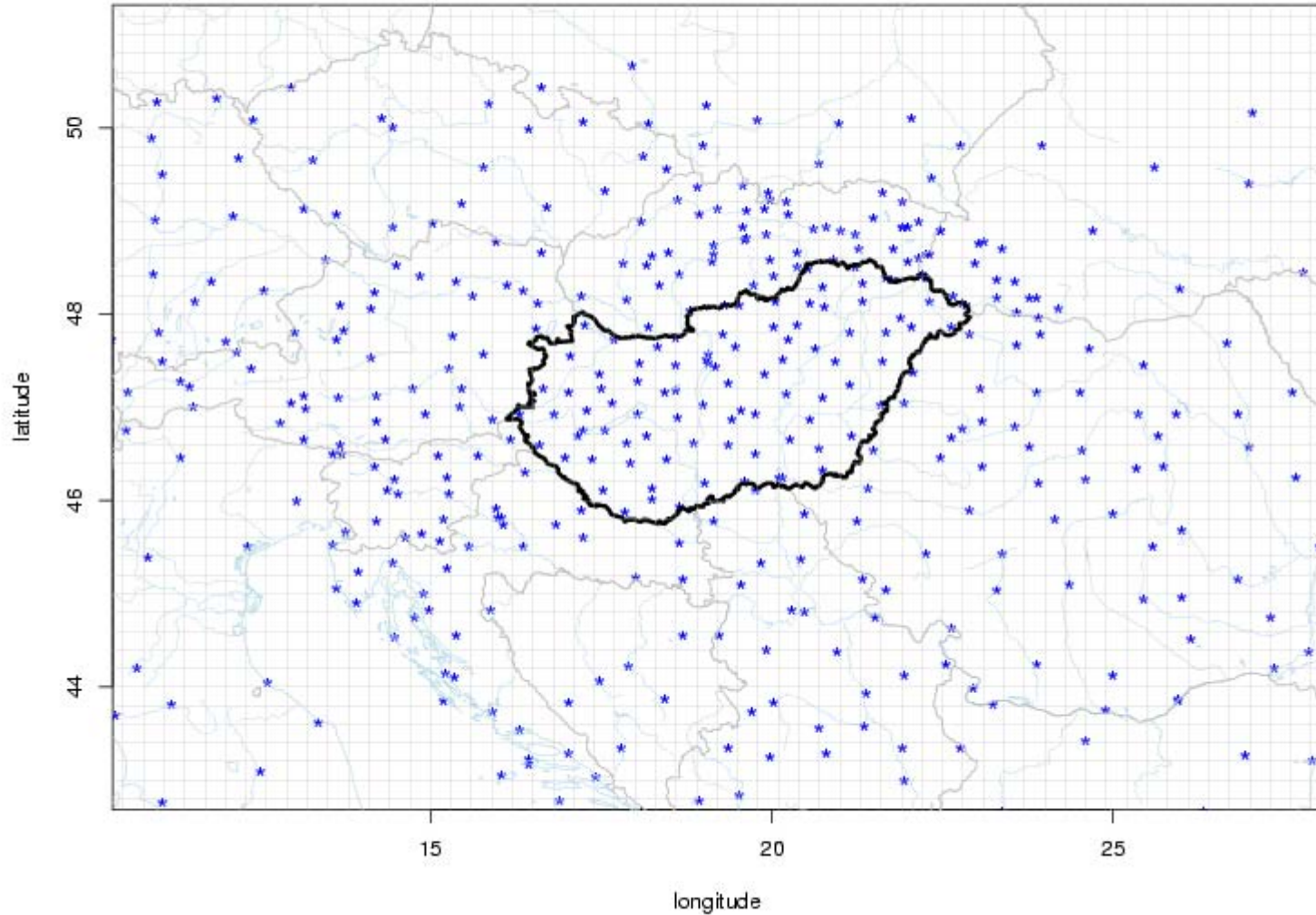
# 8 km grid



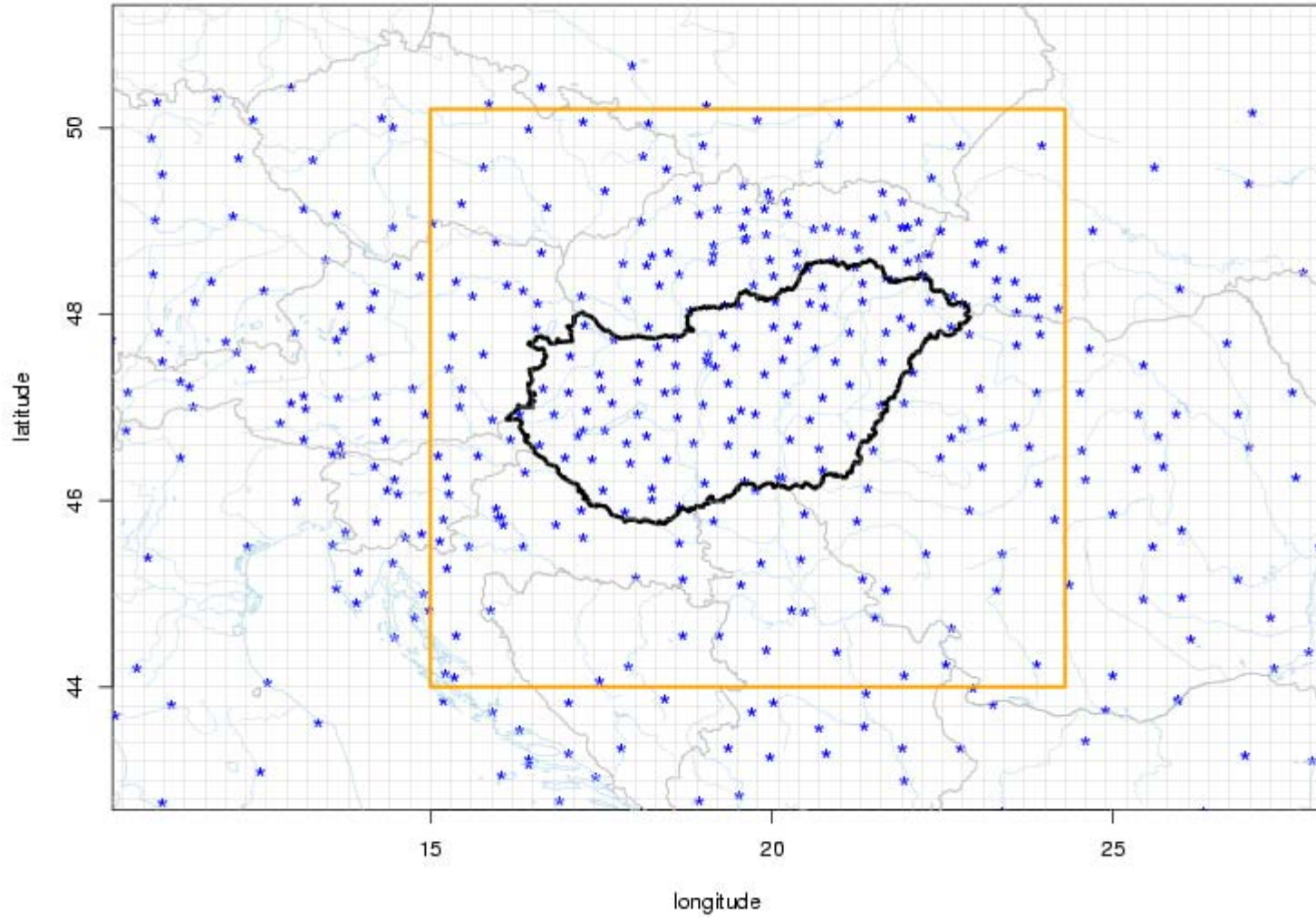
# 25 km grid



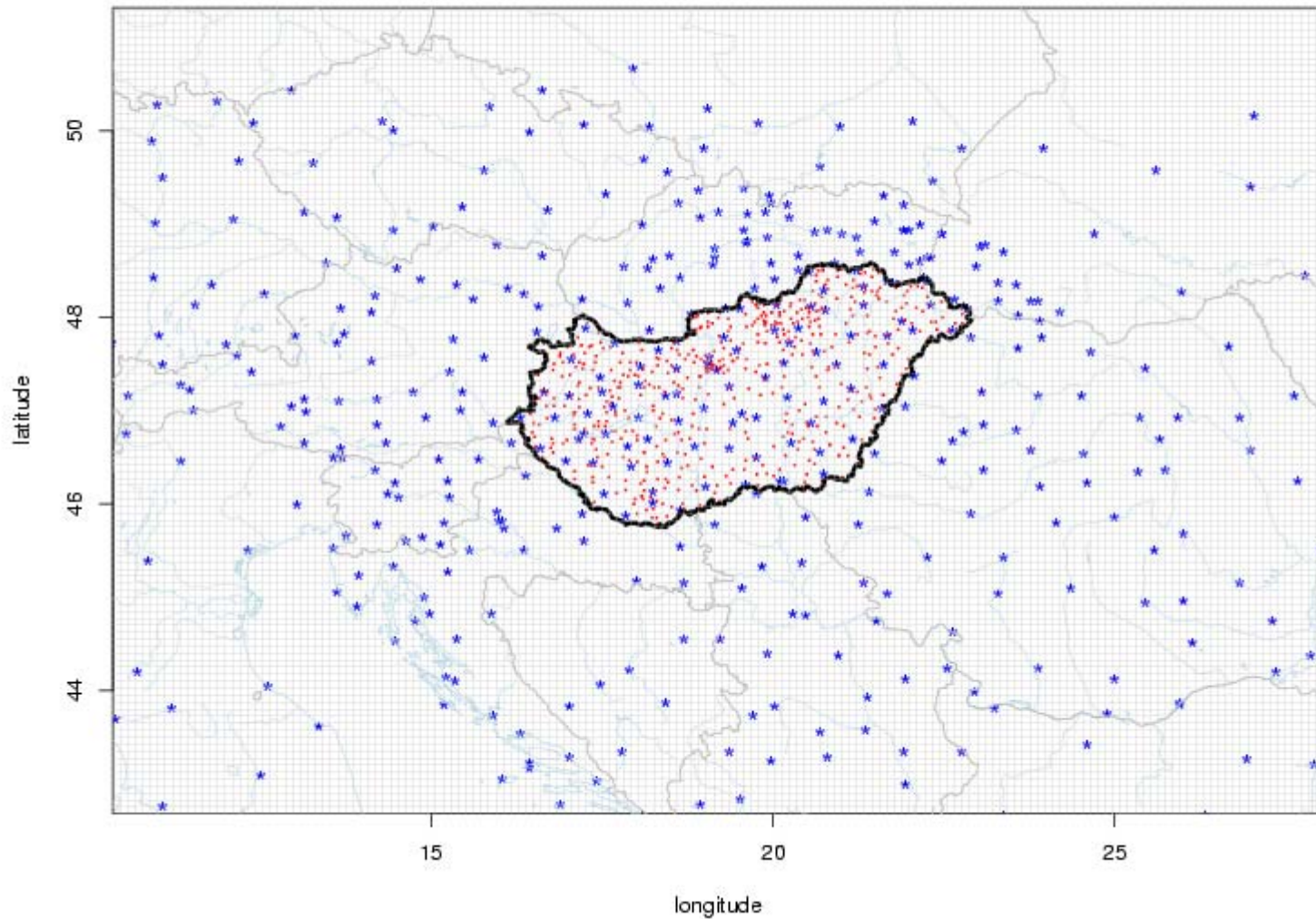
# Precip. network of the Danube-Tisza catchment area



