Test implementation of assimilation cycle with CANARI surface analysis at the Environmental Agency of Slovenia

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Code, scripts and configuration details

The suite is based on cycle 32t3 and 3MT patch by CHMI. The only tested (and successfully validated) assimilation configuration was 701.
The major problem with installation was linked to odb_glue.c routine, since this part was not taken care of automatically by gmkpack version 6.2b.

The „first guess“ for CANARI script and a lot of help was kindly provided to us by CHMI colleagues. The script was than further adjusted to fit our SMS environment.

The oulan format of SYNOP is generated by conversion of XML stream from Visual Weather system.

When running 701, the namelist variable OBSHOR had to be changed to 201 instead of 203 to disable bicubic interpolations, even though not analyzing upper-air fields.
Perhaps it is worth mentioning that DR_HOOK had to be explicitly switched off for ADDGFL and BLENDSUR executables.

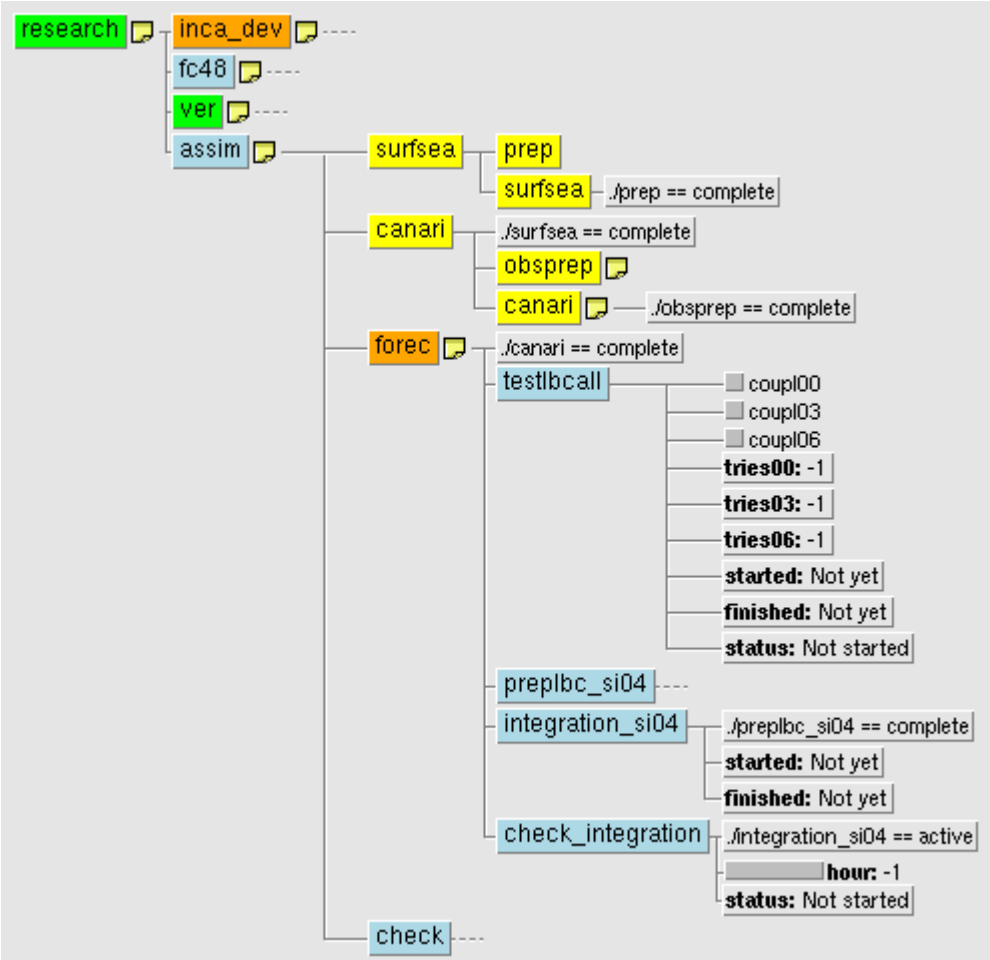
Description of the assimilation cycle

The experimental assimilation cycle contains (in the same order as specified here):

- 6-h forecasts as first guess (short cut-off LBC's from Arpege),
- SST analysis from Arpege (with BLENDSUR),
- CANARI surface analysis using SYNOP observations (2m T and RH),
- cycling of microphysics (ADDGFL).

