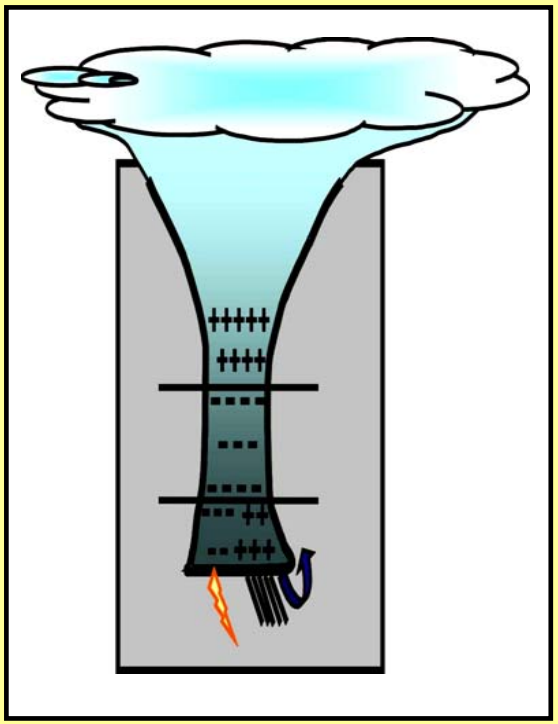


First results on the verification of precipitation forecasts from COSMO-models during GOP 2007

M. Zimmer; M. Paulat; H. Wernli; T. Reinhardt and S. Crewell

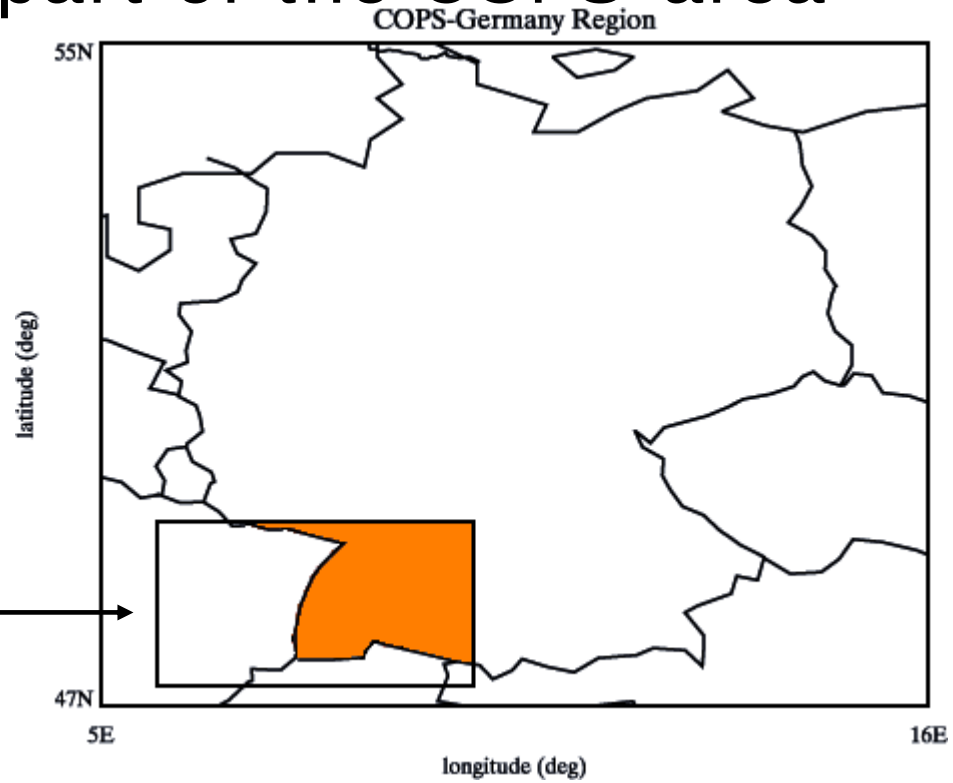
SRNWP-Workshop **Bad Orb** **7. November 2007**

