

*Regional Cooperation for
Limited Area Modeling in Central Europe*



Data assimilation work in Hungary

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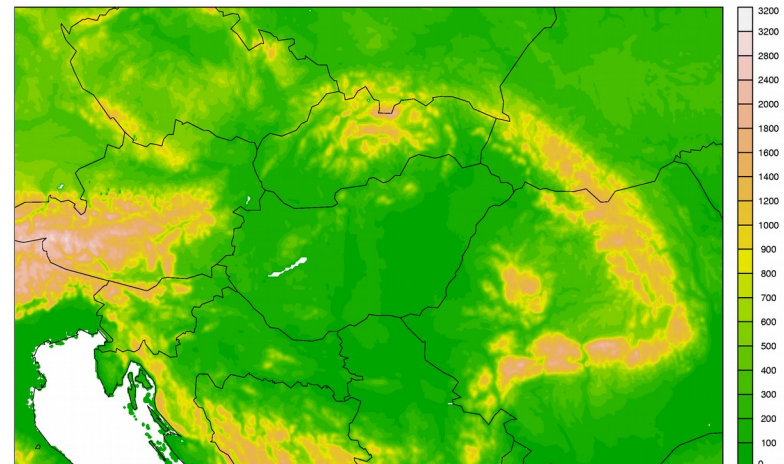
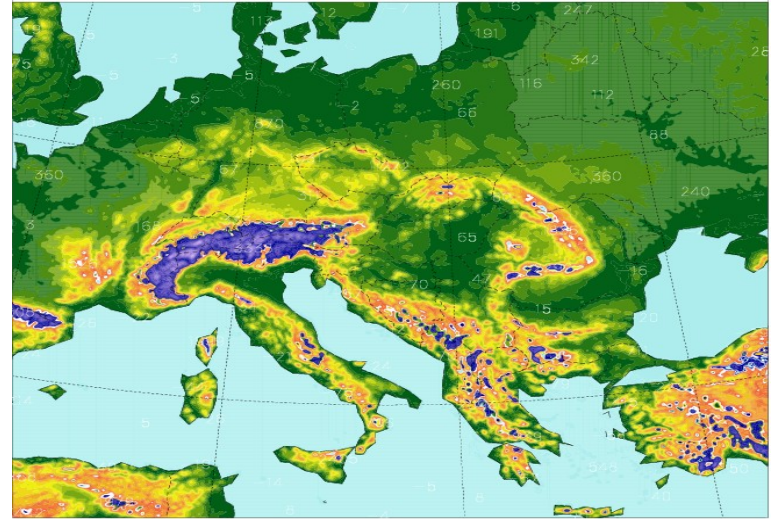
Outline

- Status of operational DA systems
- Validation of cy40t1 for data assimilation
 - OI_main and SURFEX issues
- AROME EKF surface assimilation (see also Viktor's presentation)
- GNSS ZTD assimilation in AROME 3DVAR (see presentation later)

Operational NWP and DA systems

- ALARO
 - 8km horizontal, 49L vertical
 - cy38t1_bf03
 - SMS environment
 - 4 runs/day up to 60 hours
 - 3 hourly coupling IFS global
 - Operational CANARI+3DVAR
 - Observations: SYNOP, AMDAR, TEMP SEVIRI, Geowind AMV, NOAA-18 AMSU-A, MHS
 - ALADIN EDA B matrix

- AROME
 - 2.5km horizontal, 60L vertical
 - cy38t1_bf03
 - 8 runs/day up to 48 hours
 - 1 hourly coupling IFS global
 - Operational OI_main, 3DVAR 3h RUC
 - Observations: SYNOP, AMDAR, TEMP
 - AROME EDA B matrix