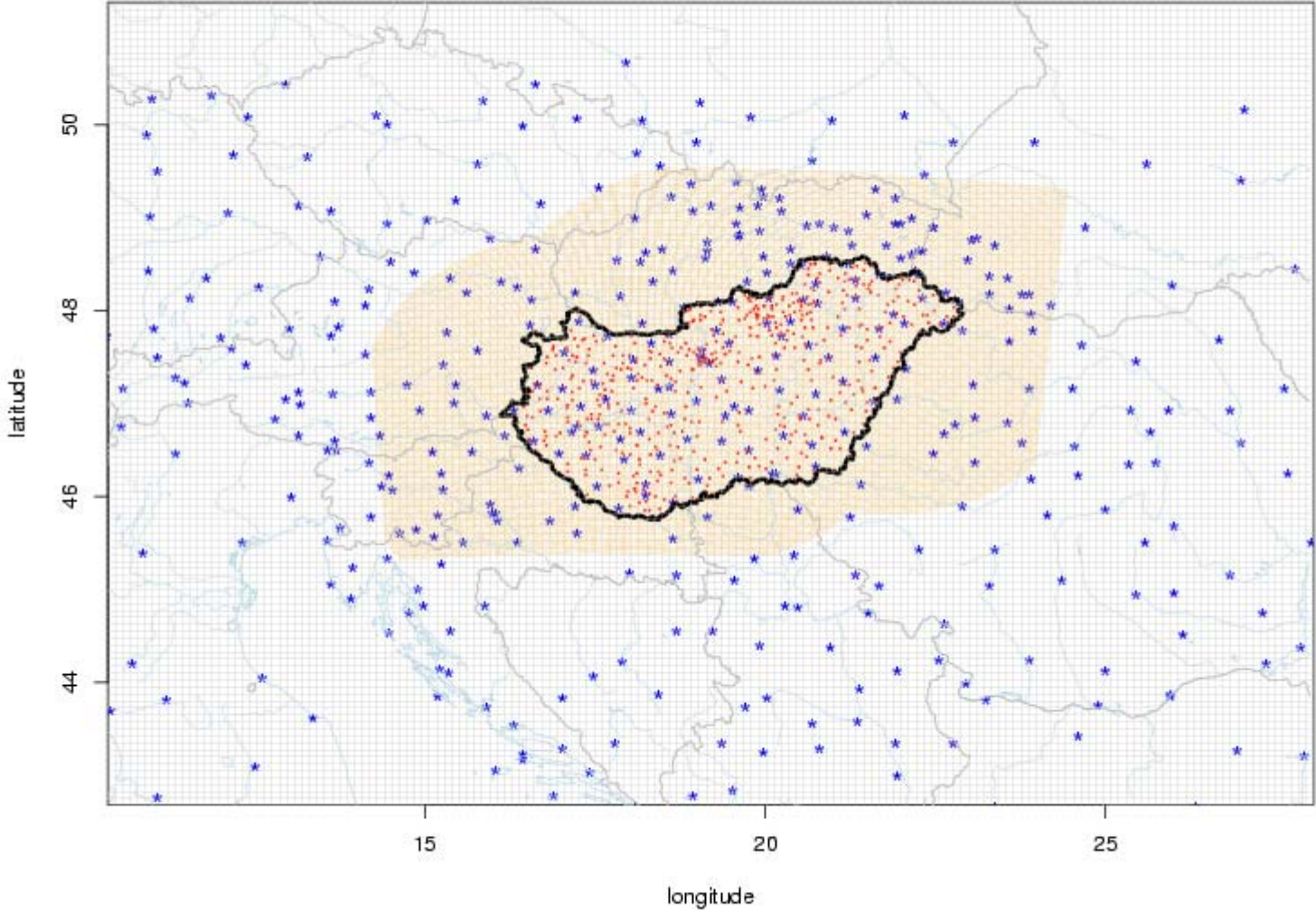
# „Large” area



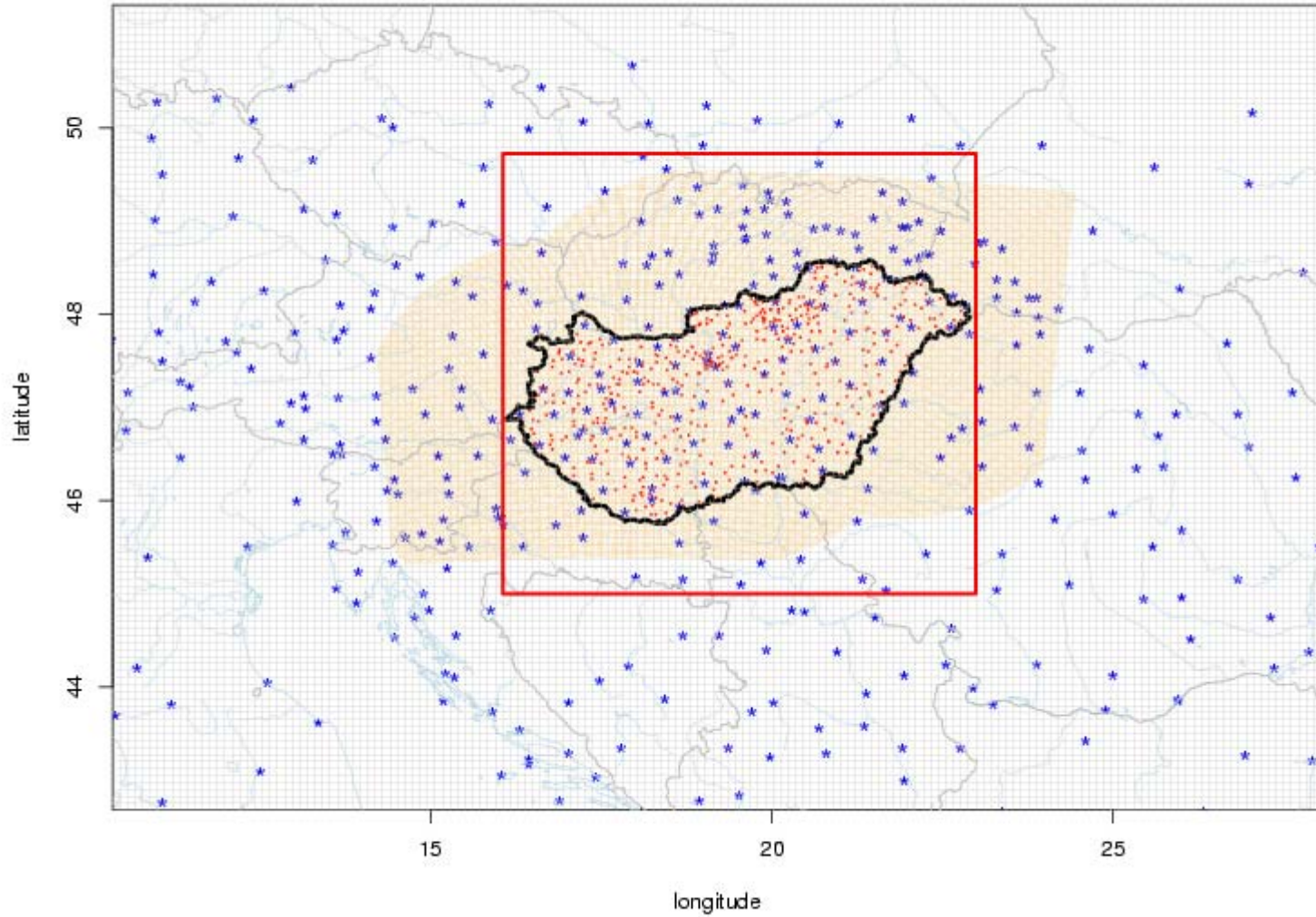
# Dense Hungarian precipitation network



# Radar data

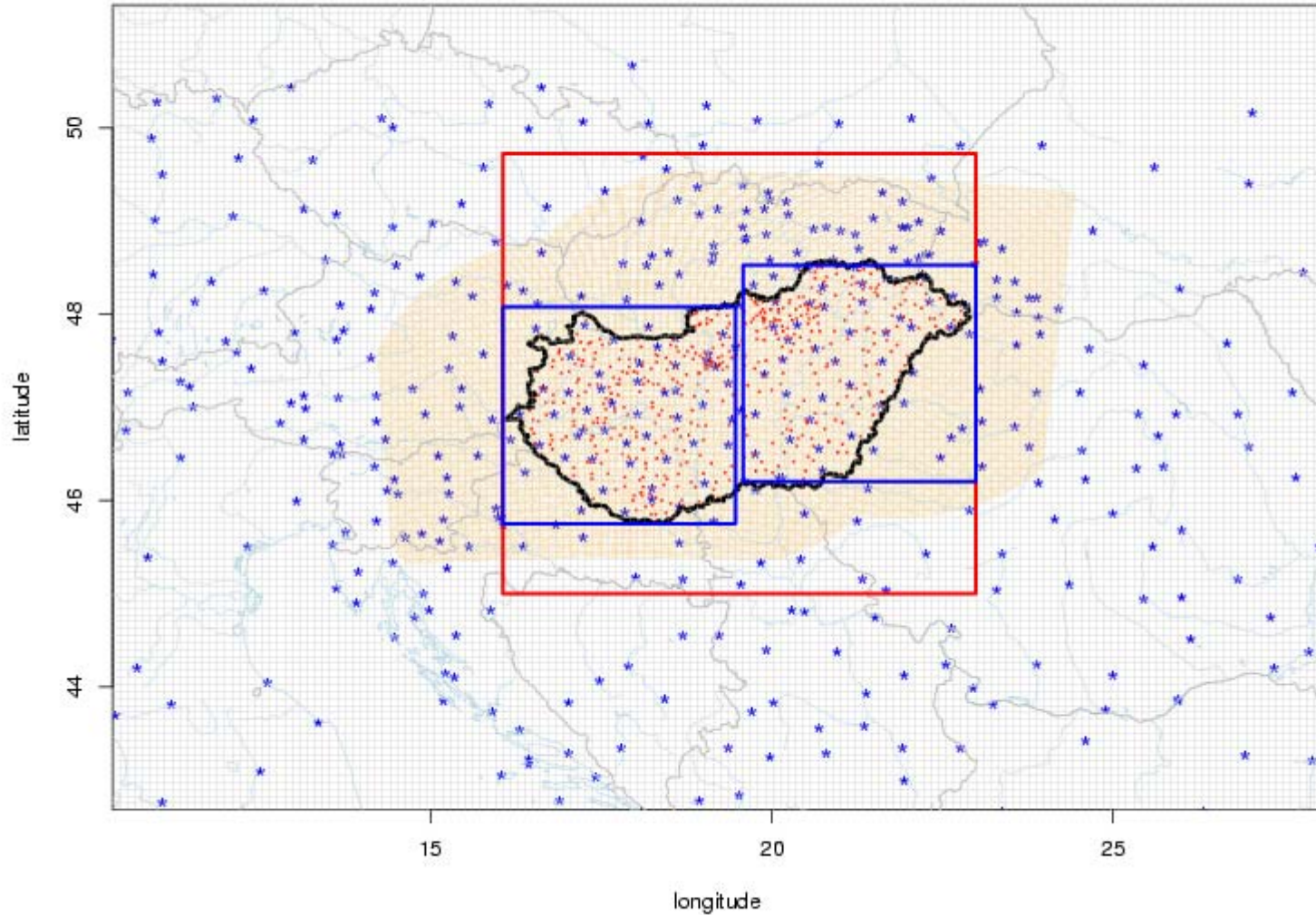


# „Medium” area





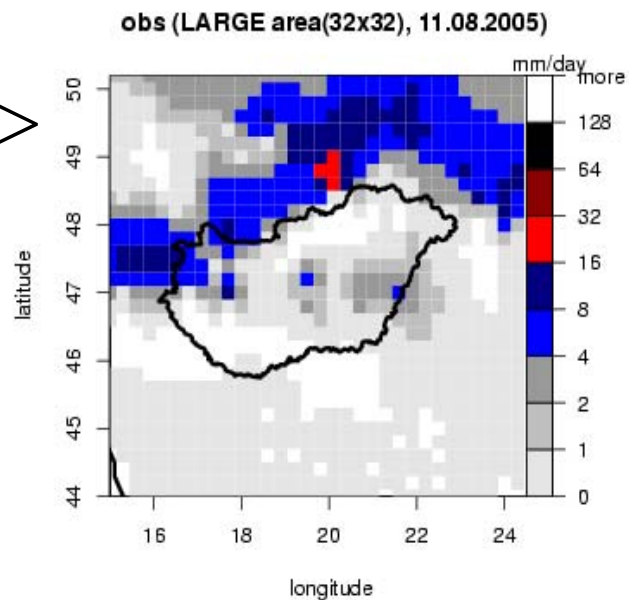
„Medium” area (red); „East”, „West” area (blue)



