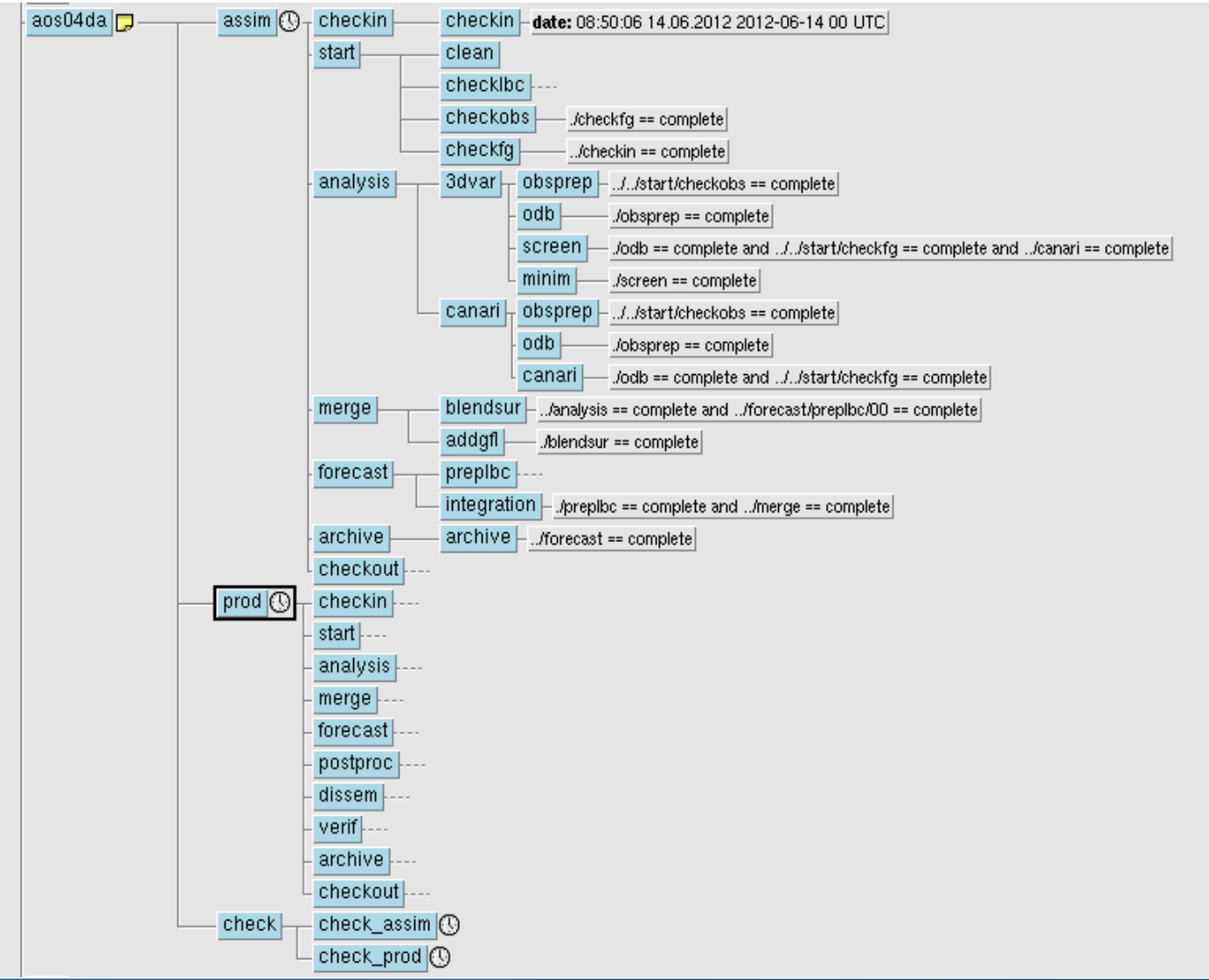
Local data assimilation system in Slovenia - 2012

