



A 55 year surface analysis over Europe at 5.5km within the UERRA project



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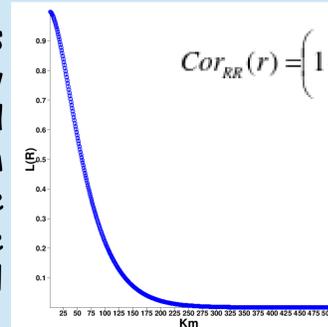
www.uerra.eu Grant Agreement 607193 EU FP7 SPACE 2013-1



UERRA is a 4-year project (2014-2017) financed by the European Union under its 7th Framework Programme SPACE. One of its main objectives is to provide a 50-year reanalysis dataset of surface essential climate variables (ECV) at 5.5km grid at European scale, together with, as much as possible, uncertainty estimates.



The system used to provide the ECV and consistent other surface variables at 5.5km such as: soil moisture at several levels, surface evaporation, snow depth is based on a surface analysis (MESCAN) for 24h accumulated precipitation (Soci et al. 2016), T2m and Rh2m and on the surface platform called SURFEX. The observations used for precipitations analysis are the 24h accumulated precipitation, from 6 UTC to 6 UTC, using SYNOP, climate stations from available databases such as ECMWF, ECA&D and national databases (France, Sweden) as well as data recovered in WP1 (UERRA).



$$Cor_{RR}(r) = \left(1 + \frac{r}{L}\right) e^{-\frac{r}{L}}$$

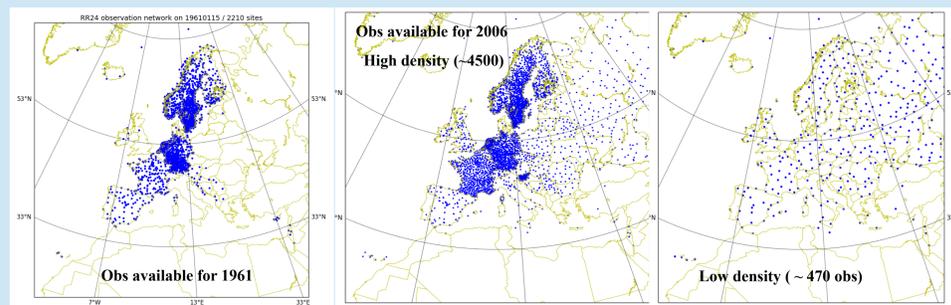
L=35km, Sigma_b=13

RR_obs=0. → $\sigma_0=0.001$

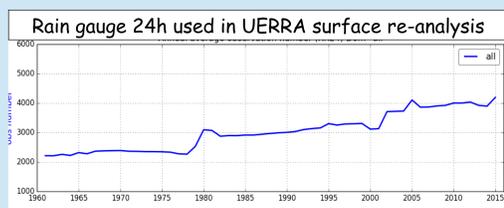
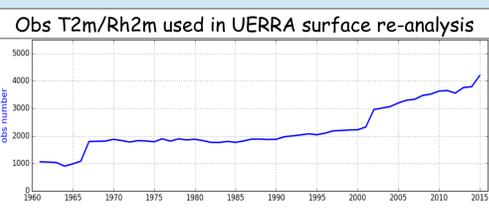
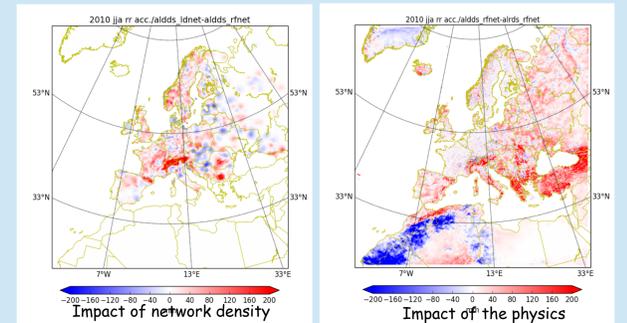
RR_obs<50mm → $\sigma_0=0.7+RR*0.1$