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OBS->



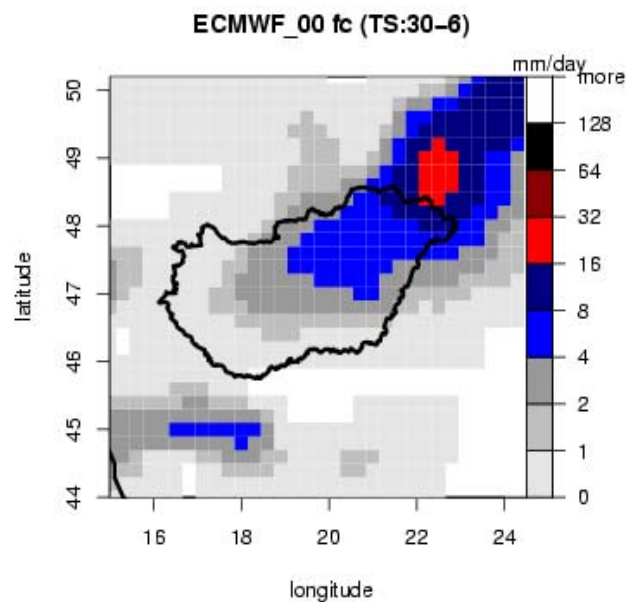
ECMWF\_00 (10.08.2005.)

TS: 30 - 06

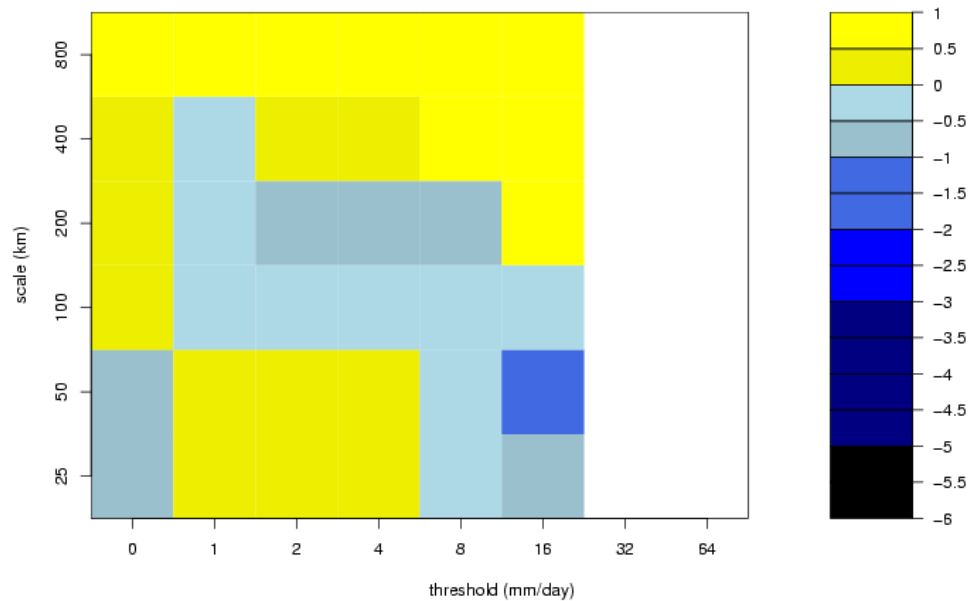
Obs: 11.08.2005. 06 UTC

Int.scale verification

FC->



Intensity-Scale SS (ECMWF\_00, TS:30-6, LARGE area (32x32), 11.08.2005)



ALHU\_12 (06.08.2005.)