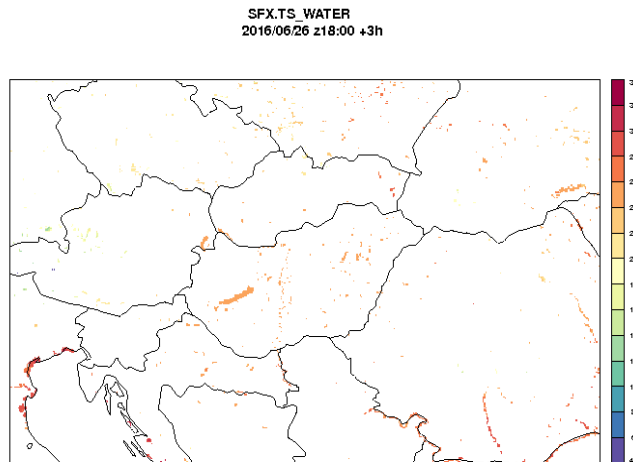


Validation of cy40t1

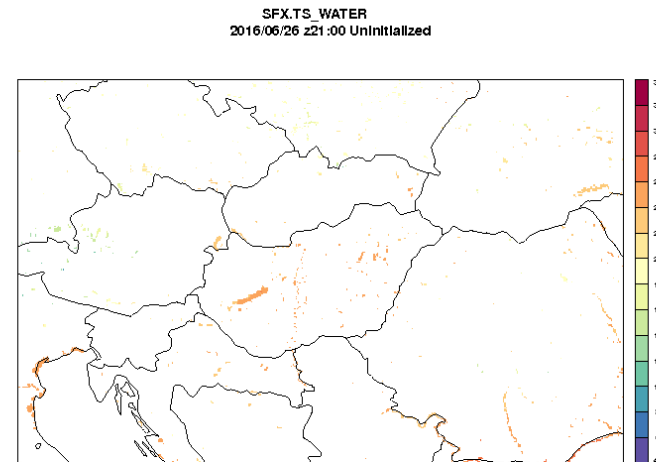
- The cy40t1 is still in validation phase, but seeing the light at the end of the tunnel.
- Previously reported “Invalid surface pressure” issue of RTM is fixed in cy40t1_bf06 (aladin/coupling/ecoupl1.F90)
- The cy40t1_bf07 is currently validated.
- For AROME OI_main surface assimilation two major novelties have to be checked.
 - LFI format → FA format in SURFEX
 - Offline OI_main (OI_main binary) → Inline OI_main (called from MASTERODB)
- There are few other minor changes related to SURFEX.
 - Changes in the name of surface fields (e.g. SST → SFX.SST)
 - TEB scheme (3 layers → 5 layers)
- From our system point of view the following surface initialization procedures have to be updated with cy40t1.
 - Initialization of lake surface temperatures
 - Snow update external program

Ol_main issues in cy40t1

- The cy40t1 + SURFEX v7.3 was implemented with inline Ol_main and FA format. The same observation set gave similar realistic increments compared to current operational cy38t1 + SURFEX v7.2
- At the very first AROME forecast, the model integration exploded with “wind too strong” error message.
- It was due to Ol_main surface analysis and undefined SFX.TS_WATER values of small lakes.



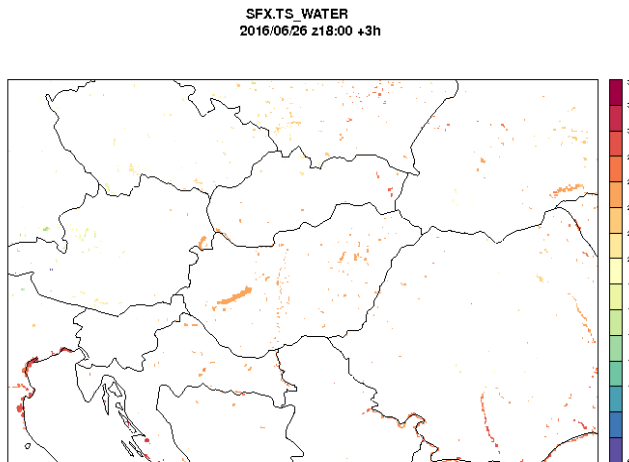
SFX.TS_WATER values of surface first-guess



