SHMU - NWP

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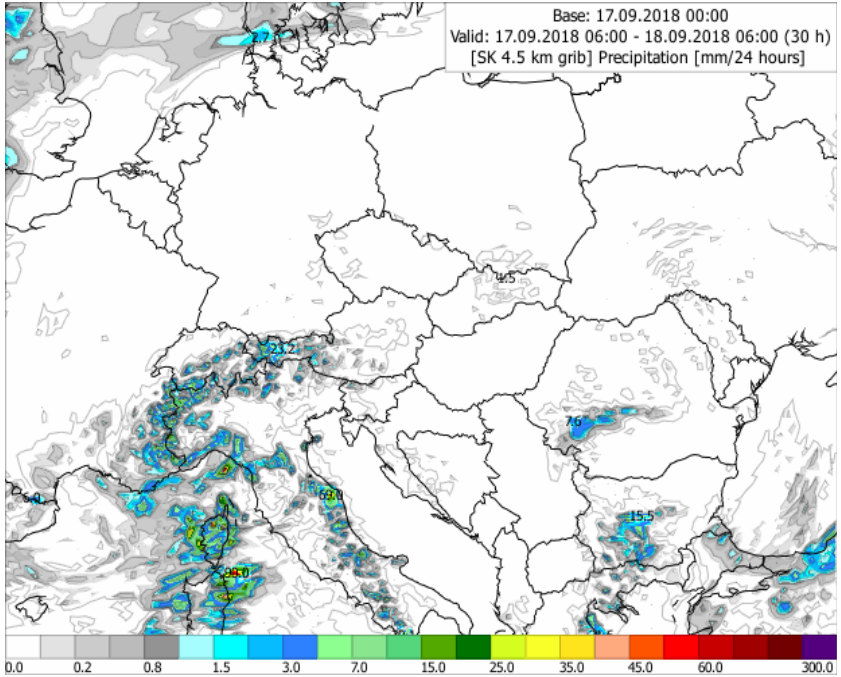
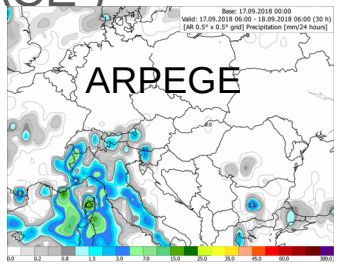
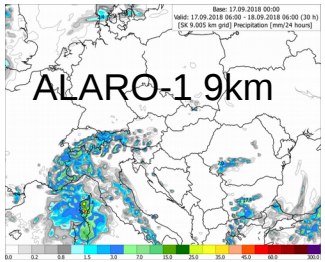
Operational Setup SHMU

- on SHMU: HPC2 (RH Linux)
- ALARO-1, cy40t1_bf06
- domain: 4.5km, 625x576
- 63 vertical levels, mean orography
- time step 180s
- 3h space consistency coupling ARPEGE synchronous
- forecasts up to
  - F+72h at 00, 06, 12 UTC
  - F+60h at 18 UTC
- upper air blending
- CANARI (local + OPLACE)