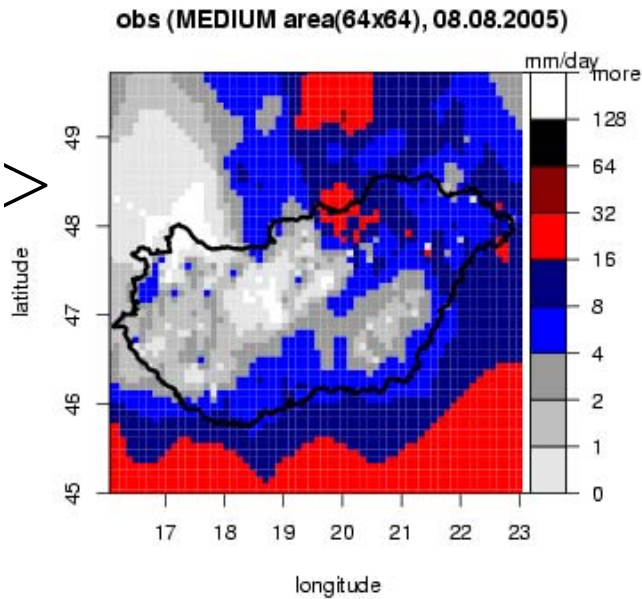
TS: 42 - 18

ALHU\_00 (07.08.2005.)

TS: 36 - 06

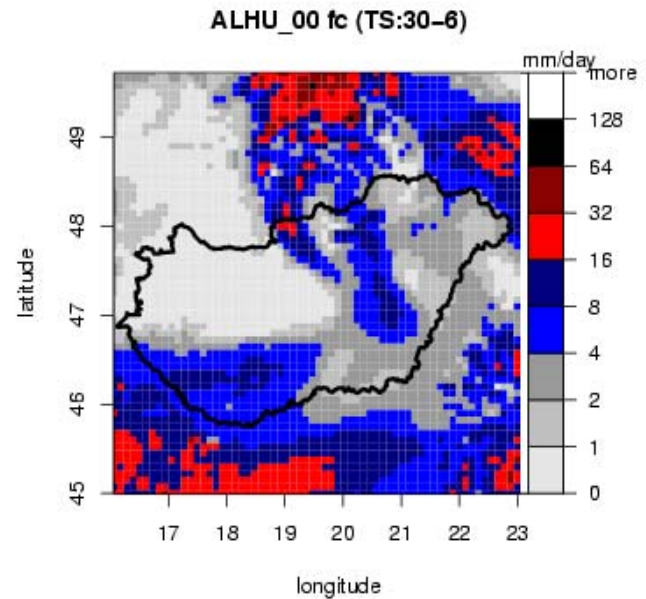
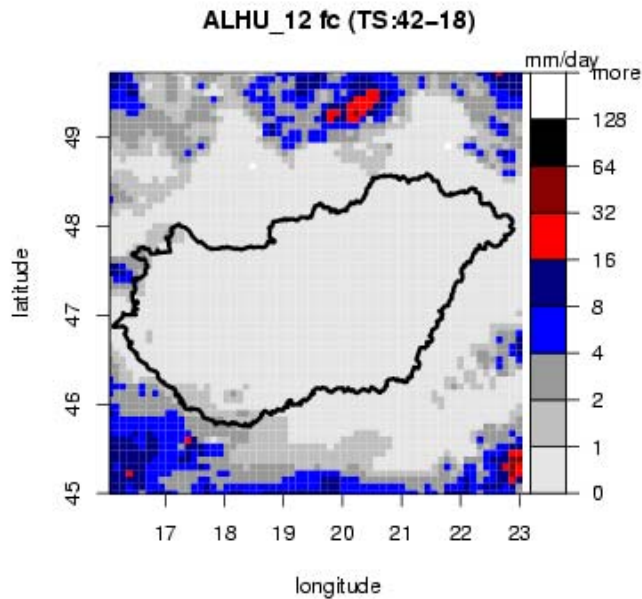
Obs: 08.08.2005. 06 UTC

Obs->

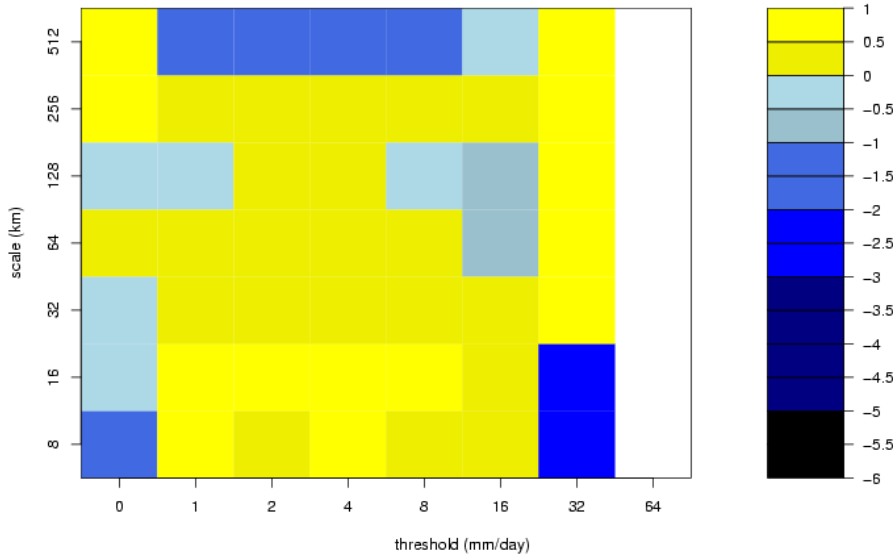


Fc. (12 hours later)

Fc->



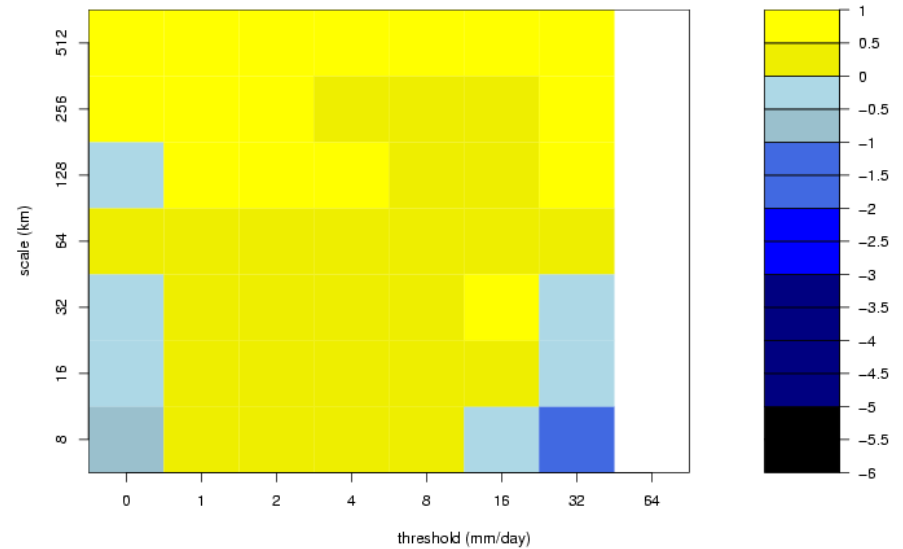
Intensity-Scale SS (ALHU\_12, TS:42-18, MEDIUM area (64x64), 08.08.2005)



Int.scale verification of  
ALHU\_12 (06.08.2005.)  
TS: 42 - 18

Int.scale verification of  
ALHU\_00 (07.08.2005.)  
TS: 36 - 06

Intensity-Scale SS (ALHU\_00, TS:30-6, MEDIUM area (64x64), 08.08.2005)