Operational data assimilation system

Basic characteristics

- ALARO model, cy35t1, 4.4 km resolution, 43 vertical levels
- 6-hourly data assimilation cycle
- 3D-Var + CANARI + SST replacement
- 4 production runs (54 h); starts at 2:50, 9:40, 14.28, 21:45 UTC
- Static B matrix, computed by downscaling of ARPEGE ensembles over one-month period (July)

Assimilation suite - SMS



Observations

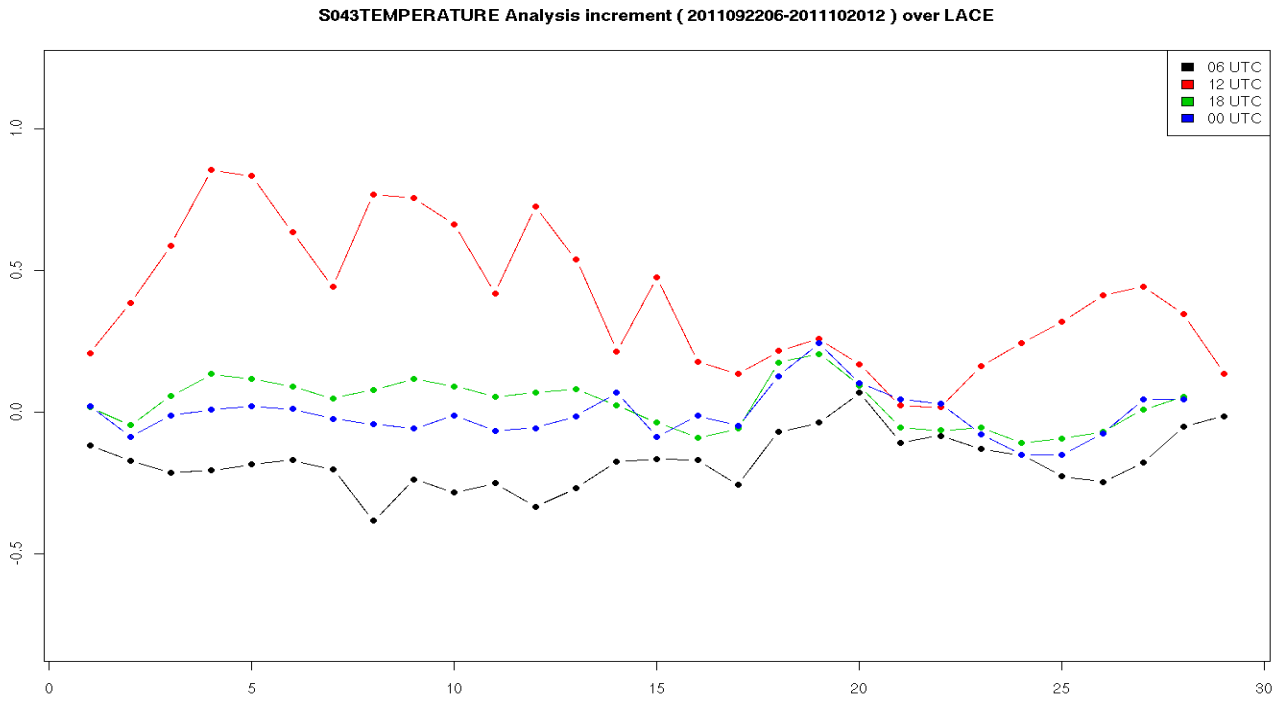
- All conventional observations available through OPLACE
- Surface observations are combined with locally received SYNOP data
- Satellite data: AMSU-A,B from NOAA 16,18; MSG SEVIRI

Bias correction

- Constant bias correction used at the moment
- Problems experienced with cycling of Var-BC coefficients (unsuccessful minimisations after a few days or weeks, a cold start of VarBC helps) – still not explained (nor fully understood)