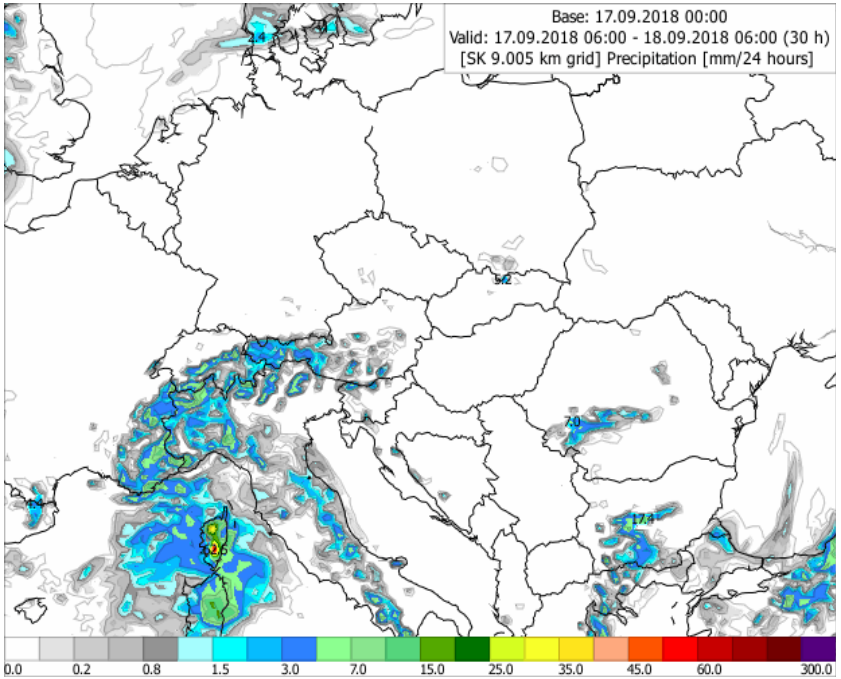


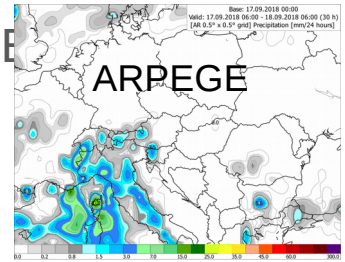


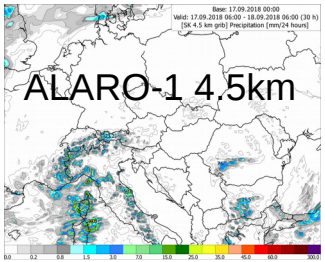


Still running also **old** operational Setup SHMU

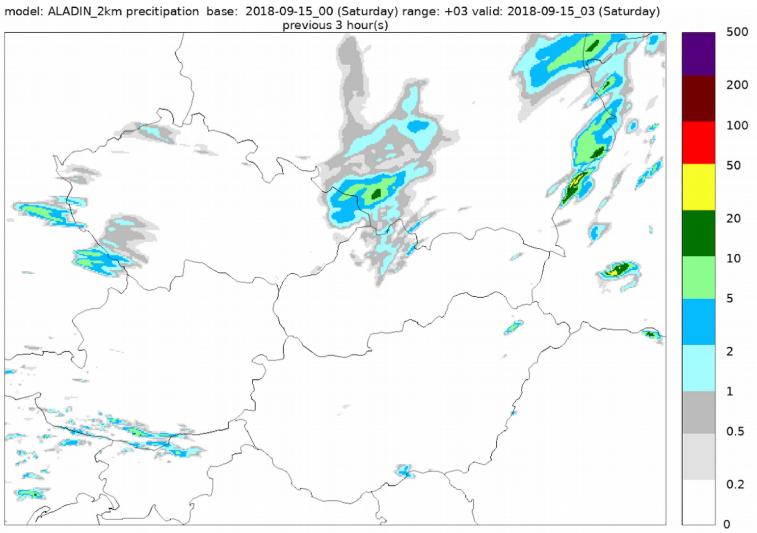
- on SHMU: HPC1 (AIX)
- ALARO-0, 36_t1.10
- domain: 9km, 320x288
- 37 vertical levels, mean orography
- time step 400s
- 3h space consistency coupling ARPEGE synchronous
- forecasts up to
  - F+72h at 00, 06, 12 UTC
  - F+60h at 18 UTC
- upper air blending
- CANARI (local + OPLACE