Outline

1. Dataset
   - RADOLAN
   - COSMO
2. Standard verification
3. Novel quality measure SAL
4. Conclusions

Area of interest

- German part of the COPS-area

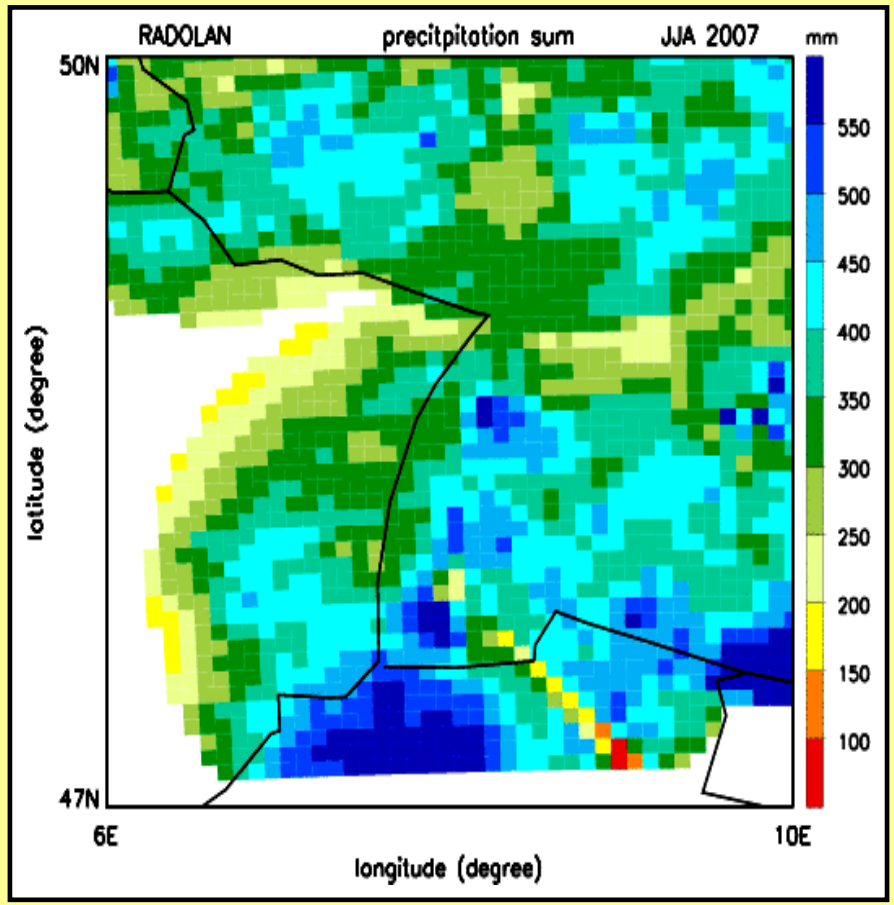


Coordinates:
47°N – 49°N
6°W – 10°W

- time period: June-July-August (JJA) 2007

Observations

- RADOLAN (RW-Product)
- 16 Radar stations
- online calibration to rain gauges
- hourly precipitation sums in mm
- effective resolution of 4 km
- averaged onto the 7 km grid of the COSMO-EU



Forecast data

- every 3h start of a model-run
- 21h forecasts
- hourly precipitation sums in mm

COSMO-EU:

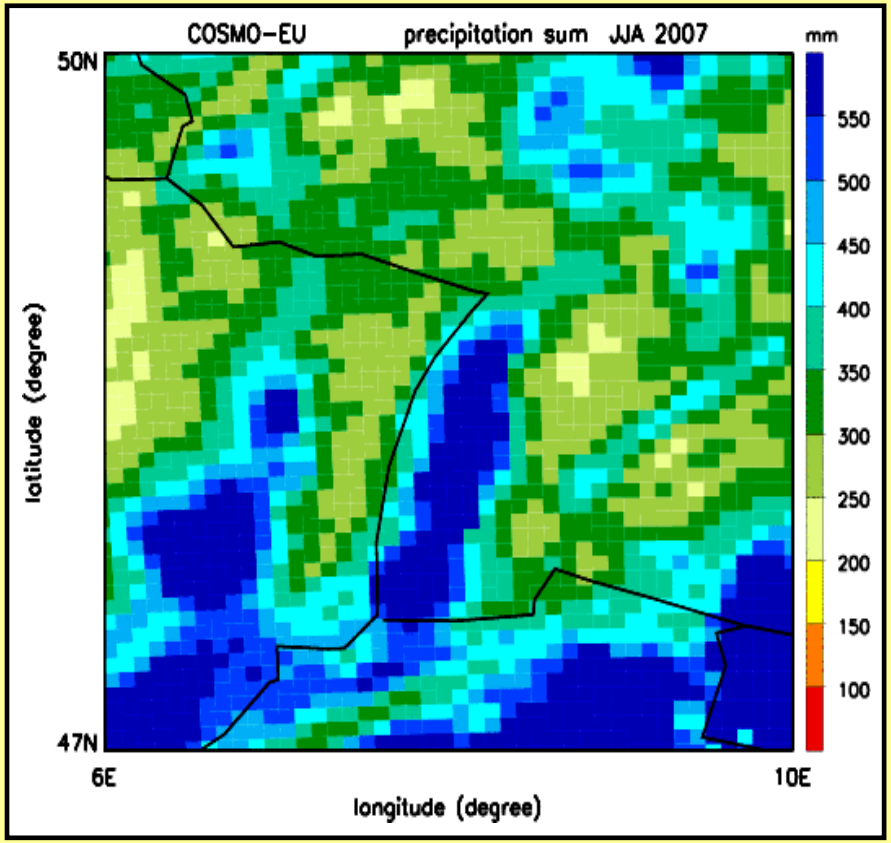
- 7 km horizontal resolution
- deep convection is parameterized
- nested within GME

COSMO-DE:

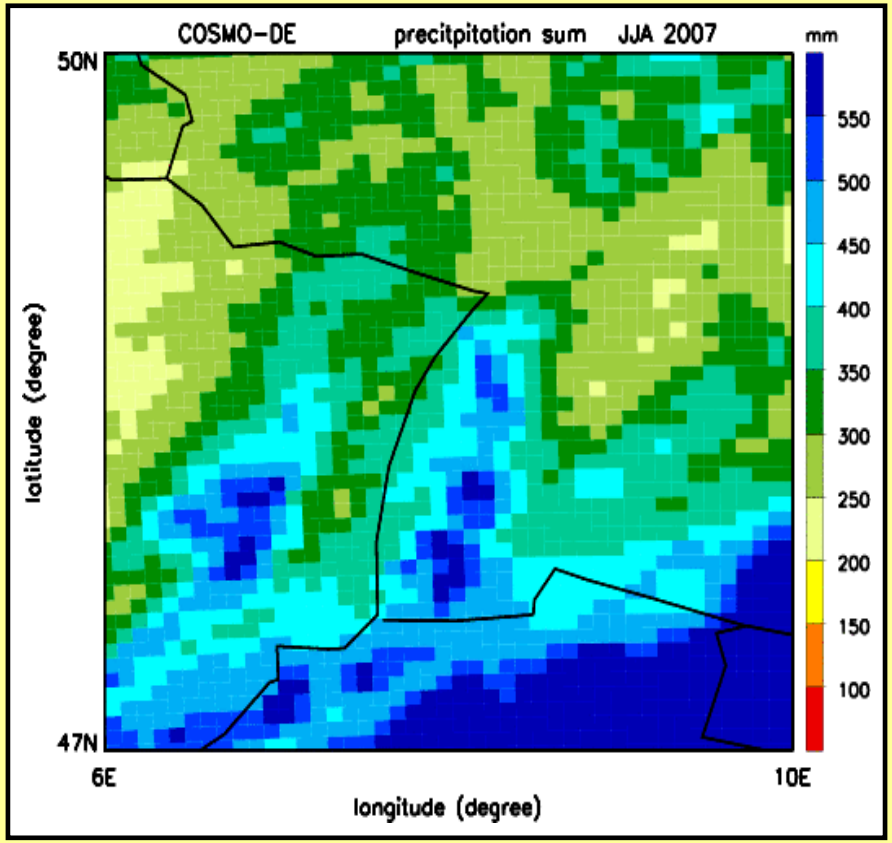
- 2.8 km resolution
  → averaged to 7 km
- explicit calculation of deep convection
- 'Latent Heat Nudging' (LHN)
- nested within COSMO-EU