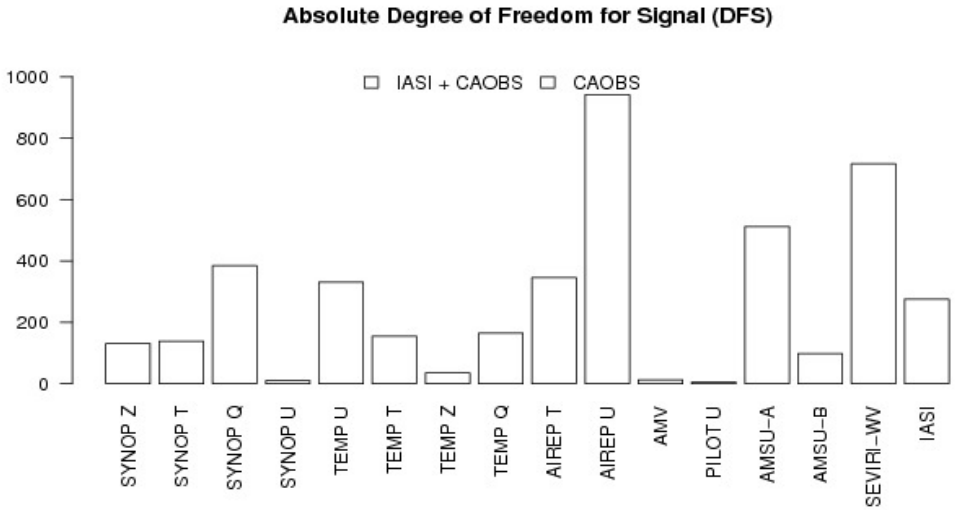
Diagnostics (1)

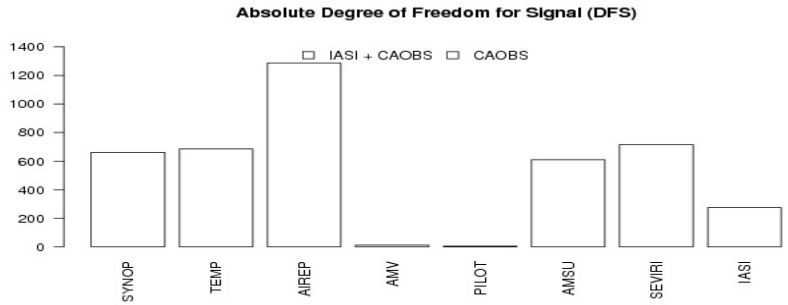
- Diagnosis of model bias by mean analysis increments: mostly cold bias of near-surface T, highest during day (12 UTC), under-estimated diurnal cycle