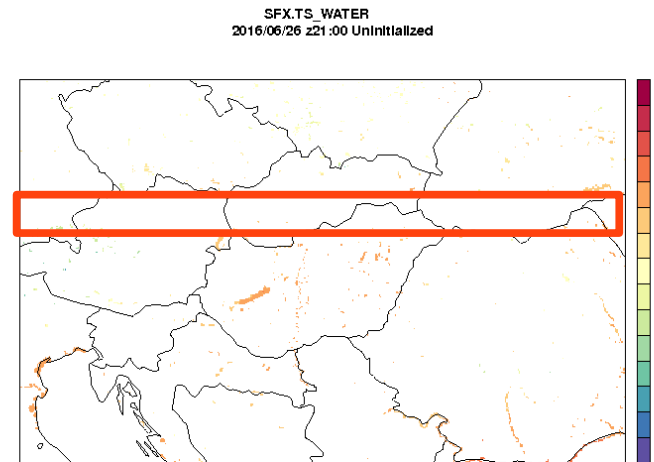
SFX.TS_WATER values in Ol_main analysis

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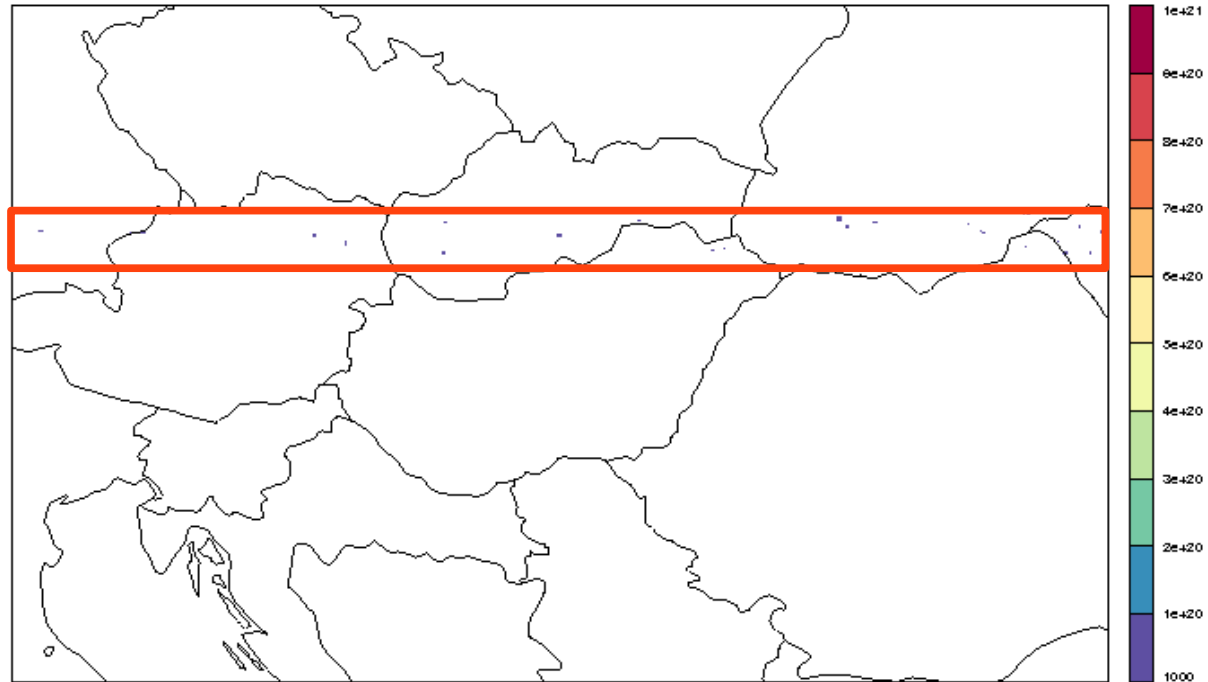
SFX.TS_WATER values of surface first-guess



SFX.TS_WATER values of Ol_main analysis

Ol_main issues in cy40t1

SFX.TS_WATER
2016/06/26 z21 :00 Uninitialized



SFX.TS_WATER values FG - SANAL

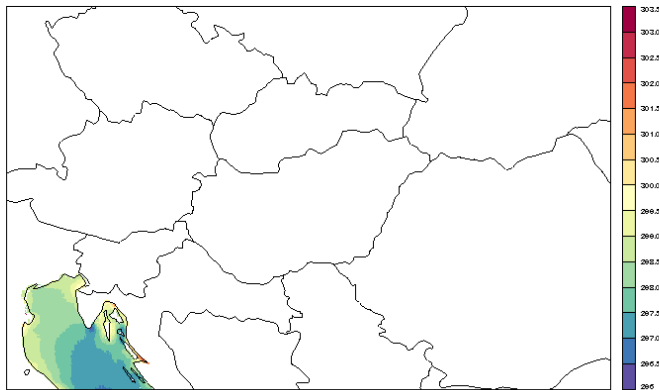
Ol_main issues in cy40t1

- Description of the problem:
 - In cy38t1 the offline Ol_main determines lake surface temperatures of small lakes ($LSM > 0.5$) from interpolation of bigger lakes ($LSM < 0.5$) taking into account all domain points.
 - In cy40t1 the inline Ol_main is doing the same, but considering only lake point of a computation block according to requested parallelization.
 - See A-level parallelization band in previous example where the related block didn't include big enough lakes for interpolation and small lake points remained undefined. For B-level parallelization boxes instead of bands might go wrong.
- Météo-France confirmed this error and two possible solution were recommended.
 - Using TG2 for small lake surface temperature initialization (quick and not too wise solution, search for a cy42 bugfix)
 - Using climatology for the small lake temperature initialization
- Another what we chose temporarily is to use only limited number of cores for Ol_main surface assimilation where there is no problem with interpolation.