Precipitation sum for JJA 2007

COSMO-EU

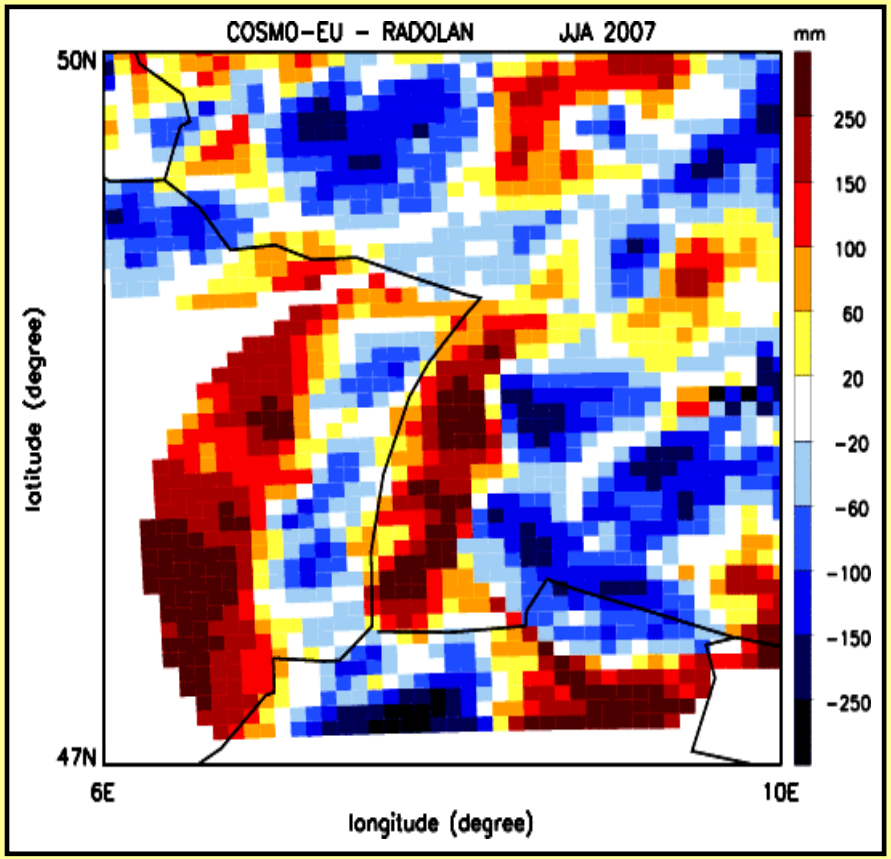


COSMO-DE