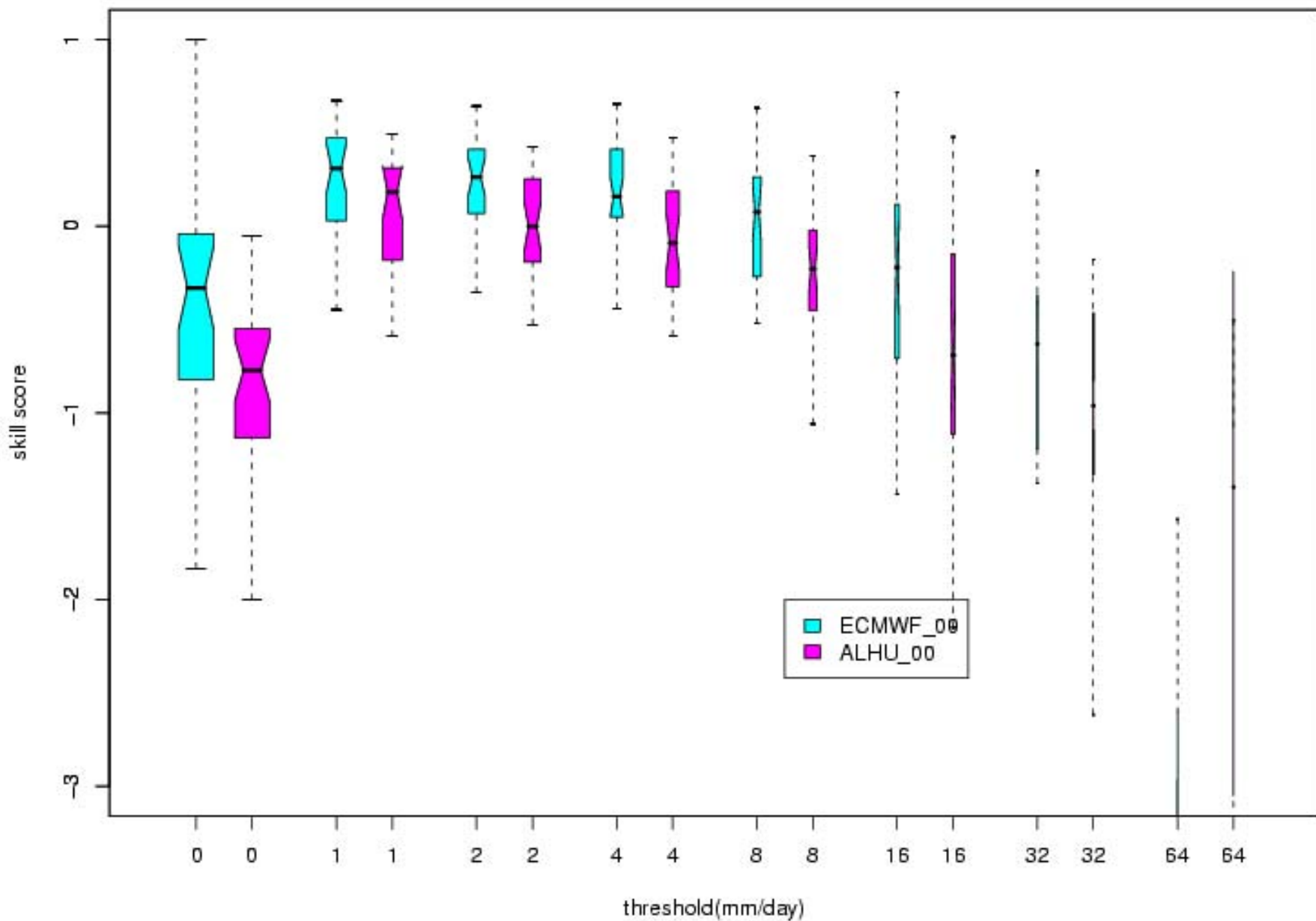


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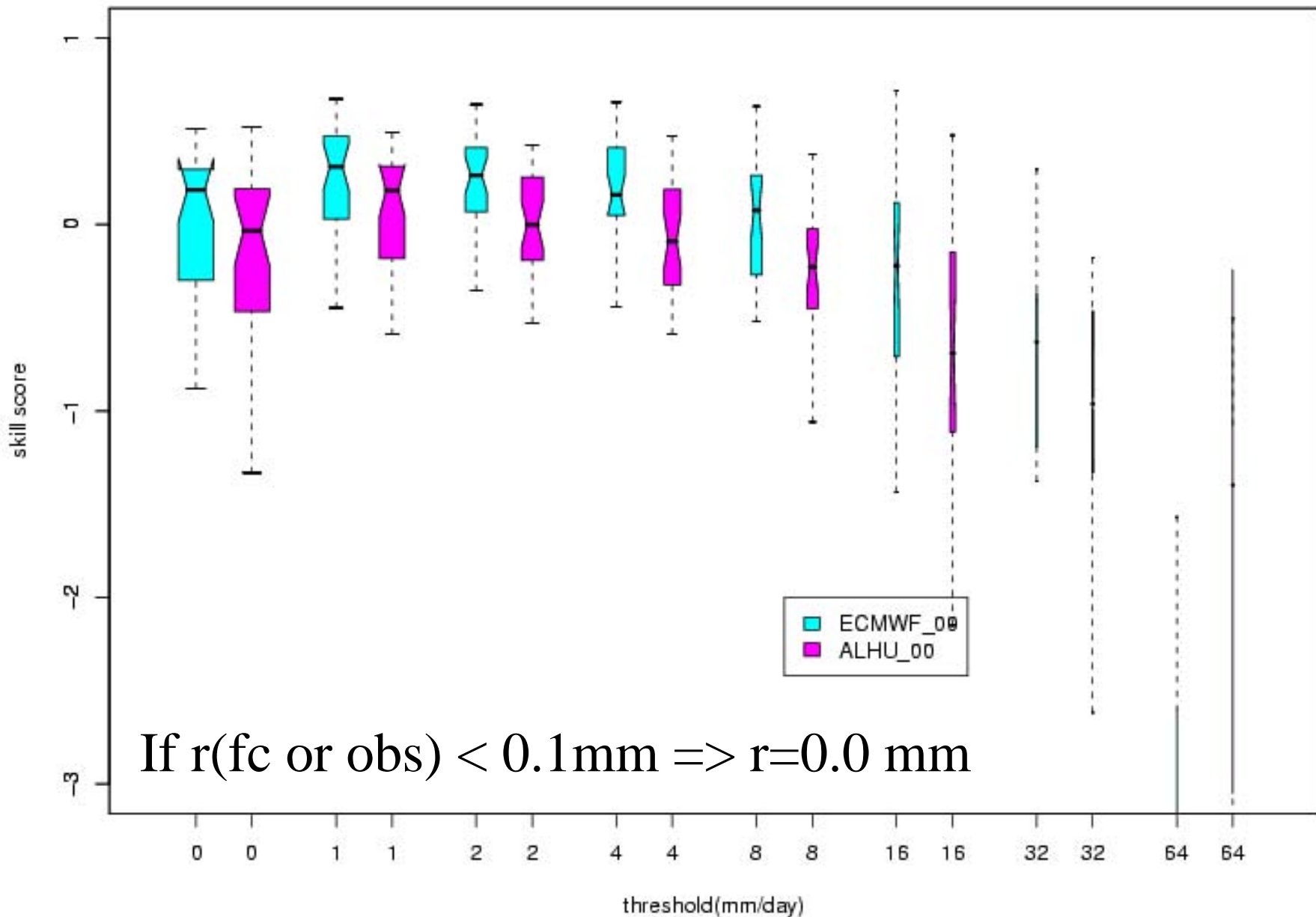
- For the two periods (Aug. 2005, Aug. 2006)
- With the help of box-and-whisker plots
- Comparison
  - between the ECMWF and ALADIN forecasts ("Large" area)
  - between the different ALADIN forecast versions ("Medium" area)
- Attempt to use Hungarian radar data ("Medium" area)

COMPARING MODELS ( 25 km spatial scale, TS: 30 - 6 , LARGE area ( 32 x 32 ), 08 . 2005 )