Integration and analysis domain (421 x 439 points) at 4 km resolution briefly covers the Central Europe. Microphysical quantities (cloud water and ice, rain, snow) and TKE are initialized with 6-h guess values. The 48 hour forecast production based on this cycle is performed every 12 hours.

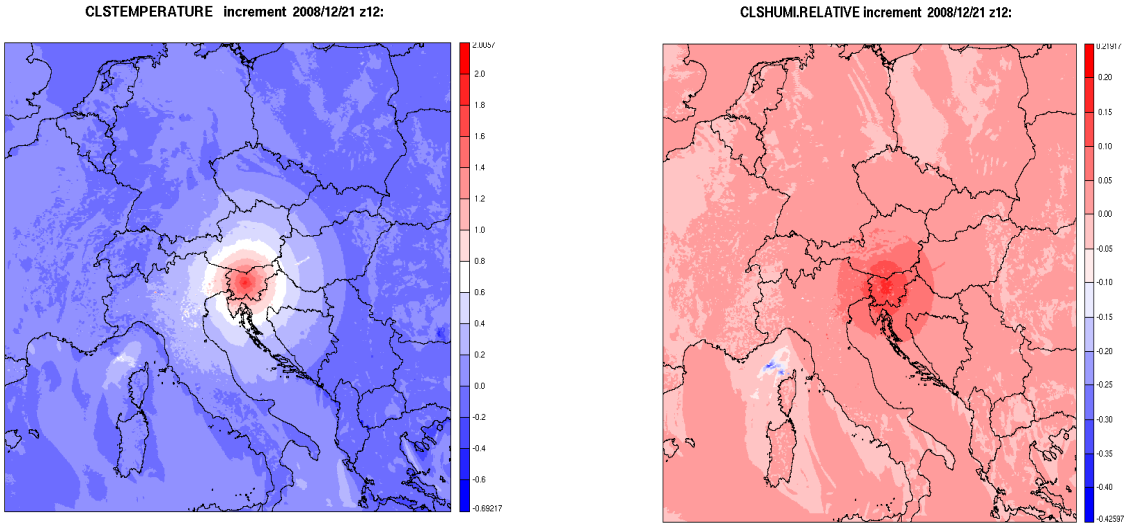
Objective verification is not yet finished, subjective validation of analysis increments shows reasonable results (a few degrees C for surface temperature and up to 20 % for 2 m relative humidity).



Assimilation cycle design (SMS suite).

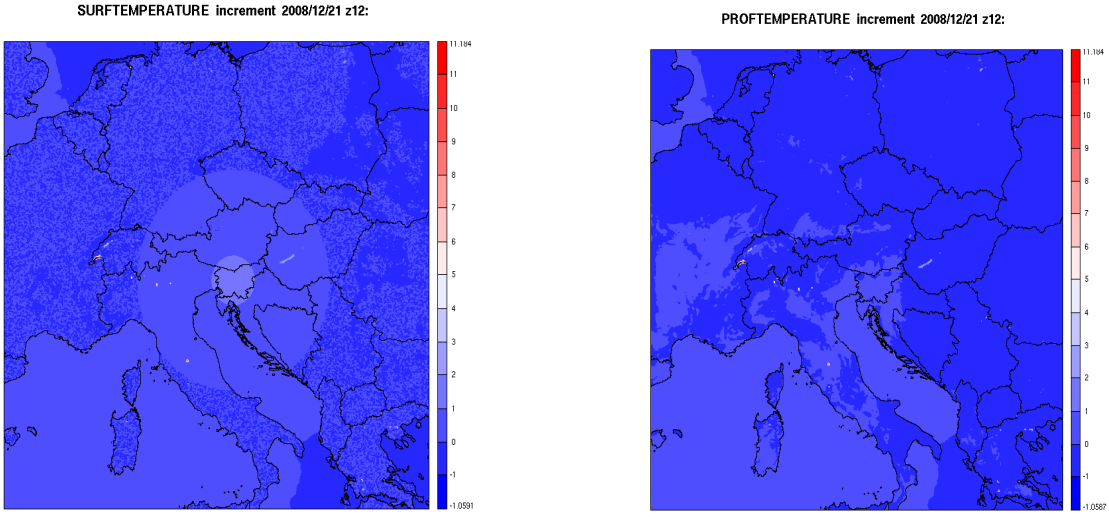
Single observation analysis increment plots (2008-12-21-12 UTC)