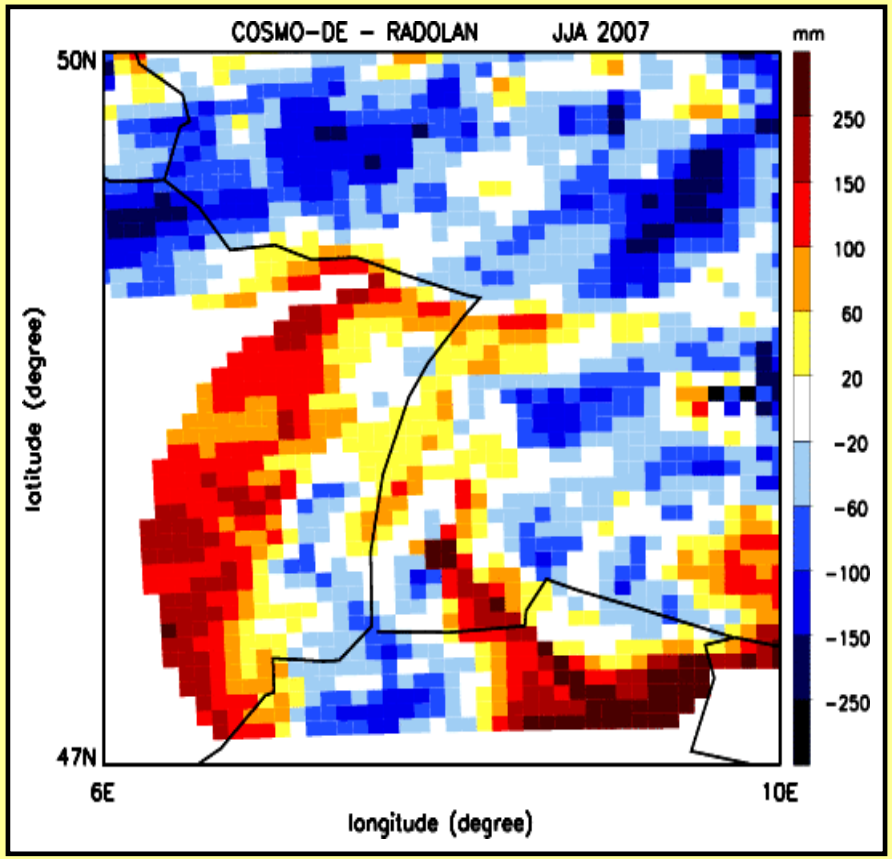


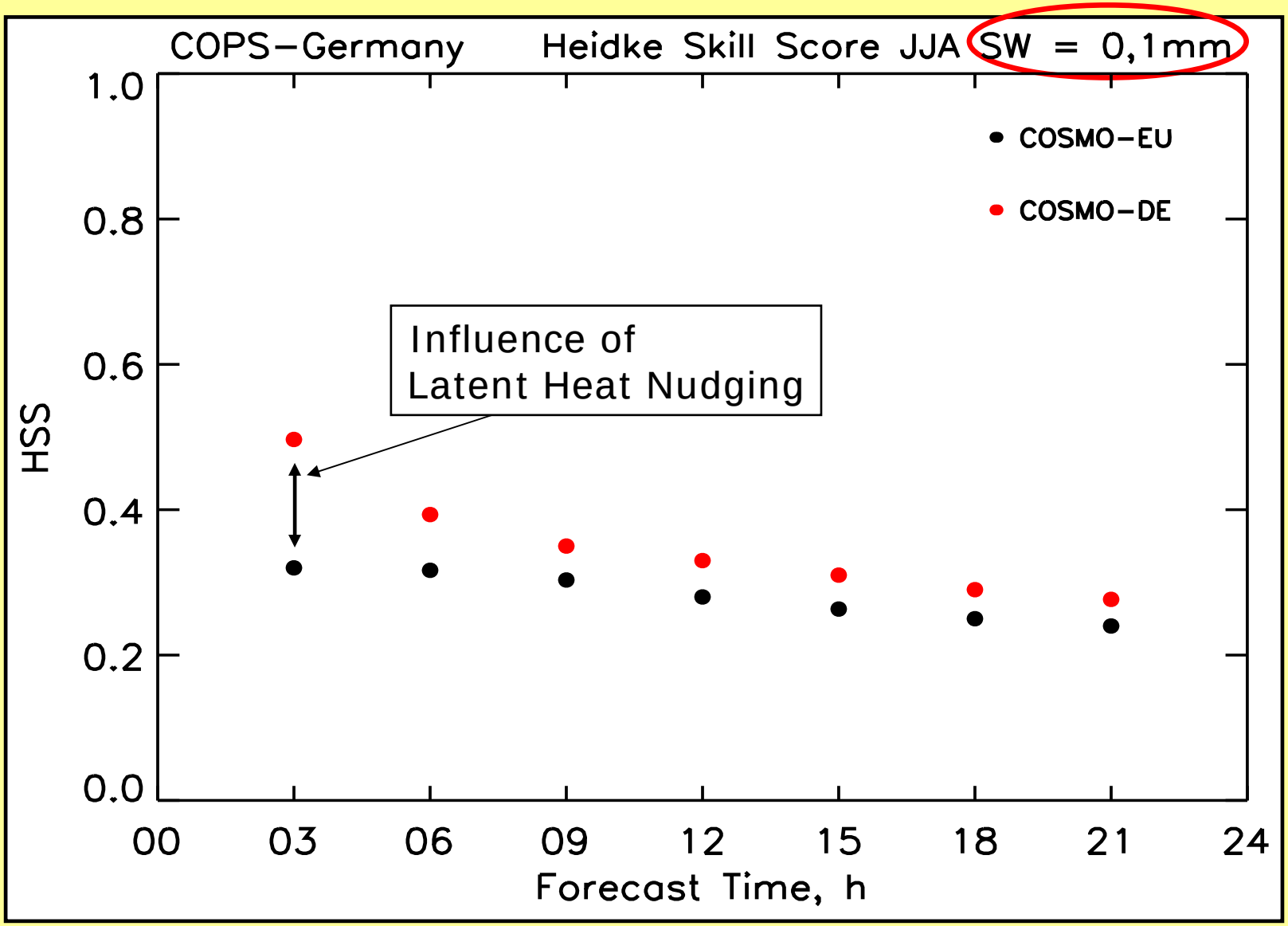
Deviation from observations for JJA 2007