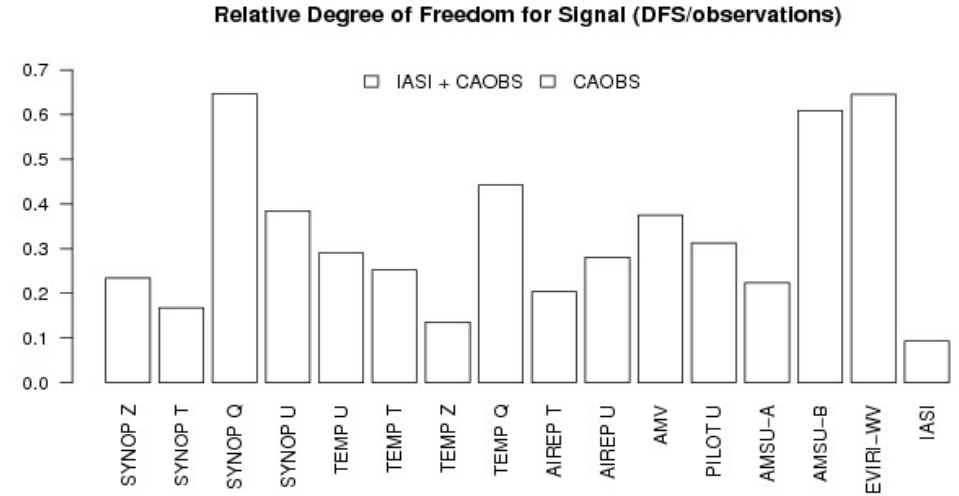


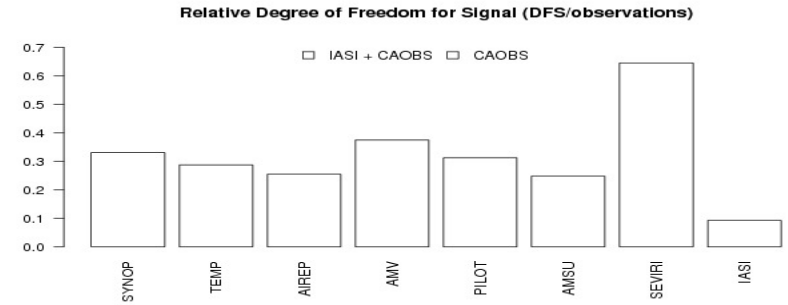
Diagnostics (2)

- DFS: AMDARs (winds) have highest impact on analysis



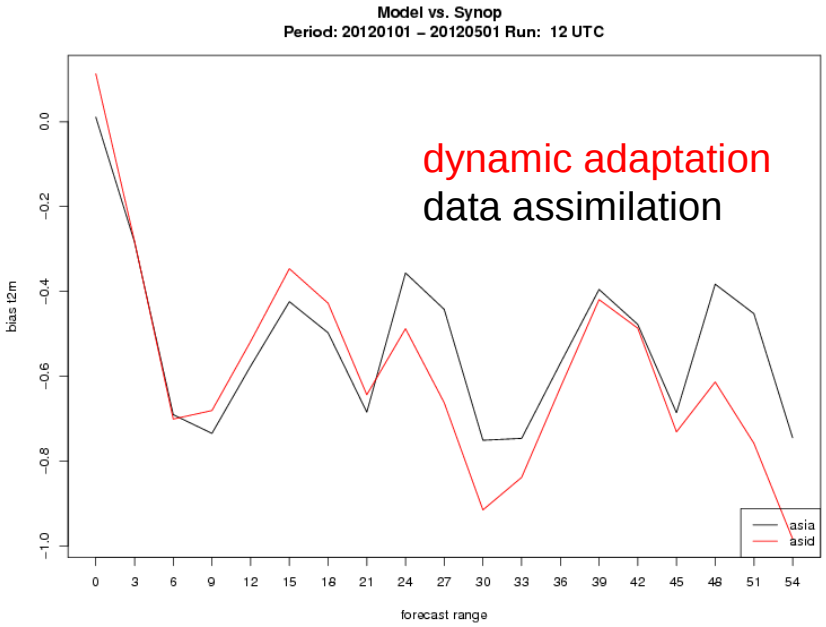




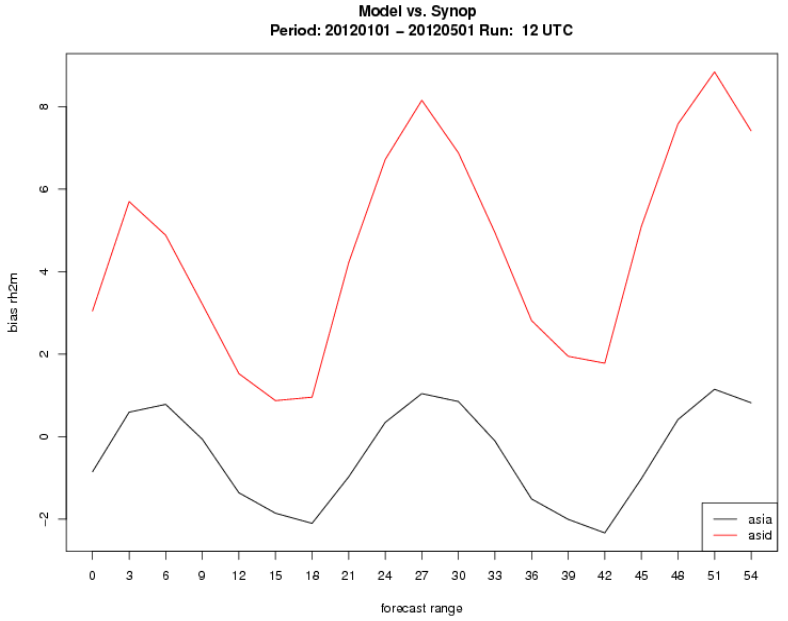


Diagnostics (3)

