CANARI assimilation for the ALADIN component of GLAMEPS

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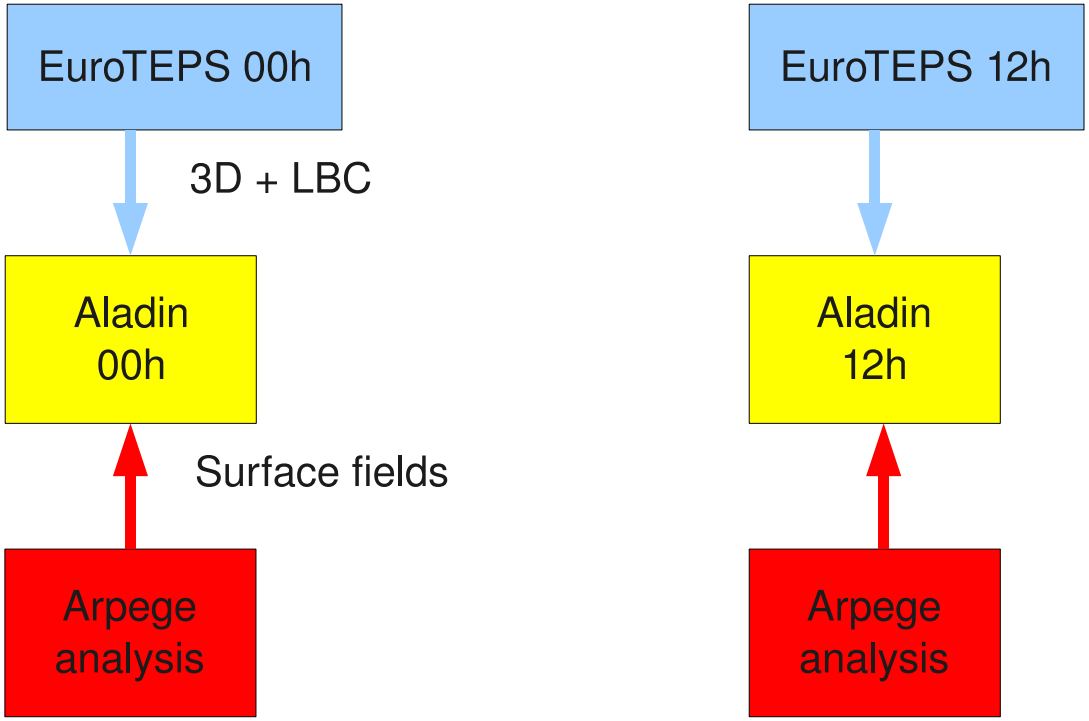
Context

- In GLAMEPS, Aladin is coupled to EuroTEPS, which uses IFS code.
- The surface schemes of ALADIN (ISBA) and IFS (Tessel) are quite different.
- Existing conversions (“901”, “e927”/GL) were inadequate, although an improved conversion algorithm for soil water is being developped.
- Current solution is to use the Arpège analysis for the surface.