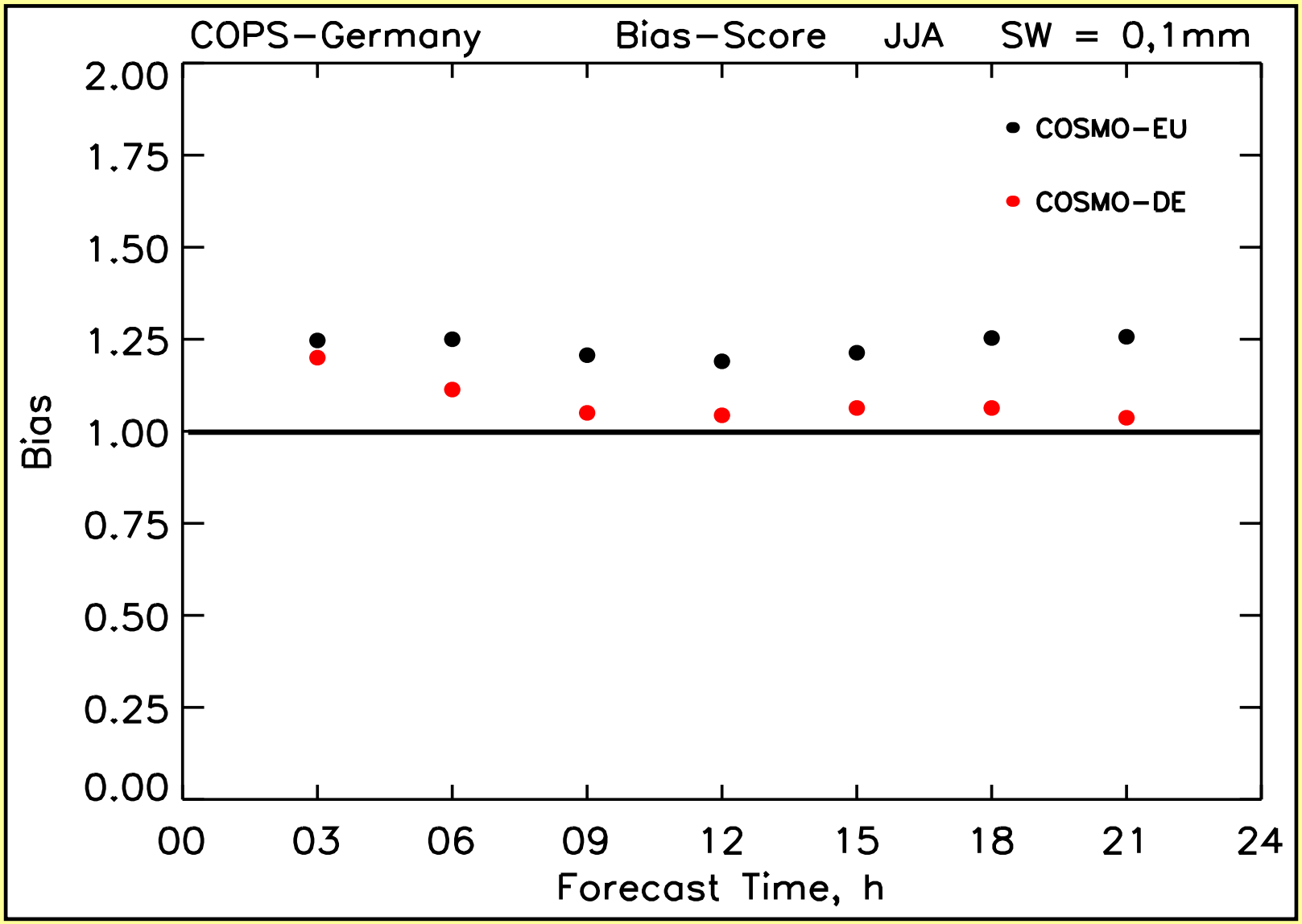
COSMO-EU - RADOLAN



COSMO-DE - RADOLAN

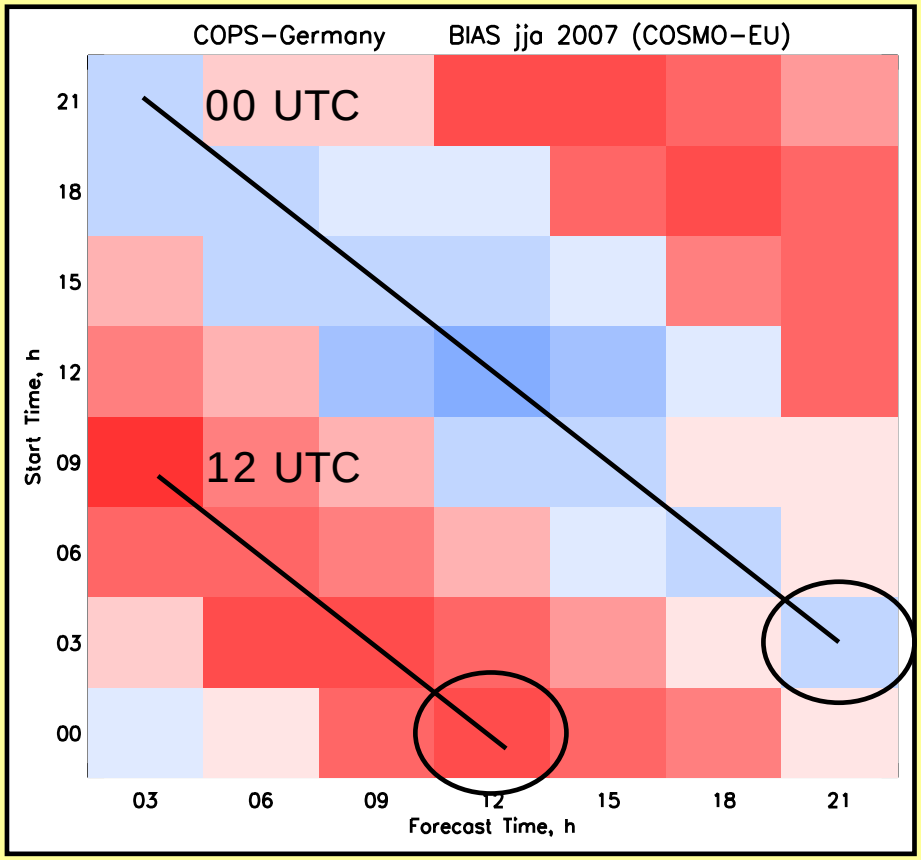



COPS–Germany Heidke Skill Score JJA SW = 0,1mm
COSMO–EU
COSMO–DE
Influence of
Latent Heat Nudging
HSS
1.0
0.8
0.6
0.4
0.2
0.0
00
03
06
09
12
15
18
21
24
Forecast Time, h


COPS–Germany
Bias–Score
JJA
SW = 0,1mm
COSMO–EU
COSMO–DE
Bias
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
00
03
06
09
12
15
18
21
24
Forecast Time, h