- forecast scores: improved near-surface biases



2m temperature bias

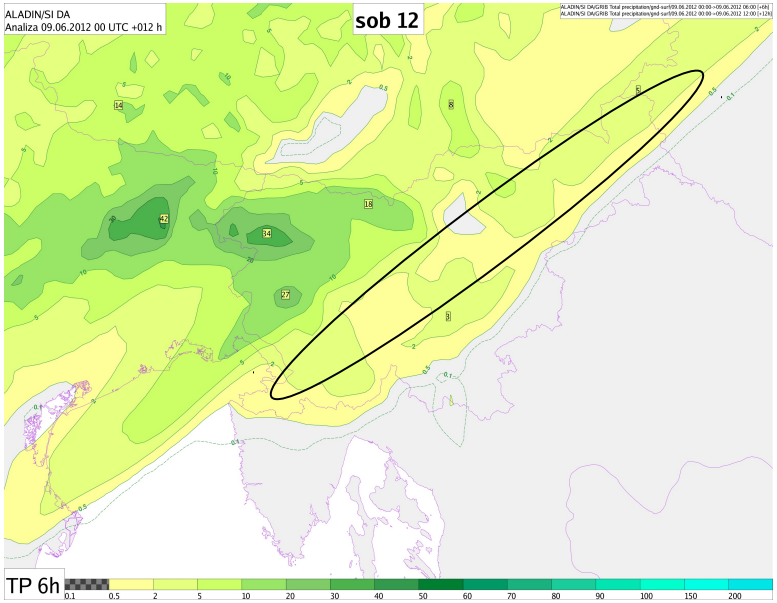


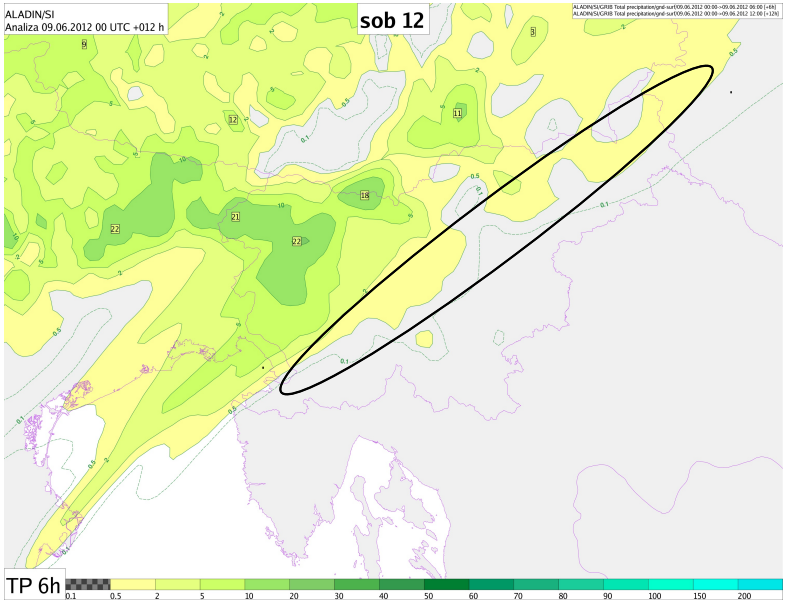
2m rel. humidity bias

Summary of observed impacts of DA

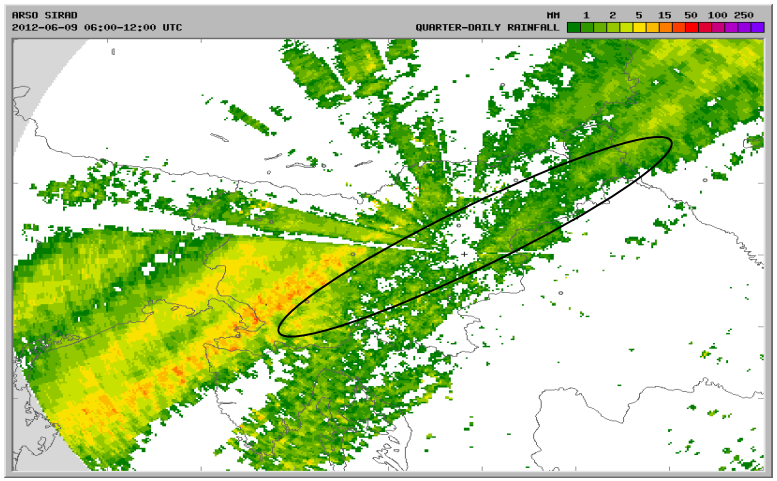
- Clear improvements of surface temperature and humidity fields
- Generally neutral impact on upper-air fields
- Impact on winds/precipitation fields from time to time, mostly related to convection