Current version



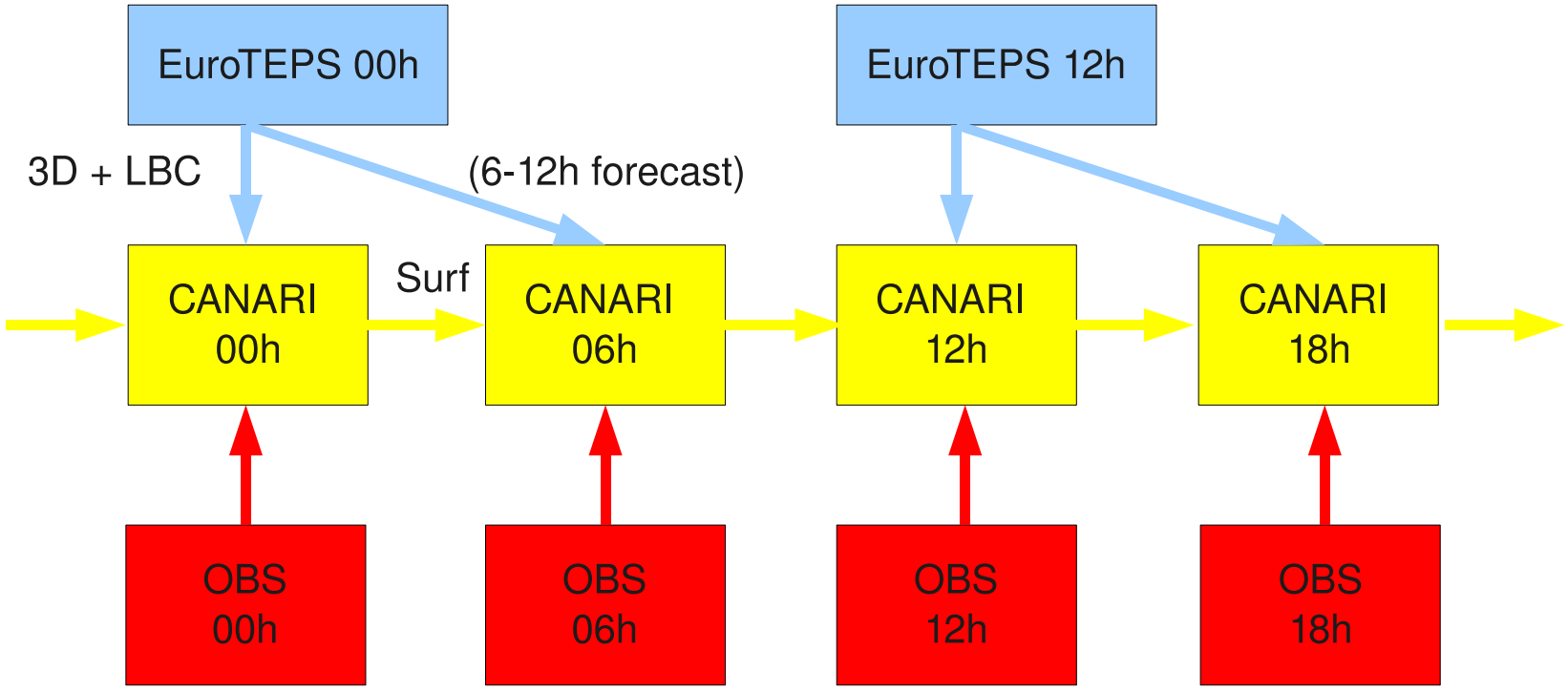
Disadvantages

- All members have the same surface.
- It makes the daily GLAMEPS run dependent on two global models, running at two different centers.
- If the Arpège analysis is unavailable, some members of the ensemble may crash
  - often at te end of DFI
  - possibly due to differences in treatment of sea ice
- Recently, we added a fix to use a 12h forecast (mbr000) for the surface fields whenever the Arpège analysis is missing.

CANARI

- Do a surface assimilation for all the Aladin members individually.
- Various schemes may be considered. We chose a 6h cycle for all members separately.
- First guess is a combination of
  - 3d fields from EuroTEPS (+0h or +6h)
  - surface fields from the previous 6h forecast.
- Coupling files for the 6h cycle run are from EuroTEPS (+0h-6h or +6h-12h fc)
- Based on Harmonie script.

CANARI cycle



First tests

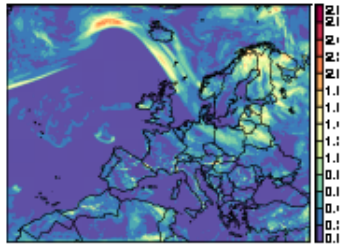
- GLAMEPS 0.2 test run.
- 12+1 members
- Test run 20080118-20080131 .
- Only tested for a very limited period, so no full conclusions yet.

Mean and spread

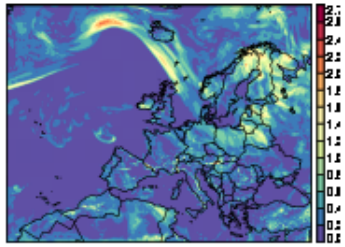
- In the following graphs we compare the mean and spread of the 13 Aladin forecasts using the CANARI surface or the Arpège surface.
- For T2m, some regions show a significant difference which must be studied further.