First guess from 2008-12-21-06 UTC is first updated by ARPEGE sea-surface temperature analysis. This is followed by the CANARI analysis using single observation (T-2m and RH-2m) from Ljubljana SYNOP station. Increments at 2 m of both analyzed quantities are shown on figures below. Their shapes are circular with magnitude decreasing from the observation location (with 80 and 85 km reference horizontal lengthscale for T and RH). Some additional increment can be seen over Genoa Bay, which must be connected to updated sea-surface temperature.



T-2m and RH 2-m analysis increments.

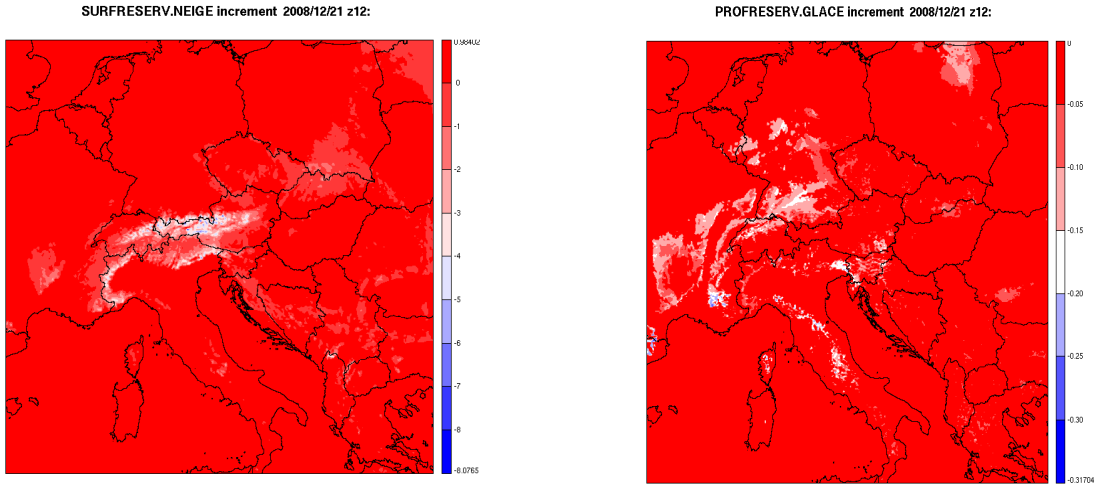
Corresponding increments in surface and soil fields are more complex. Surface temperature is a combination of ARPEGE analysis increments and CANARI increments over land. We can observe quite large increments over some (or parts of some) lakes. The difference occurs at interpolation of ARPEGE surface temperature over lakes (described much better at 4 km resolution).



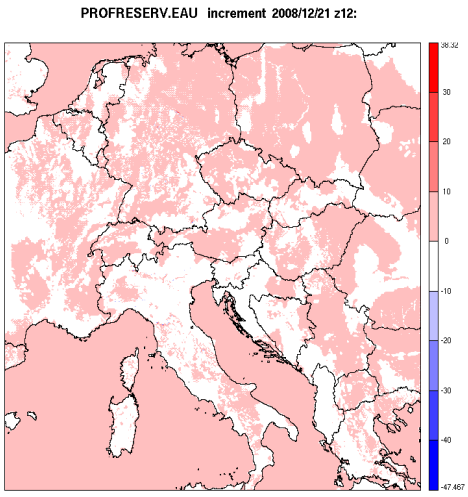
Analysis increments of surface and soil temperature.

It seems that also some “not over lake” temperatures are used to generate lake surface temperature at high resolution. A quite large increment of surface temperature, caused by the isolated observation, can be observed. The impact on soil temperature is very small.

Regarding surface and soil water, we observe zero increments for surface liquid water and ice. The only non-zero increment is surface snow. Same situation is reported by CHMI. The shape of this increment is a bit suspicious. It covers mainly the regions with hills or mountains, but does not decrease with distance from observations.



Analysis increments of surface snow and soil ice.



Analysis increments of soil water.

Analysis of soil increments shows rather small increments generally, but some rather high isolated values. The reason for those values is not clear.