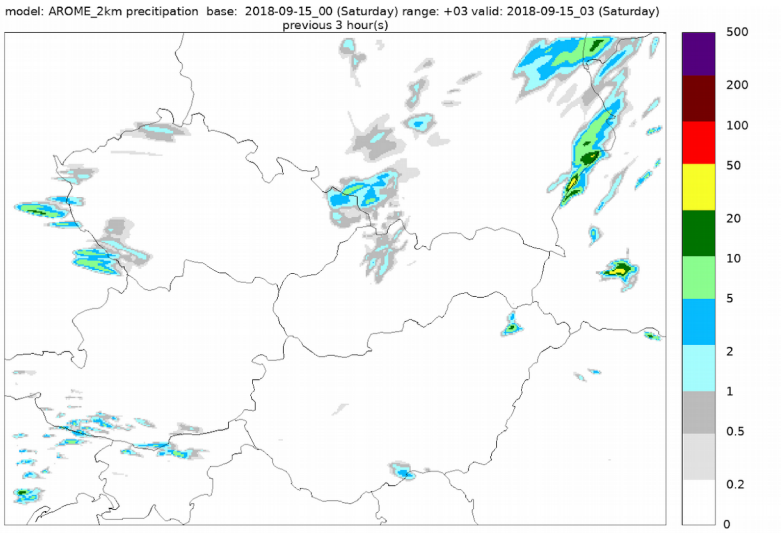






Tests domains (only 00, 12 UTC runs)

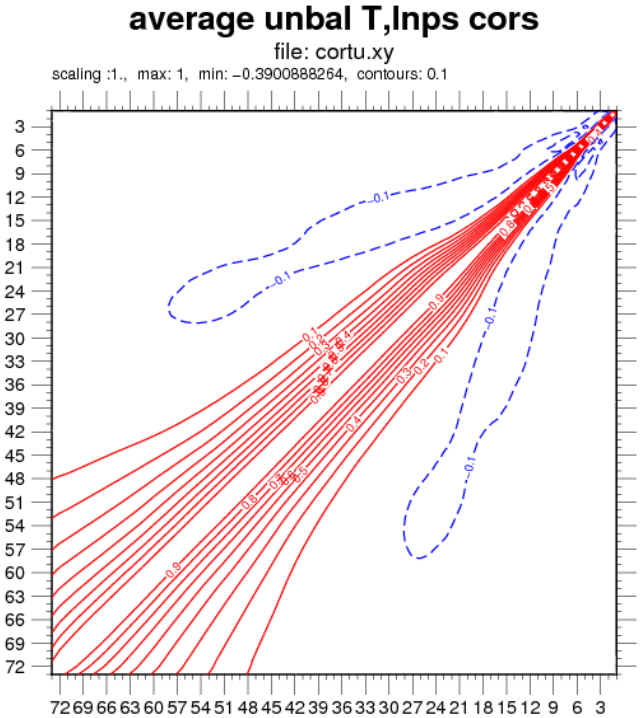


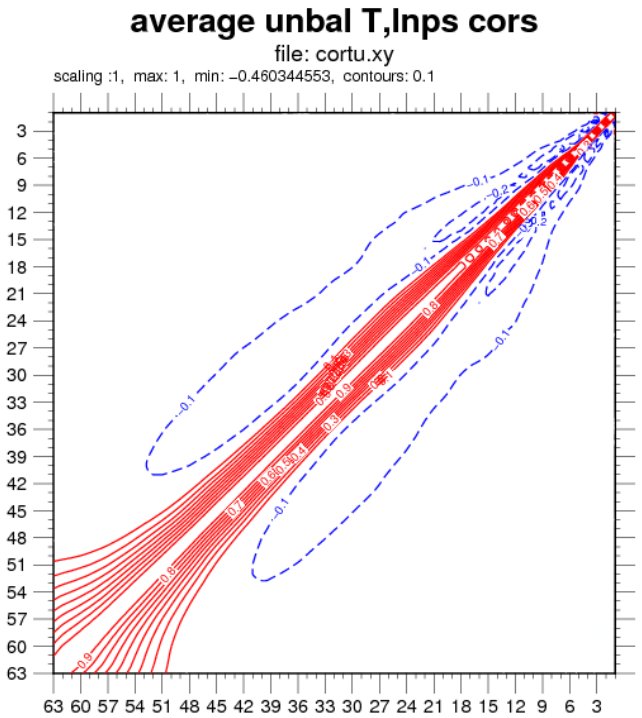


- ALARO-1 cy40t1_bf06
- 2km, 512x384
- 73 vertical levels
- time step 90s
- Coupling with 4.5km
- HPC1-Gentoo linux - Class:old