OI_main issues in cy40t1

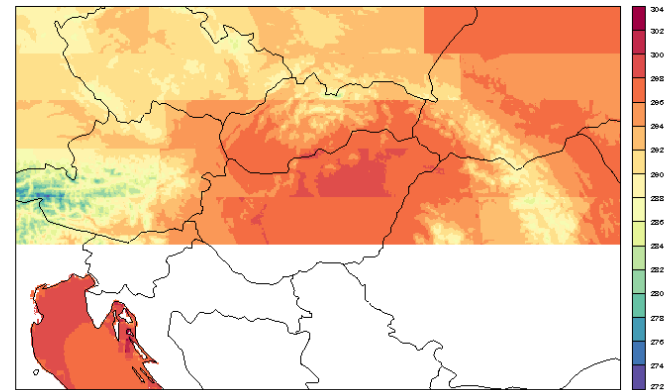
- Another issue with SST fields after OI_main (but model doesn't crash)
- OI_main fills land points with temperature values as SFX.SST where there is no sea in the working array.

SFX.SST
2016/06/26 z18:00 +3h



SFX.SST in First Guess

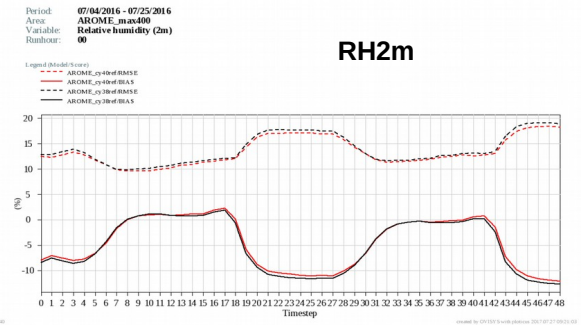
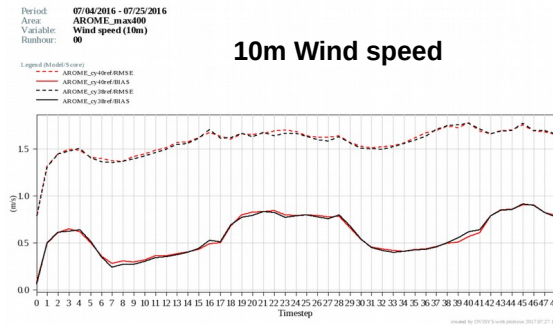
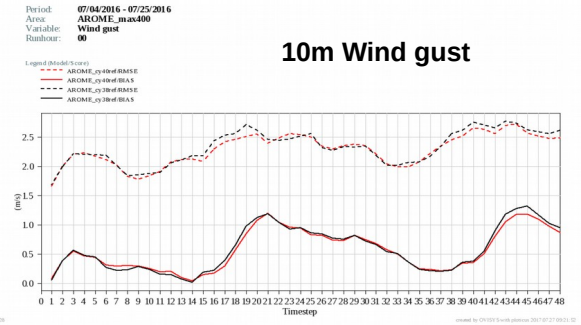
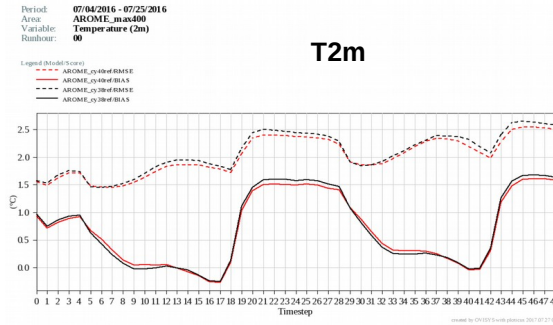
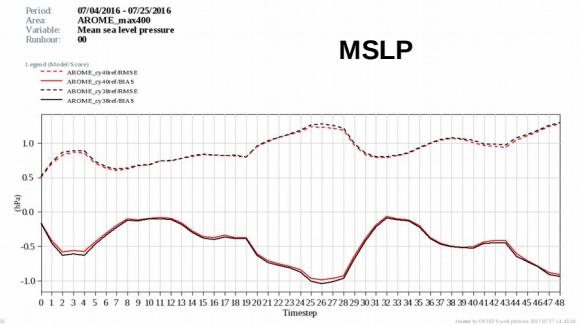
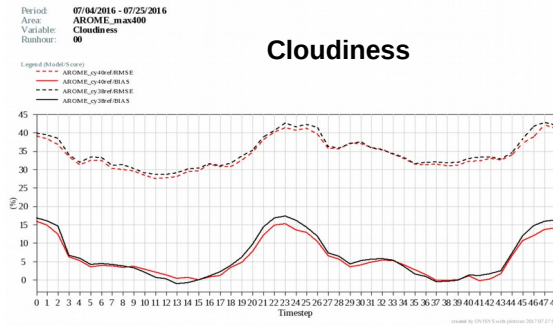
SFX.SST
2016/06/26 z21:00 Uninitialized