T2m forecasts

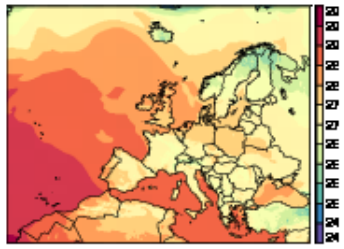
T2m spread ARP
2008012600+24



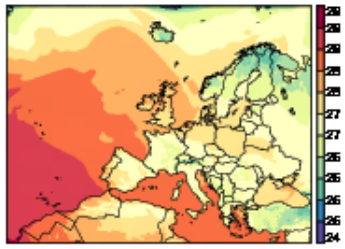
T2m spread CAN
2008012600+24



T2m mean ARP
2008012600+24

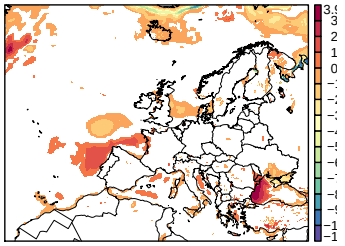


T2m mean CAN
2008012600+24



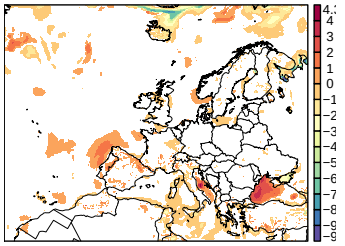
Mean T2m

Aladin mean(T2m) 2008011800+24
CAN − ARP



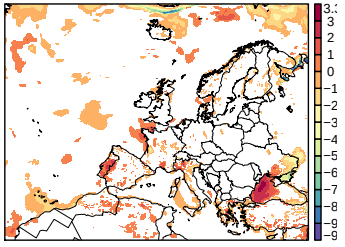
(abs(d) < 0.5 masked)

Aladin mean(T2m) 2008012000+24
CAN − ARP



(abs(d) < 0.5 masked)

Aladin mean(T2m) 2008012200+24
CAN − ARP



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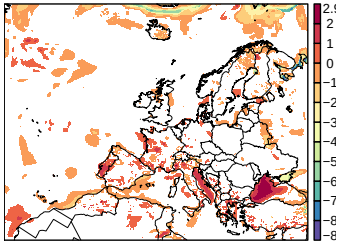
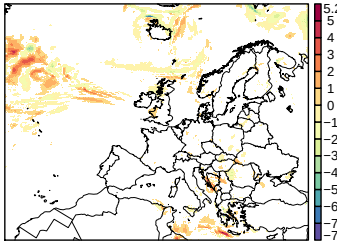
Aladin mean(T2m) 2008012600+24
CAN − ARP



(abs(d) < 0.5 masked)

Mean cumulated precipitation

Aladin mean(Prcp) 2008011800+24
CAN − ARP



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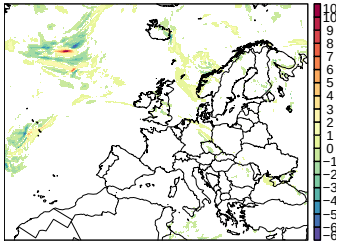
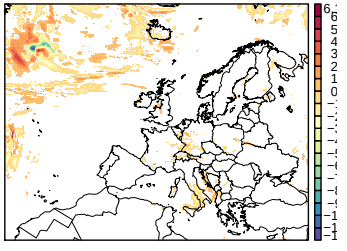
Aladin mean(Prcp) 2008012000+24
CAN − ARP



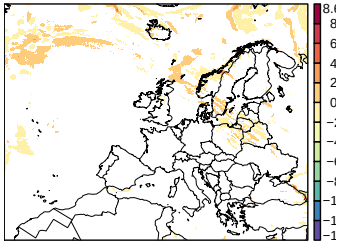
(abs(d) < 0.5 masked)

Aladin mean(Prcp) 2008012200+24
CAN − ARP



(abs(d) < 0.5 masked)