- AROME cy40t1_bf06
- 2km, 512x384
- 73 vertical levels
- time step 144s
- Coupling with 4.5km
- HPC2:Gentoo linux - Class:old
- B-Matrix

B-matrix: spin-up ensemble based B matrix, LBC data with 8km resolution from AEARP, 6 members, 2 periods in 2016 (32 days)





testing domain:

- ❑ AROME cy40t1_bf05
- ❑ 2km, 512x384
- ❑ 73 vertical levels

OPER domain:

- ❑ ALARO-1 cy40t1_bf05
- ❑ 4.5km, 625x576
- ❑ 63 vertical levels

Data assimilation activities with focus on GNSS data

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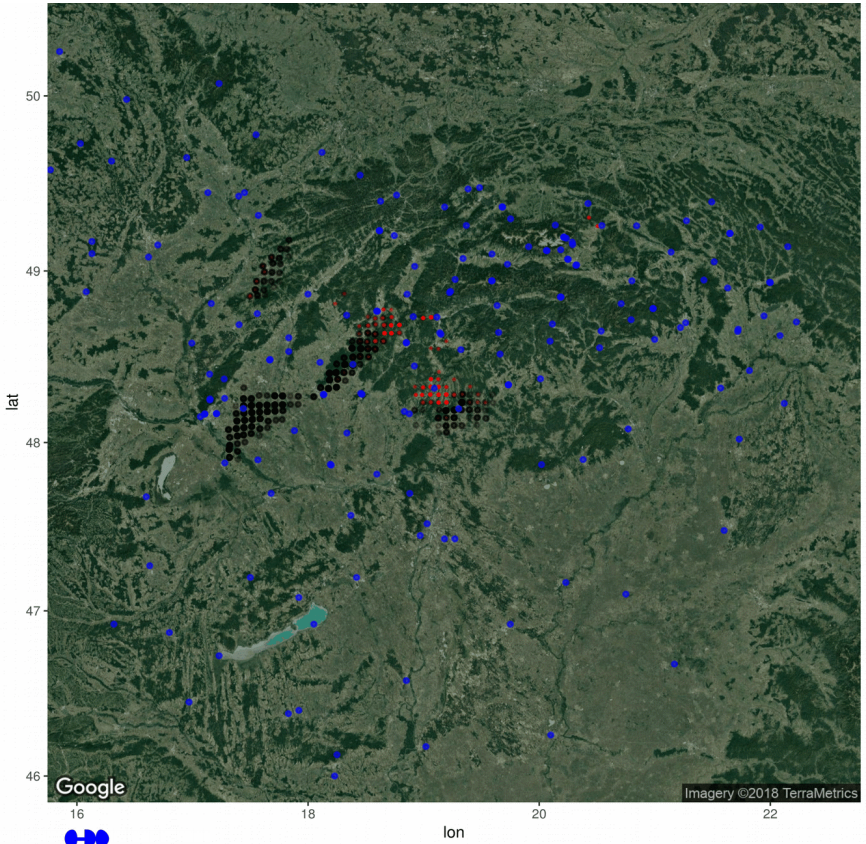
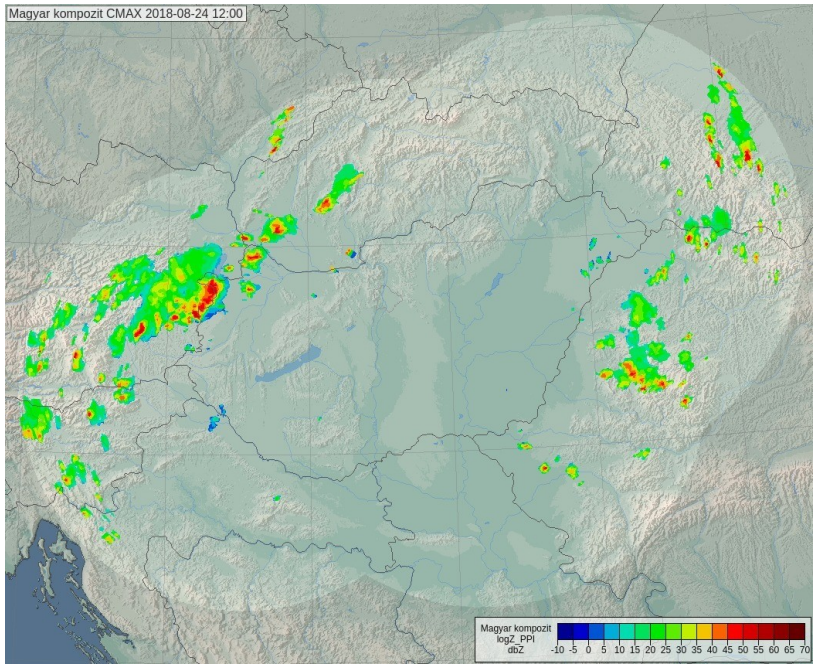
testing domain:
- ❑ AROME cy40t1_bf05
- ❑ 2km, 512x384
- ❑ 73 vertical levels