Diurnal cycle of the BIAS-Score

COSMO-EU

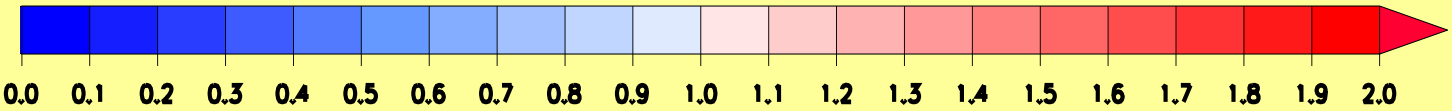


- threshold = 0.1mm per hour

- diagonal lines show same time of day

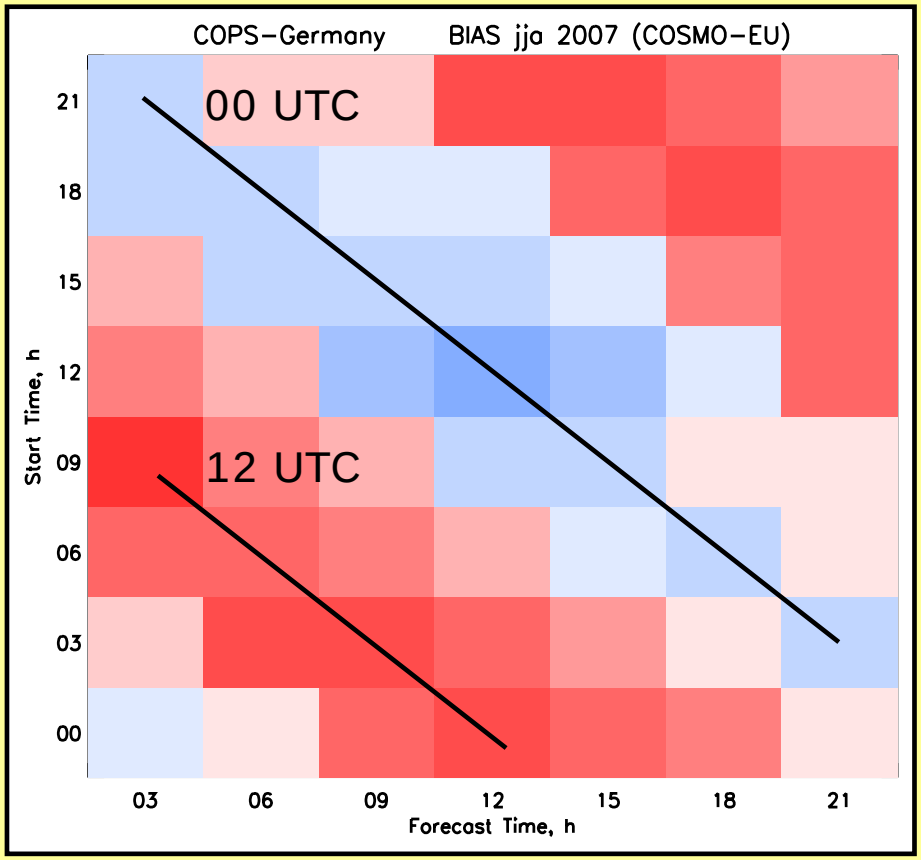
Example 1: 12 UTC
→ overestimation

Example 2: 00 UTC
→ underestimation

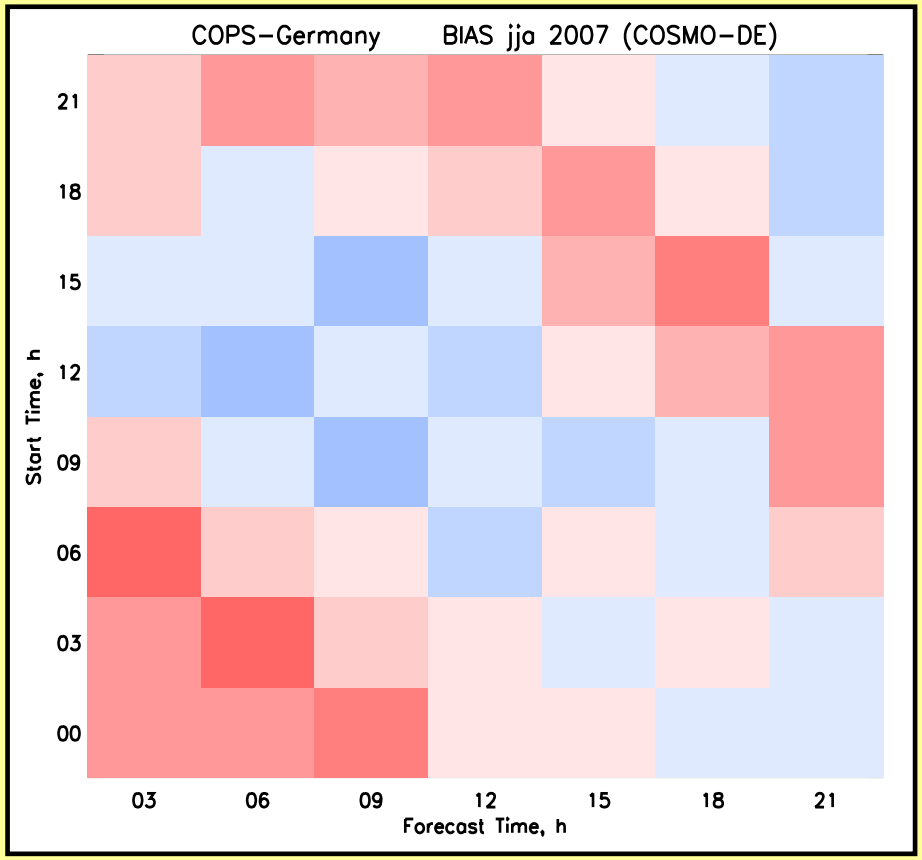


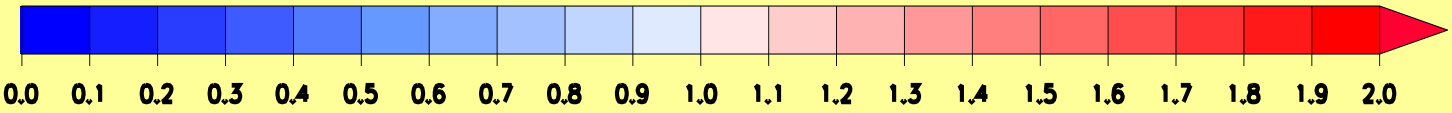
Diurnal cycle of the BIAS-Score