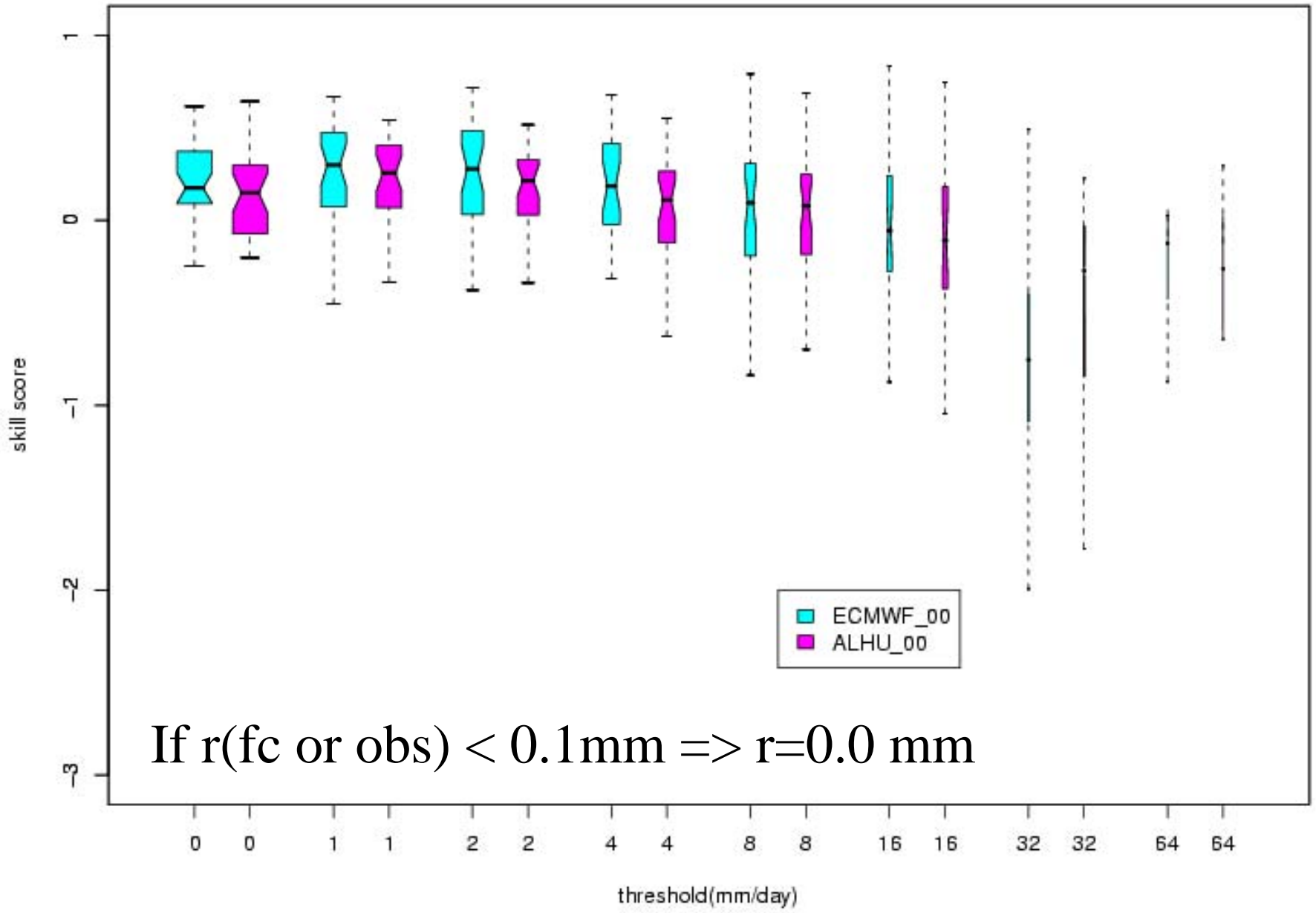




COMPARING MODELS – TRUNC ( 25 km spatial scale, TS: 30 – 6 , LARGE area ( 32 x 32 ), 08 . 2005 )



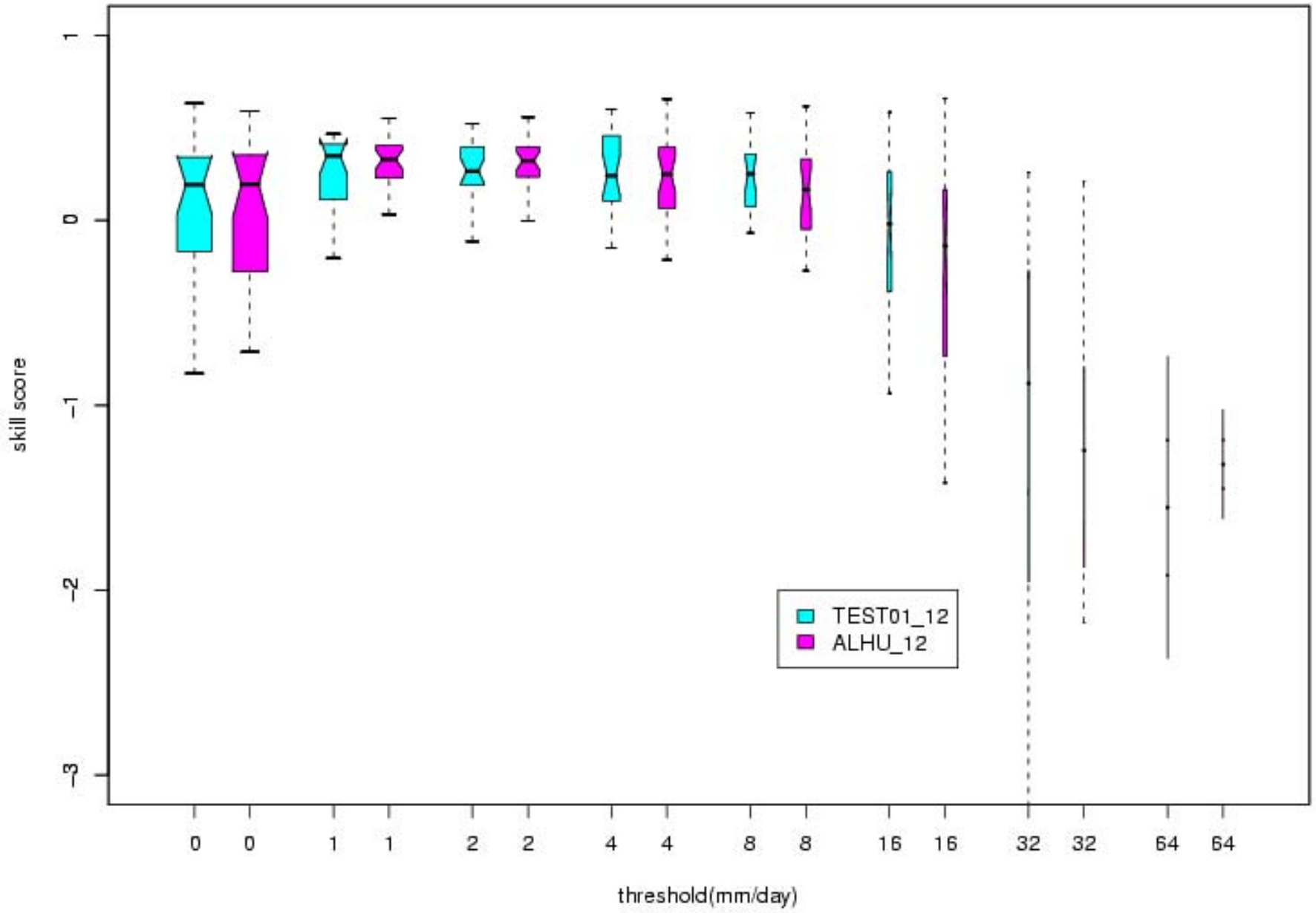
COMPARING MODELS – TRUNC ( 50 km spatial scale, TS: 30 – 6 , LARGE area ( 32 x 32 ), 08 . 2005 )



# Comparison between the different ALADIN forecast versions:

- ALHU\_00, ALHU\_12 (3d-var)
- TEST01\_00, TEST01\_12  
(dynamical adaptation: starting from an interpolated Arpege analysis)

COMPARING MODELS – TRUNC ( 8 km spatial scale, TS: 42 – 18 , MEDIUM area ( 64 x 64 ), 08 . 2006 )



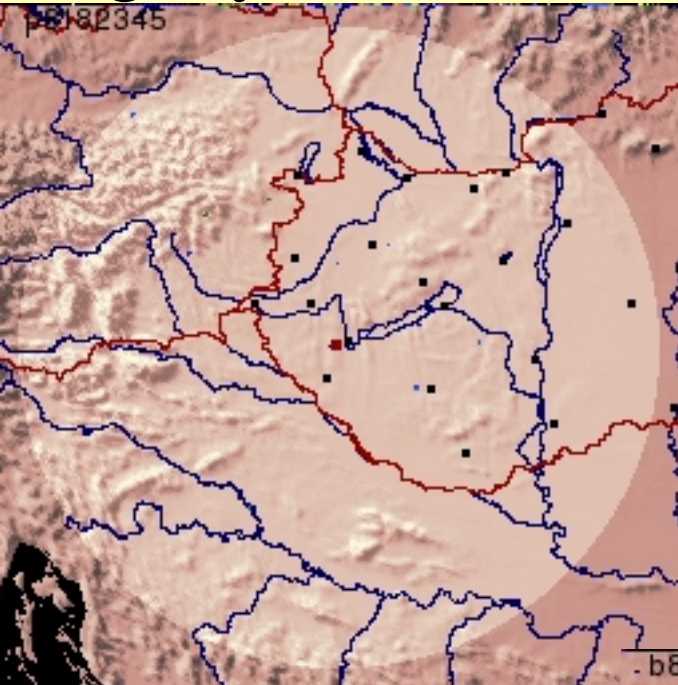
COMPARING MODELS – TRUNC ( 16 km spatial scale, TS: 42 – 18 , MEDIUM area ( 64 x 64 ), 08 . 2006 )