Recent convective case





data assimilation



dynamic adaptation

6h radar accumualtion

Developments

Currently evaluated

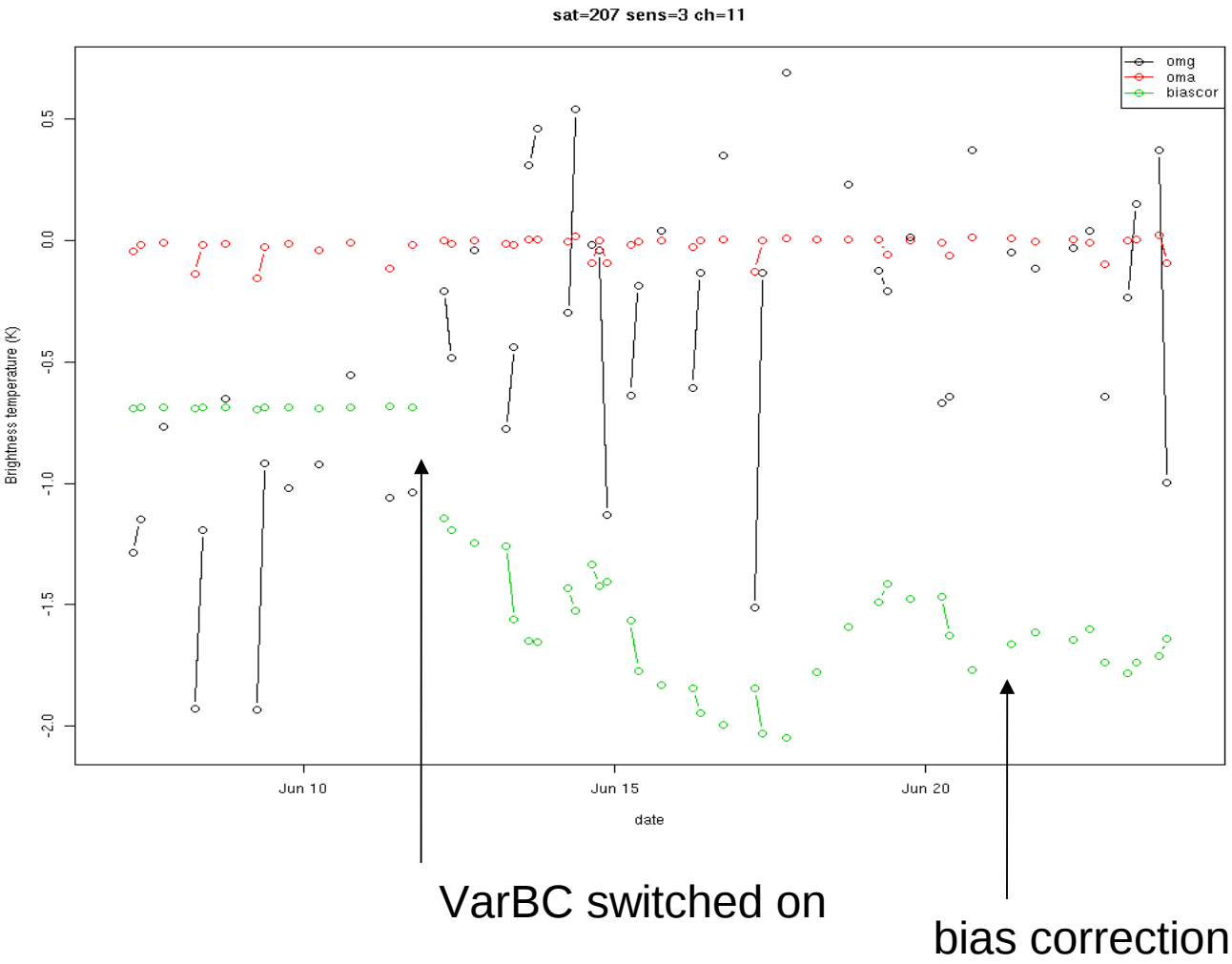
- VarBC performance (temporal evolution of coefficients)
- Additional satellite data:

  NOAA-19 (AMSU)

  METOP (AMSU, IASI)
- Additional local aircraft data (Mode-S, separate presentation)

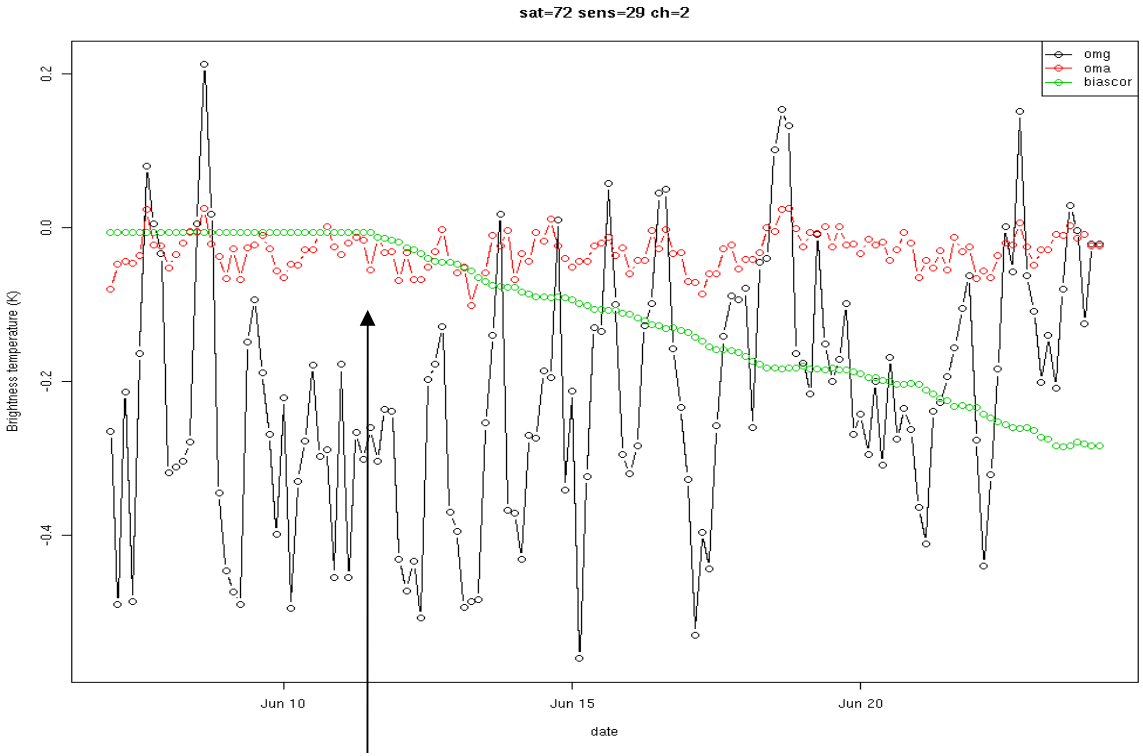
VarBC validation: warm-up (1)

- 3-hourly cycling,
- 3-h VarBC update
- AMSU: VarBC converges fast (few days), but coefficients not stable



VarBC validation: warm-up (2)