COSMO-EU



COSMO-DE





Novel quality measure SAL

- define a region, e.g. COPS-Germany

  → no grid point by grid point verification

- three independent components

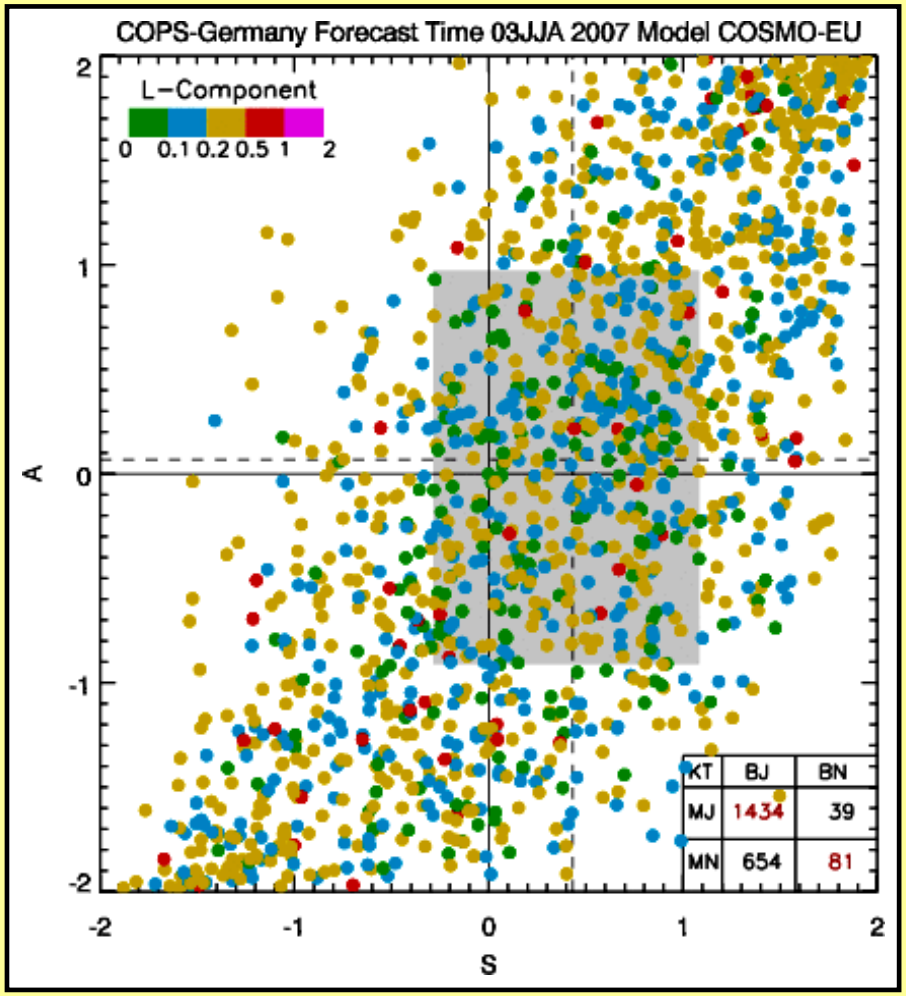
  Structure (S) e.g. frontal rain vs. convect. cells

  Amplitude (A) amount of precipitation

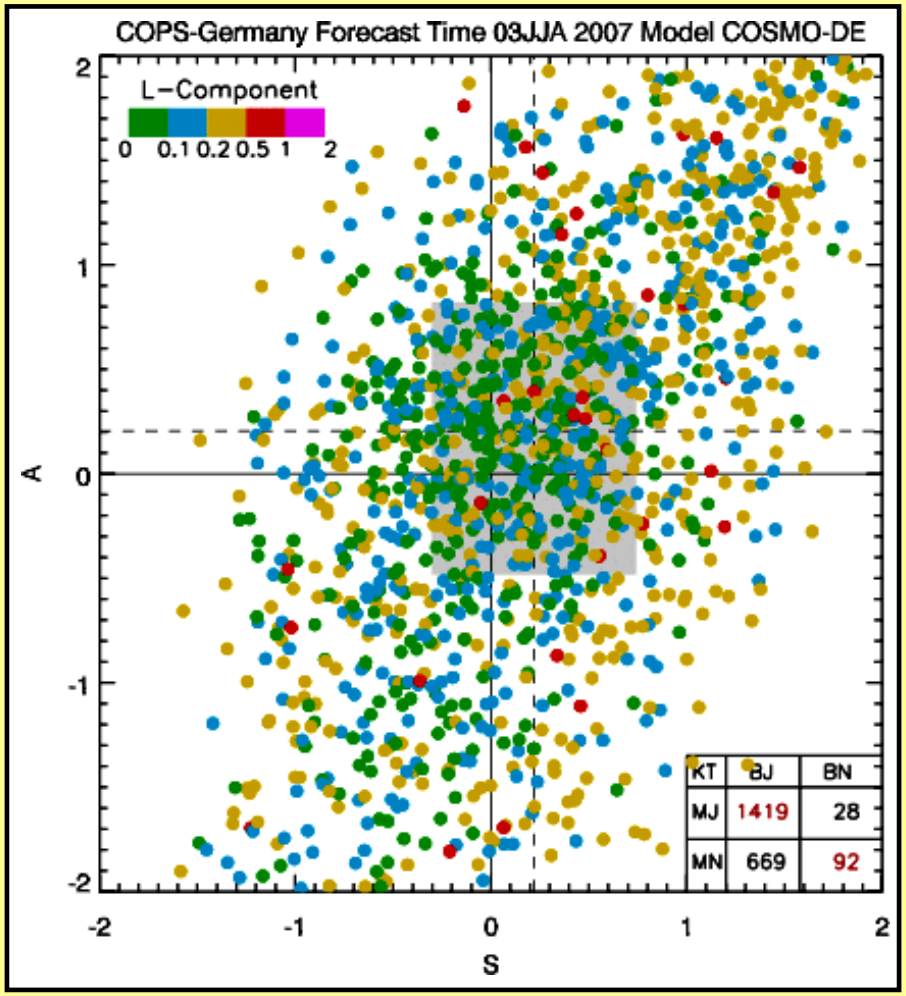
  Location (L) position of the precipitation event