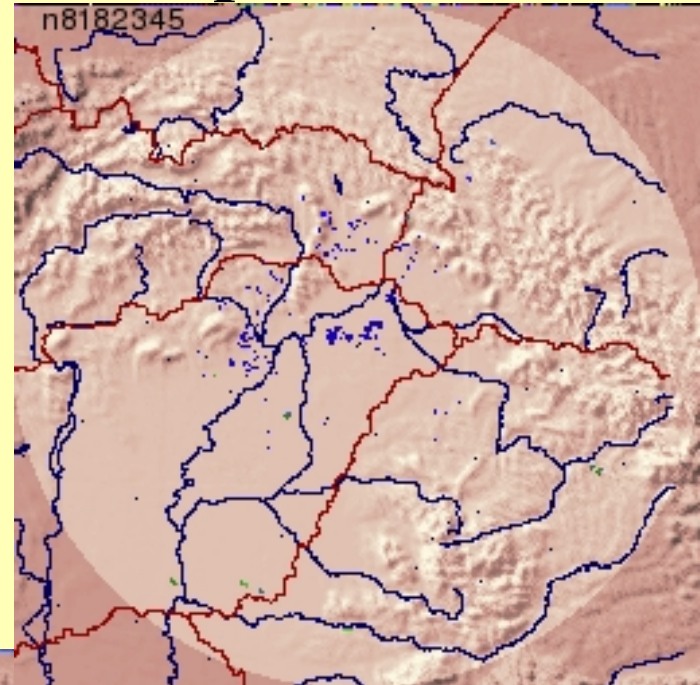
## Attempt to use Hungarian radar data

- Three Hungarian radar stations (cover Hungary, but do not cover the „Medium” area → need to use the precip. network of the Danube-Tisza catchment area as well)
- Problems with the radar data (are they correct or not ?)
- Very dense obs. → needs smoothing

# Pogányvár



# Napkor

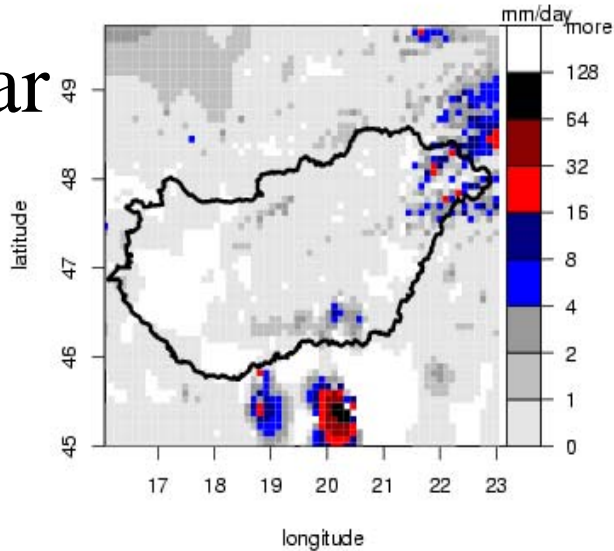


# Budapest



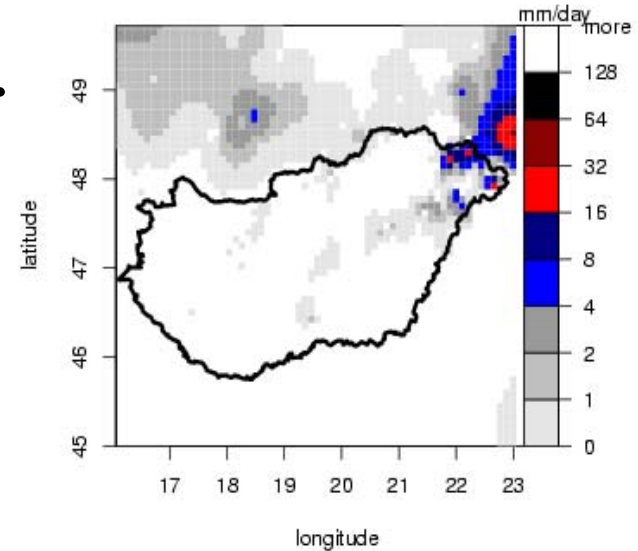
Radar

RADAR (MEDIUM area(64x64), 16.08.2006)



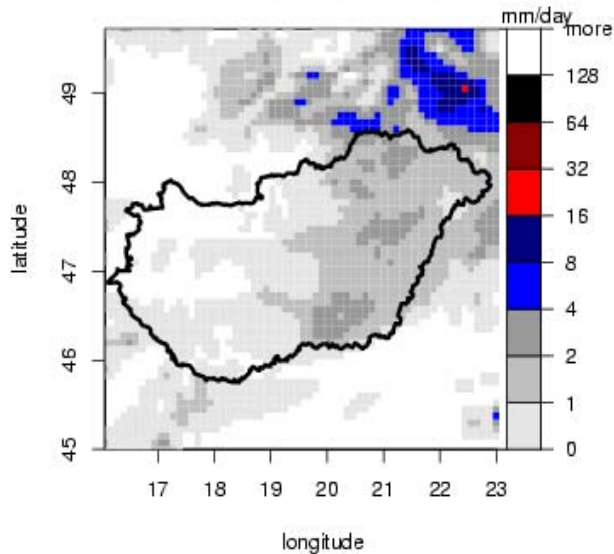
Obs.

obs (MEDIUM area(64x64), 16.08.2006)



Fc.

ALHU\_00 fc (TS:30-6)



Radar and obs.

16.08.2006. 06 UTC

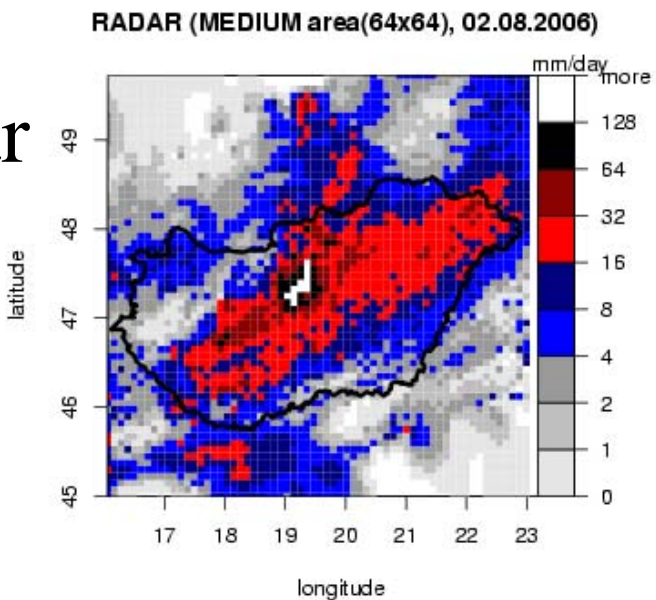
ALHU\_00 (15.08.2006.)

TS: 36 - 06

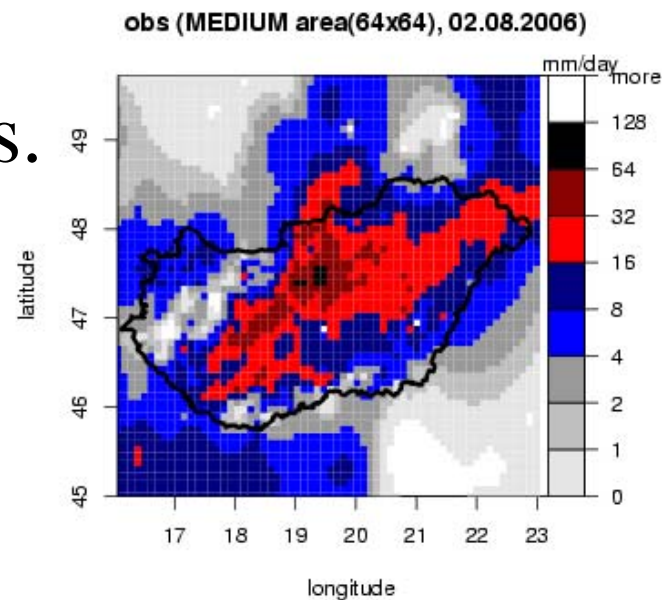




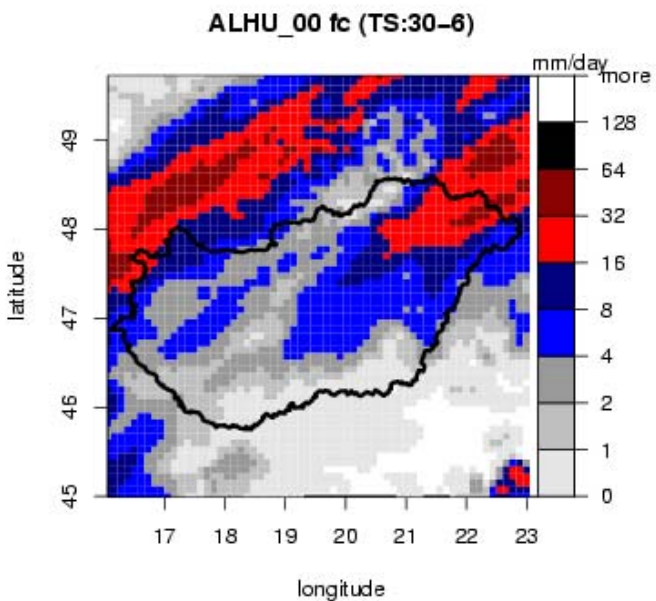
Radar



Obs.