RADAR (ODIM HDF5) –> RH.py (Slovenia) + Bator cy43t1 -> cy40t1

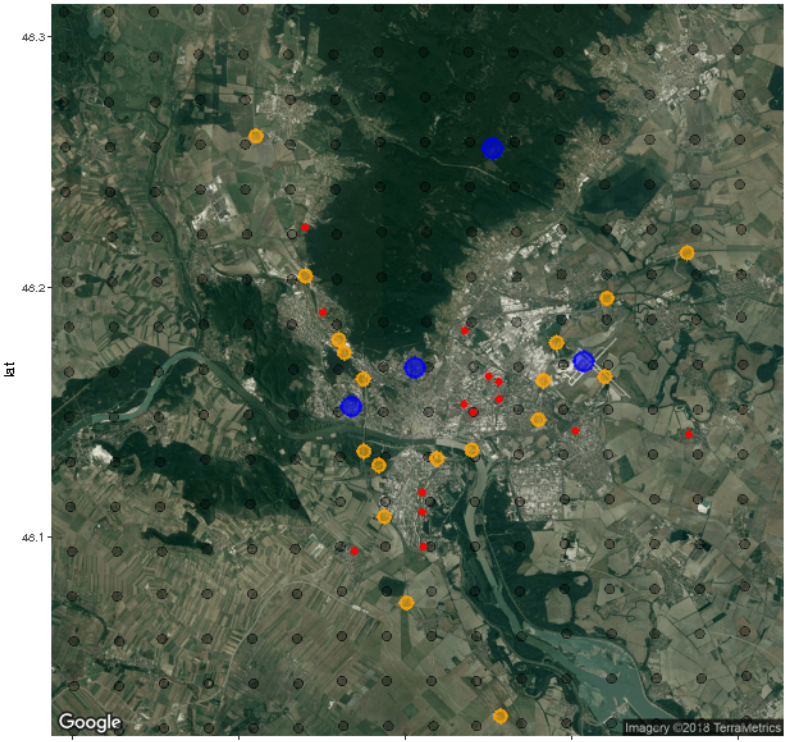




Testing Hobby Urban/Mountain station + NATIONAL OPLACE on ALARO-1 2km

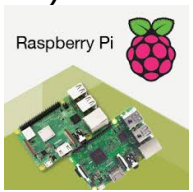
testing domain:

- ❑ ALARO-1 cy40t1_bf06
- ❑ 2km, 512x384
- ❑ 73 vertical levels
- ❑ MESCAN



Conclusions:

- urban stations most of time degrading MESCAN analysis when assimilate as SYNOP (T2m, RH)
- require investigation of create new class of model observations with parameterisation of position, distance from a building, surrounding trees, height, shadow interval, ...
- very low representativeness of the surroundings in the city
- implementation in SURFEX (TEB - roof, wall, road)
  - Roof surface temperature (indoor/outdoor)
  - Wall surface temperature (indoor/outdoor)
  - ...