Aladin mean(Prcp) 2008012600+24
CAN − ARP

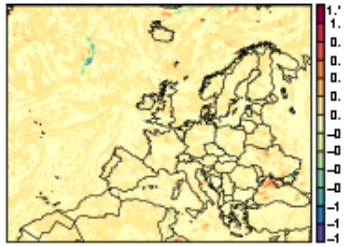


(abs(d) < 0.5 masked)

T2m spread

Aladin spread(T2m) 2008011800+24
CAN – ARP

Aladin spread(T2m) 2008012000+24
CAN – ARP



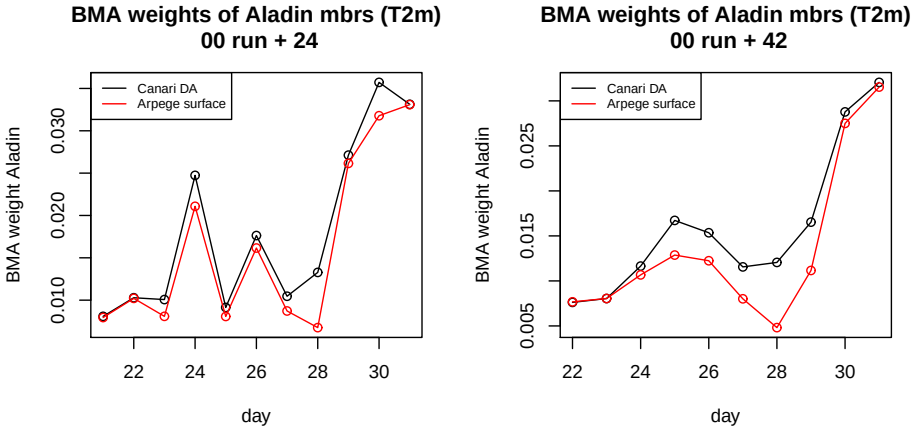
Aladin spread(T2m) 2008012200+24
CAN – ARP

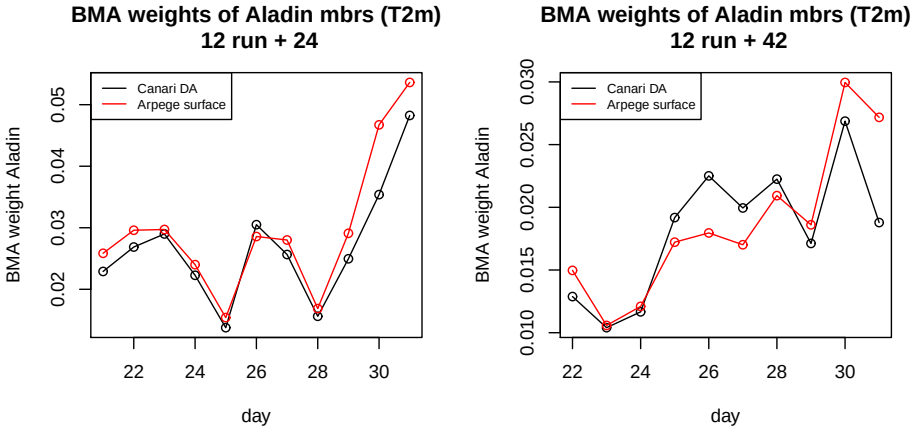
Aladin spread(T2m) 2008012600+24
CAN – ARP

BMA weights

- If we use Bayesian Model Averaging for postprocessing, we get weights for the various members.
- Weights are constant for all members from the same model (EuroTEPS, Aladin, HIRLAM_K/S).
- These weights are not really a quality score, but they do depend (for a part) on the model's performance in the previous days.
- We can compare the weights allocated to ALADIN using either CANARI or the Arpège analysis.
- We see that, for this short test period, the weights are often higher (especially 00h run), most clearly so after some days of the analysis cycle.

Daily BMA weights (T2m)





Conclusions & Outlook

- We have added a CANARI surface analysis to the Aladin part of GLAMEPS, to replace the Arpege analysis.
- First results are encouraging.
- Some significant differences at a few regions (sea ice, Black Sea).
- Further testing & validation is needed before making the CANARI assimilation operational.
- We can then create new perturbations using DA (perturbed observations...).