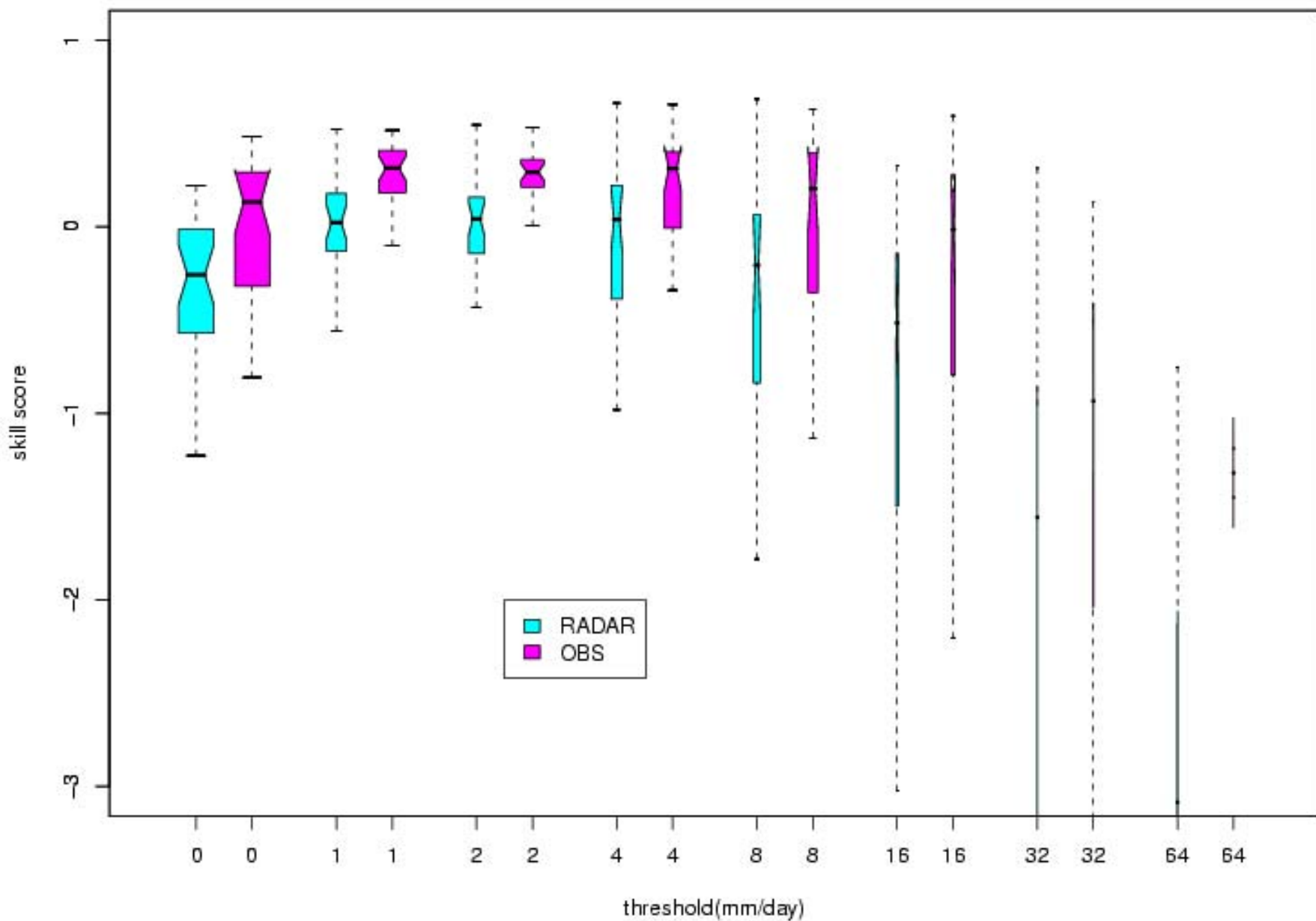
Fc.



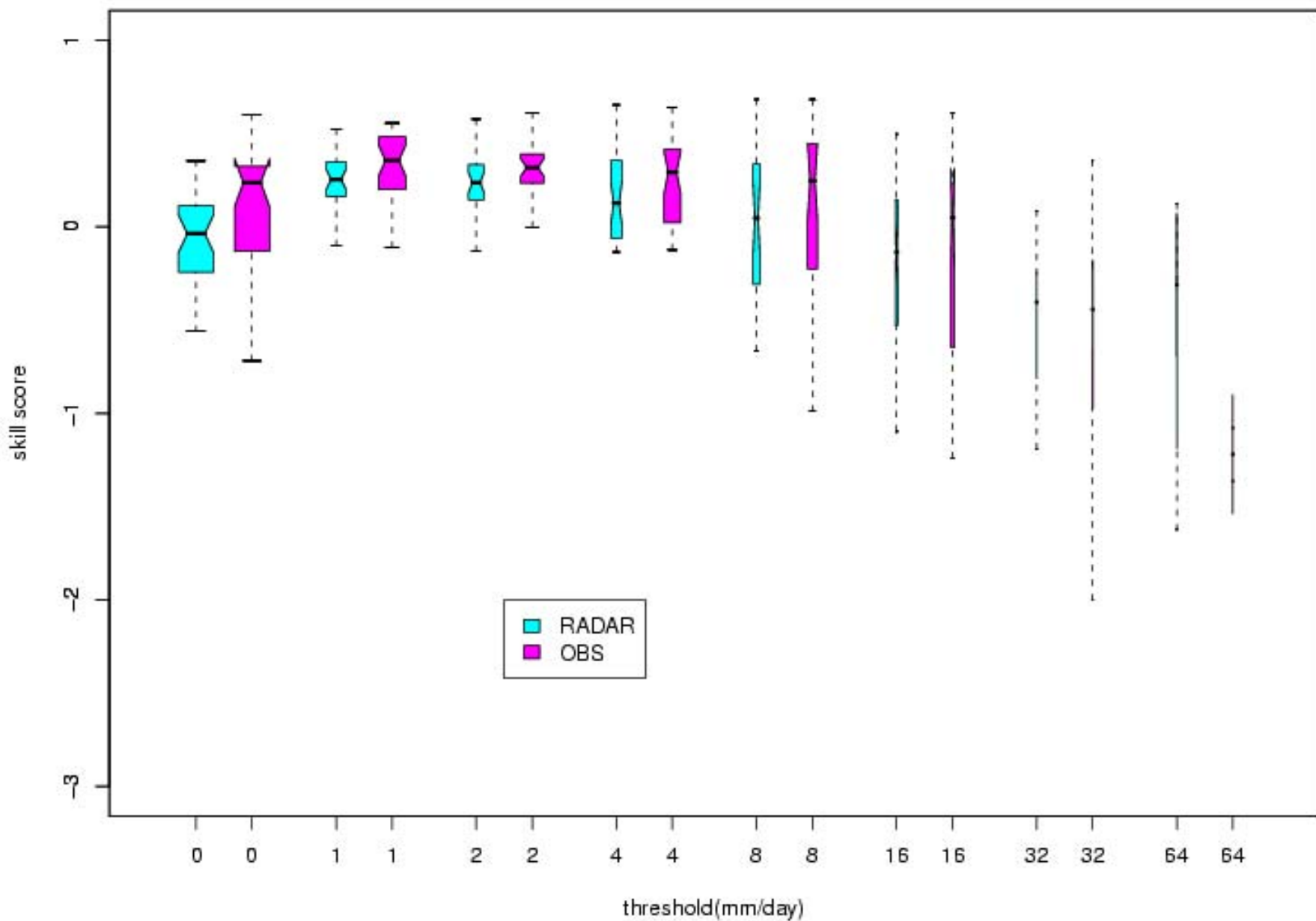
Radar and obs.  
02.08.2006. 06 UTC

ALHU\_00 (01.08.2006.)  
TS: 36 - 06

COMPARING OBS. (MODEL:ALHU\_00, 8 km spatial scale, TS: 30 - 6 , MEDIUM area ( 64 x 64 ), 08 . 2006 )



COMPARING OBS. (MODEL:ALHU\_00, 16 km spatial scale, TS: 30 - 6 , MEDIUM area ( 64 x 64 ), 08 . 2006 )



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## The technique

- provides useful insight on individual forecast cases – but only in the good selected ones
- gives valuable information on the variability of the skill score in a selected period (using box-and-whisker plots)

# Challenges

The technique needs:

- a careful choice of the grid
- large enough area (rapidly moving or large objects make it hard to interpret)

We have

- sparse obs. data
- only 24-hour accumulated precip. data

THANK YOU FOR  
YOUR ATTENTION!