New SODA-EKF based assimilation suite (ViTa)

- Analysis of soil water content (WG), temperature (TG), and later also snow cover
- Spatial domain: INCA-SK 501 x 301 @ 1 km
- Gridded observations: Standard CANARI analysis is replaced by hi-res analysis of T2M & RH2M from INCA-SK system (see figure)
- Forcing: ~20m above surface,
  - surface fields: INCA-SK precipitation analysis + global radiation analysis -> improved calculation of Jacobians
  - other fields: from ALARO-SK 4.5km
- SURFEX and SODA executables from cy40t1 pack
- Future plans:
  - Test and optimize current setup
  - Compare EKF with OI_MAIN
  - Switch to SURFEX v8.1
  - Snow cover analysis

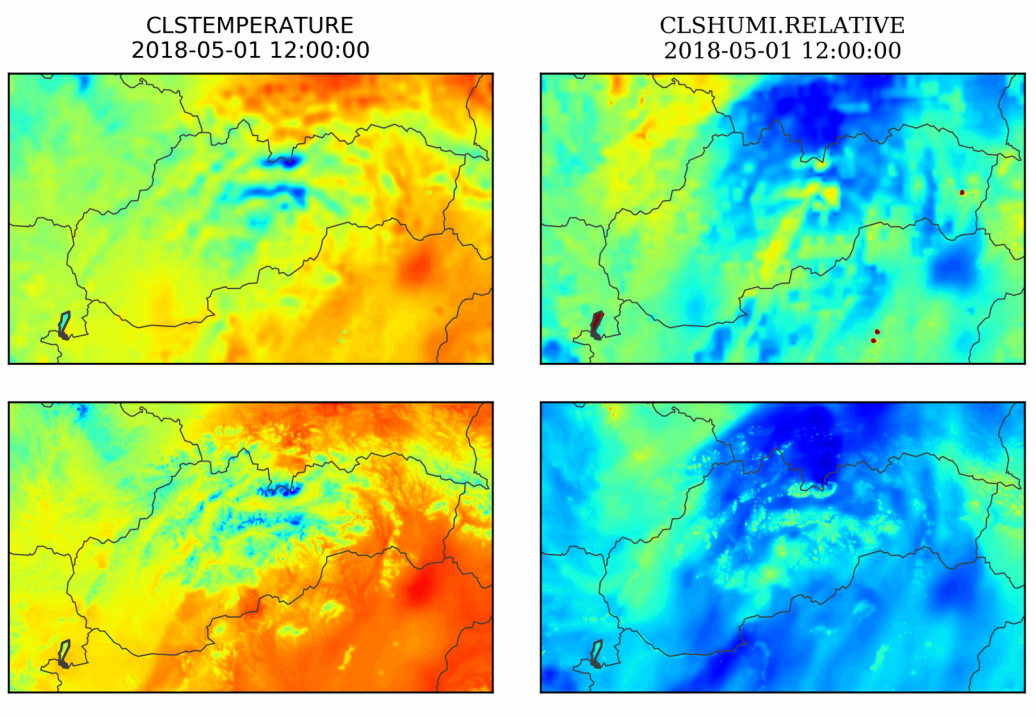
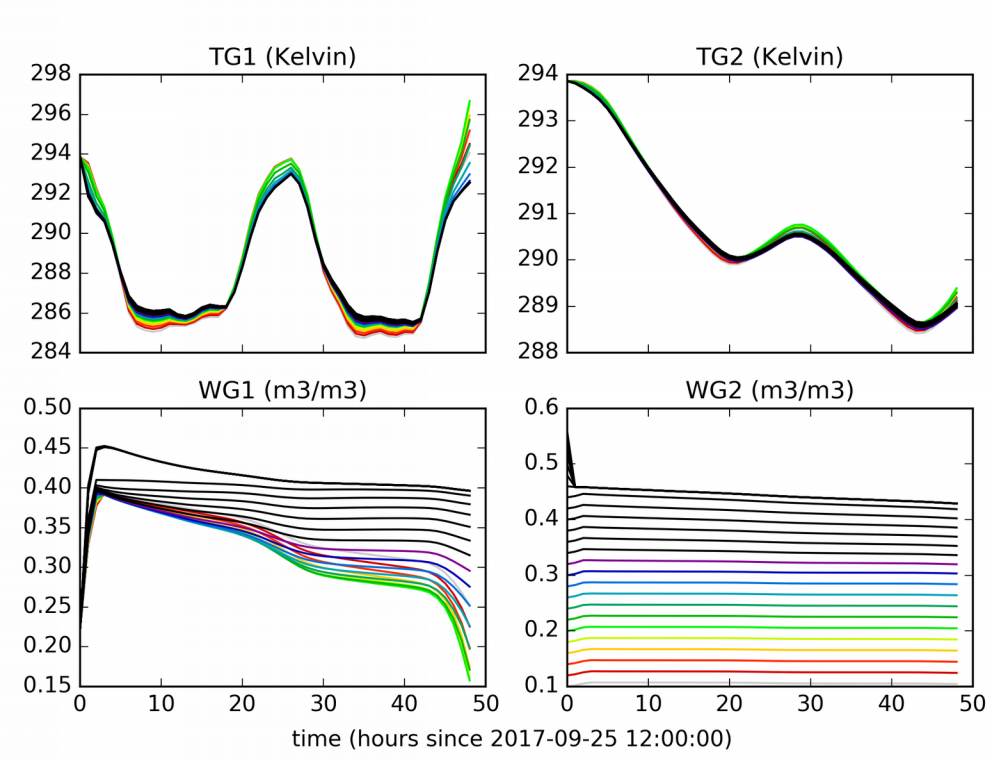