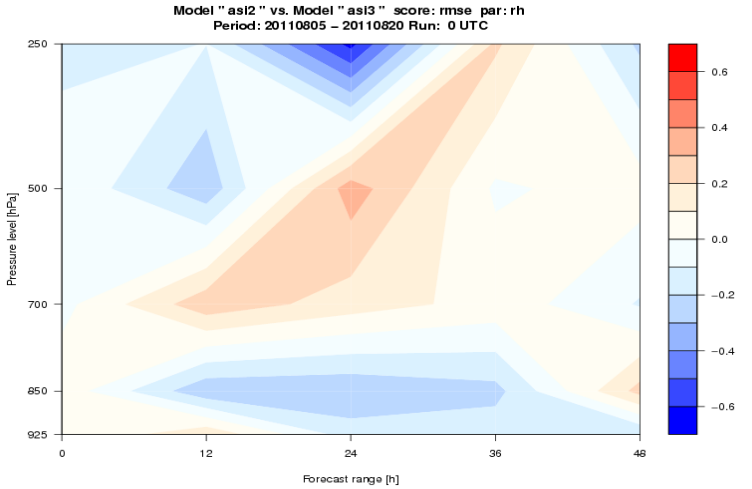
- SEVIRI: convergence is much slower, but stable bias coefficients
- more than 2 weeks to reach obs-guess bias (even with 3h cycling)

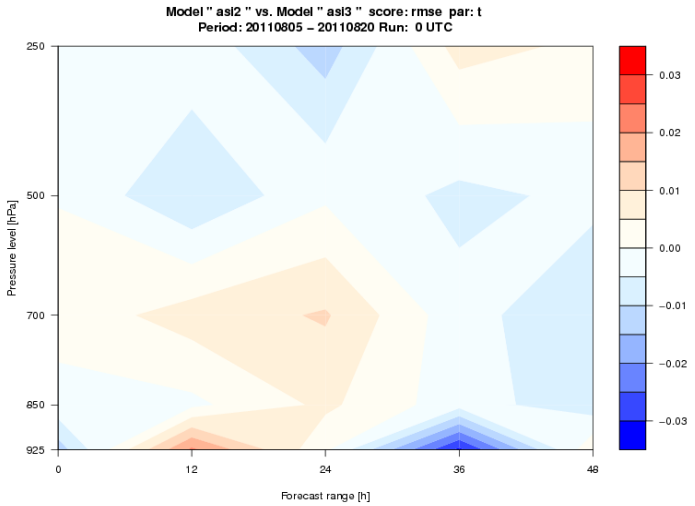


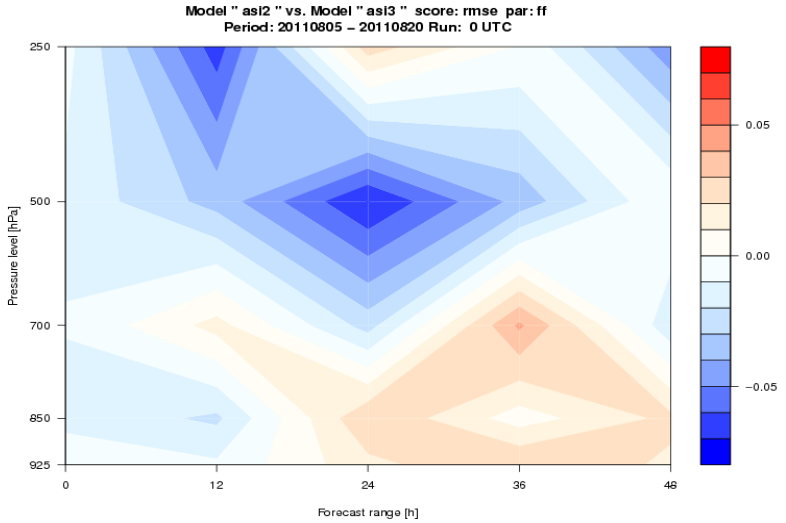
VarBC switched on

Assimilation of IASI

- 56 channels used
- VarBC with 24 h update, 1-10 hPa thickness predictors switched off
- Several time periods evaluated: generally neutral to slightly positive overall impact (improvements in blue)







Plans

- Switch to 3-hourly cycle with increased vert. resolution (needs recomputation of B matrix)
- Resolve (understand) current problems with VarBC
- Include new data