RR_obs ≥ 50mm → $\sigma_0=5.7$

Surface observation density is a critical factor for long term re-analysis:

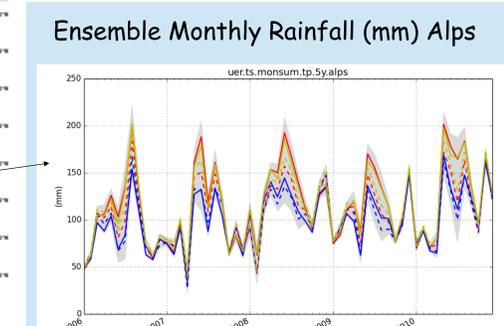
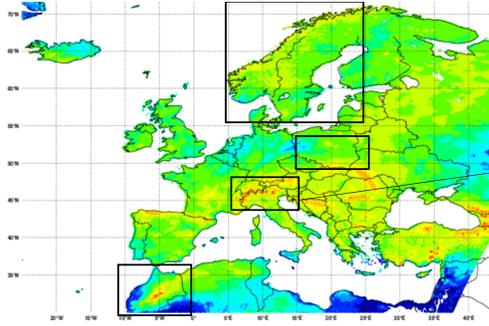


- without enough observations the reanalysis tends to drift towards the model climatology
- a sharp increase in the observation density might lead to misleading results, particularly, for surface trend interpretation...



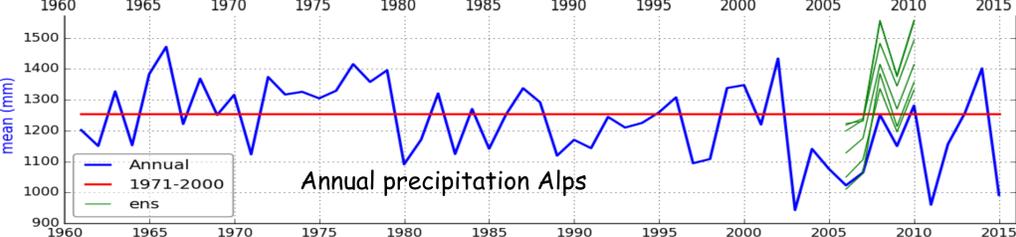
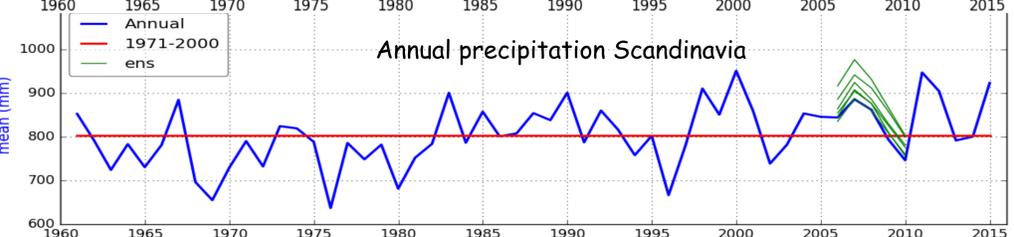
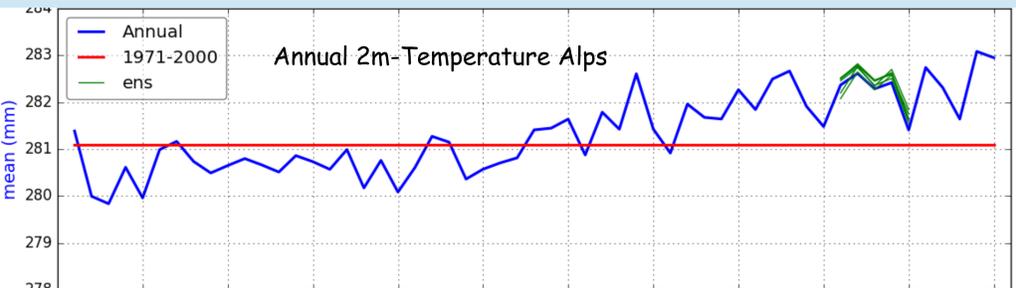
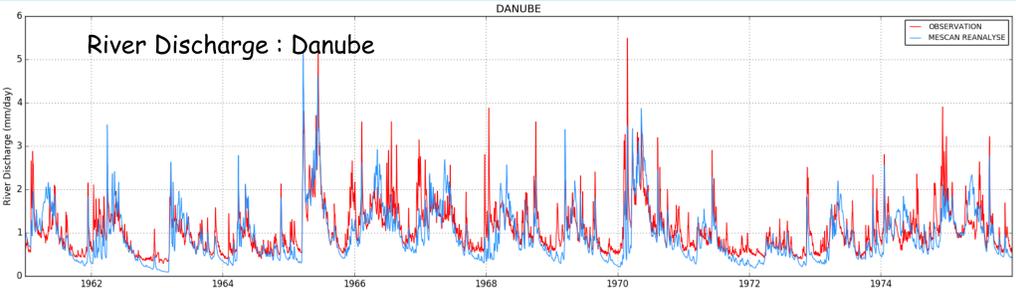
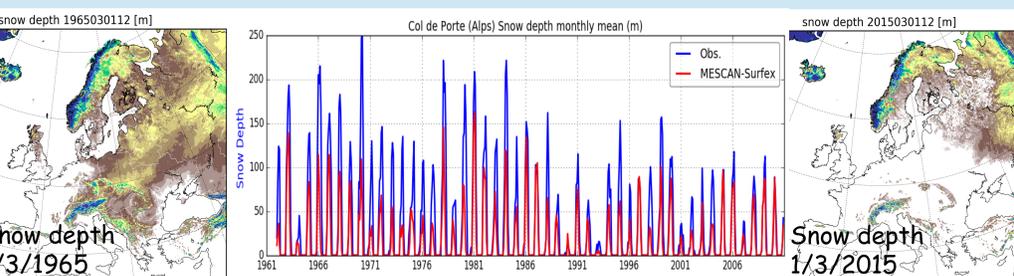
Precipitation is one of the most essential variable for climate studies (with temperature) and to "drive" hydrological model for water management, or agro-meteorology.