Fig: Downscaled CANARI (top) vs INCA-SK (bottom) analysis of T2M and RH2M used in SODA-EKF

1-column EKF validation (ViTa)

- Sensitivity test with ISBA soil scheme
- Ugly output from OFFLINE when executed as multi-process job , single-process job worked well



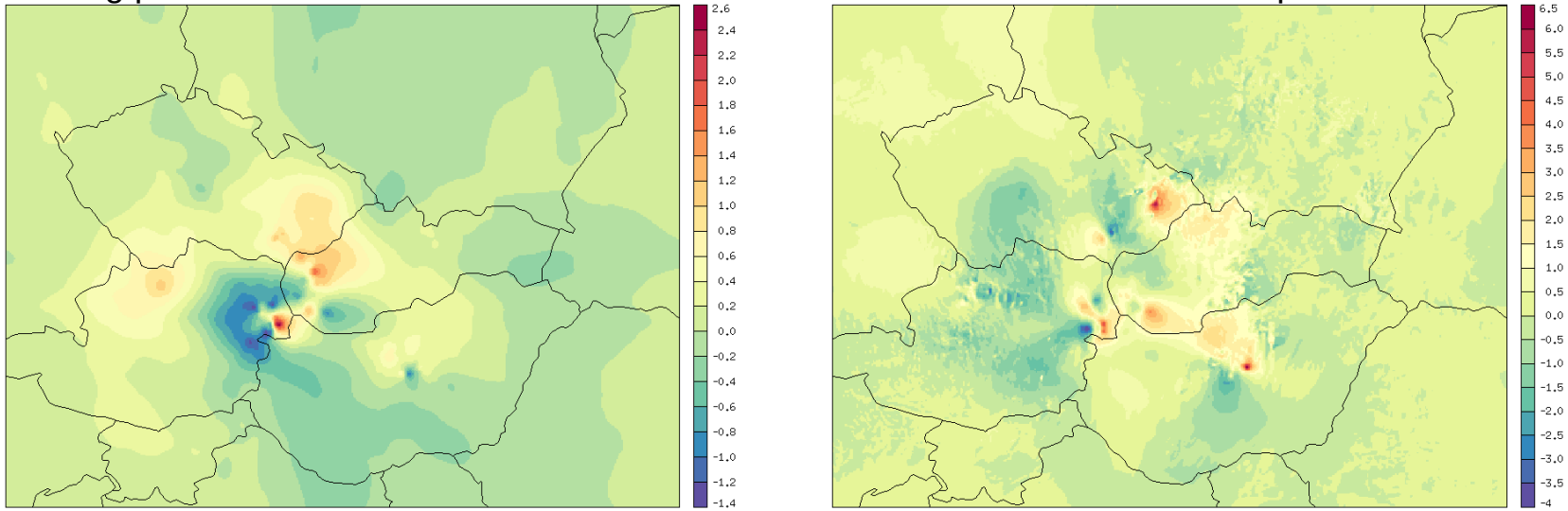
SURFEX v8.1 compilation (ViTa)