- perfect score: S = A = L = 0

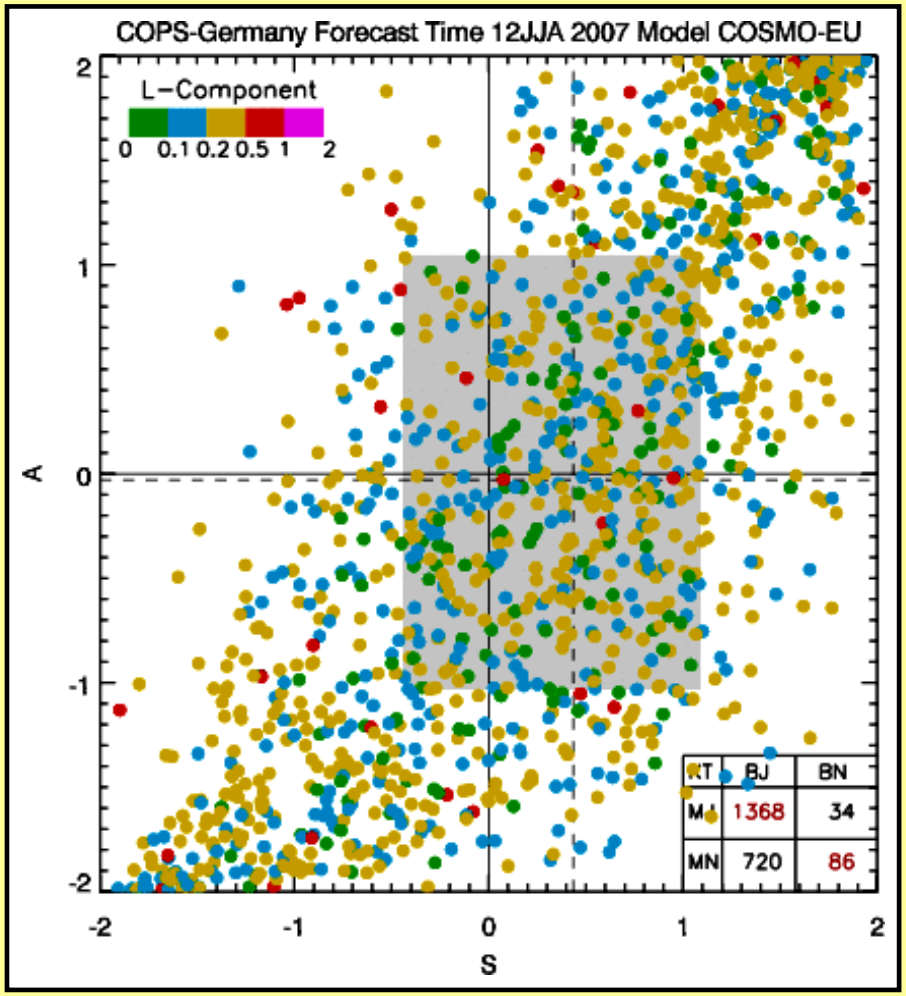
COSMO-EU 03 h



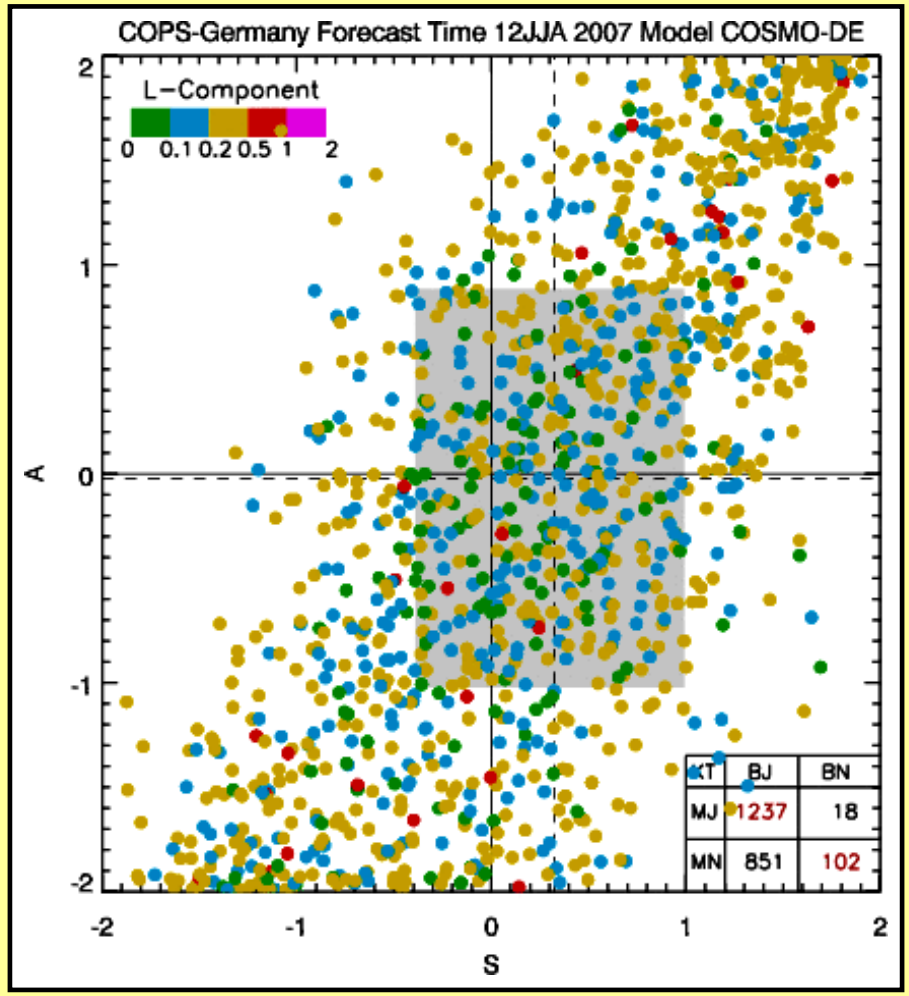
COSMO-DE 03 h



COSMO-EU 12 h



COSMO-DE 12 h



Summary & Conclusions

Verification of hourly QPFs

- data: COSMO-EU and COSMO-DE vs. RADOLAN
- domain: German part of COPS region
- time period: June-August 2007
- methods: HSS, BIAS – SAL (object-based)

QPFs from COSMO-DE reveal the following improvements (compared to COSMO-EU):

- reduced diurnal cycle of over- and underestimations of precipitation frequency (BIAS)
- more realistic structure of precipitation objects (SAL)
- positive effect of LHN during first 3 forecast hours (HSS, SAL)

Thank you very much
for your attention!