Atmospheric forcing from model: **Swd, Lwd, Wind, Ps**
Atmos. Forcing from MESCAN analysis: **T2m, Rh2m, Rainfall**



Surface Model = SURFEX V8.0 with Isba-A-gs
runoff/drainage, groundwater recharge, floodplains, water budget, evaporation fluxes, soil moisture, snow

Hydrological Model = TRIP
river discharge, floodplain fraction, flood potential infiltration



UERRA Reanalysis available on the MARS archive at ECMWF the 1/1/2018

•Bazile, E., Abida, R., Verelle A., Le Moigne P. & Szczypta (2017) : MESCAN-SURFEX surface analysis. Deliverable report D2.8 www.uerra.eu
 •Bazile, E., Abida, R., Szczypta C., Verelle A., Soci C. & Le Moigne P. (2017) : Ensemble surface reanalysis report. Deliverable report D2.9 www.uerra.eu
 •Le Moigne P., Verelle A., Besson F., Bazile, E., Abida & Szczypta (2017) : CTRIP Evaluation Deliverable report D4.8 www.uerra.eu
 •Soci, C., Bazile, E., Besson, F., & Landelius, T. (2016) : High-resolution precipitation re-analysis system for climatological purposes. *Tellus A*, 68. doi: <https://doi.org/10.3402/tellusa.v68.29879>
 •Masson, V., and Co-authors, (2013): The SURFEXv7.2 land and ocean surface platform for coupled or offline simulation of Earth surface variables and fluxes. *Geosci. Model Dev.*, 6, 929-960, doi:10.5194/gmd-6-929-2013.