- SURFEX v8.1 (Master + SODA_V8 branches) downloaded from SURFEX git repository
- Issues with compilation on HPC (IBM Power7) with GNU compiler
- Need further investigation or try newer version of GNU compiler or native IBM compiler

```
/src/dir_obj-LXgfortran-SFX-V8-1-1-MPIAUTO-OMP-O2-X0/MASTER/spll_fadcpl_fort.f90:162:0:
error: unable to generate reloads for: IF (LHOOK) CALL DR_HOOK('FADCPL_MT',1,ZHOOK_HANDLE)
internal compiler error: in find_reloads, at reload.c:3883
```

First results of ongoing diploma thesis on MODE -S

2 months of EHS data sample provided by the Air Traffic Control from Bratislava airport is being processed and technical tests are to start on AROME/SHMU domain asap.



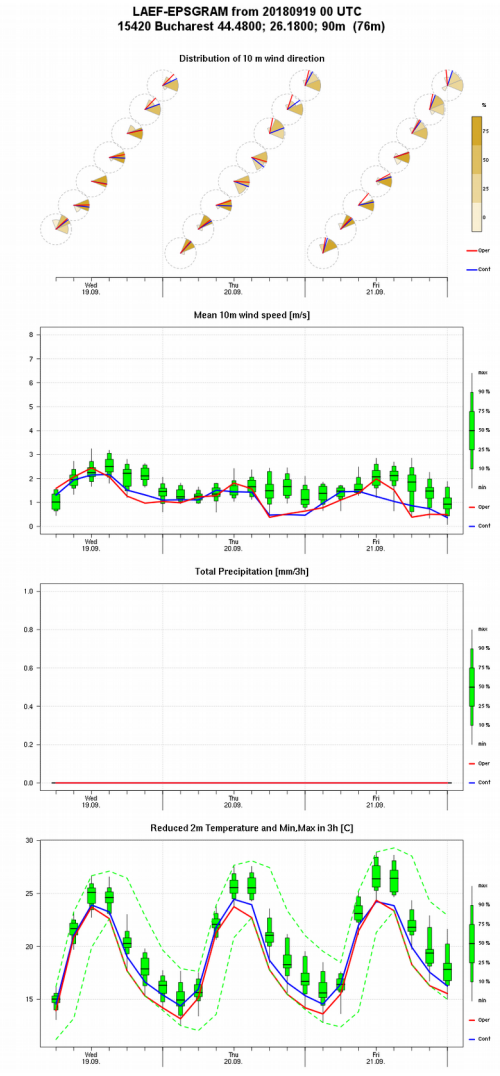
Difference between Guess and Analysis at level 40. Left) Temperature Right) Wind

testing domain:

- ❑ AROME cy40t1_bf05
- ❑ 2km, 512x384
- ❑ 73 vertical levels

Future plans

- 1h RUC AROME 2km 3DVar analysis [F+12h] (GNSS, radars, HRW, automatic stations)
- 1h RUC ALARO-1 2km 3DVar analysis [F+12h](GNSS, radars, HRW, automatic stations)
- Continue works on radar DA for RC-LACE radars (Michal Nestiak)
- Continue works on GNSS data (Martin Imrisek)
- Continue works on Surfex (Viktor Tarjani)
- Calculating B-Matrix for ALARO-1 2km (Maria Derkova)
- working on MODE-S diploma thesis (Katarina Catlosova co: Maria Derkova)
- Working on Urban/Mountain automatic stations (M. Nestiak, M. Dian, R. Zehnal)



thanks for attention