SFX.SST in OI_main analysis

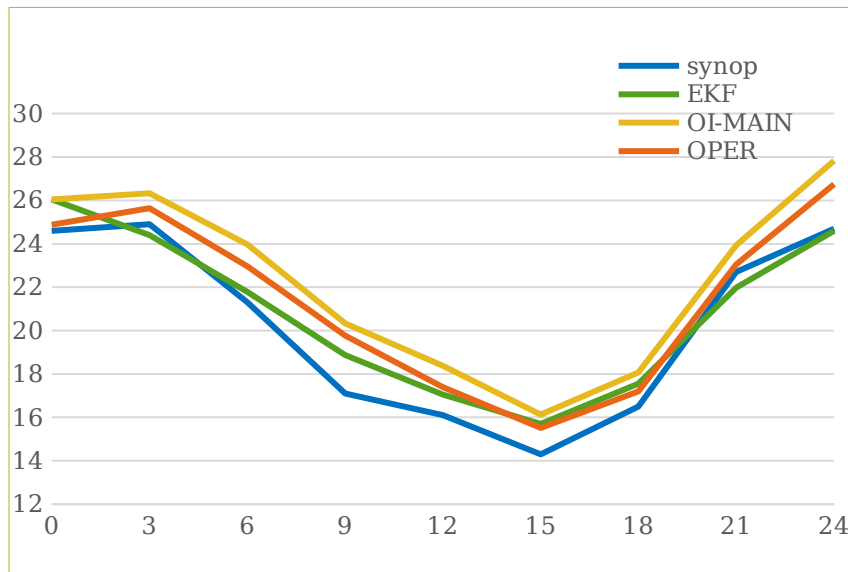
Forecast verification: cy40t1 vs cy38t1

- Summer period:
4th – 25th July, 2016
- AROME_cy40t1
- AROME_cy38t1

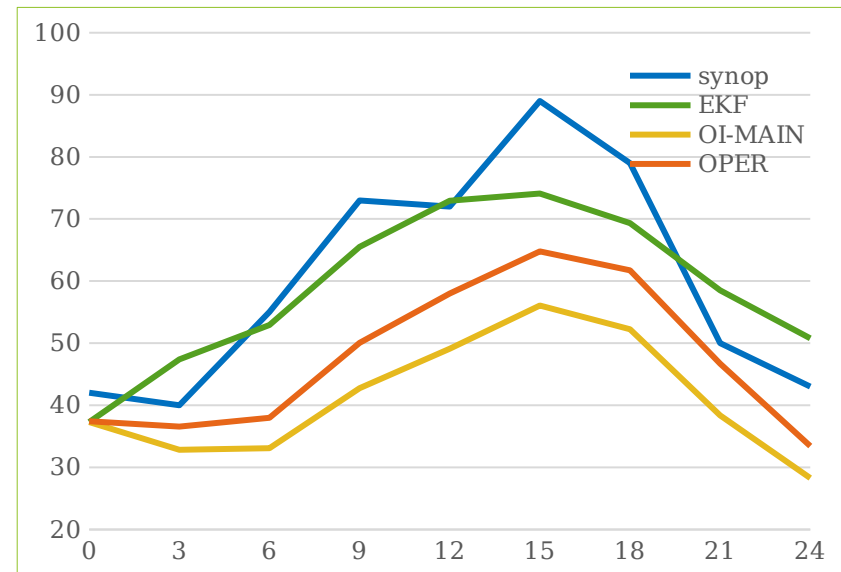


EKF surface assimilation

- The main goal is to build EKF surface assimilation using conventional observations (and to replace CANARI and/or OI_main in the future)
- In this topic the preliminary results showed promising impact on a particular case study (made by Helga)
- More details about the EKF validation is going to be given by Viktor



RMSE of AROME T2m forecast comparing different configurations
(OPER means downscaled ALARO surface)



RMSE of AROME RH2m forecast comparing different configurations
(OPER means downscaled ALARO surface)

The end

- Thank You for your attention!
- Questions?
- Answers?