New version of the European surface reanalysis UERRA-Land at 5.5km for the period 1961-2019

Eric Bazile (1), Verrelle A., Glinton and Le Moigne P.

(1) CNRM, Université de Toulouse, Météo-France, CNRS, Toulouse, France
Eric.bazile@meteo.fr

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UERRA-Land = UERRA-MESCAN-SURFEX

2D surface analysis at 5.5km for 1961-2015 with precipitation analysis during the UERRA project (2014-2017). Data available on the Climate Data Store.

3DVar Re-analysis at 11 km

5.5 Km over Europe
SW,LW,Wind,T2m,Hu2m,RR24

Observations

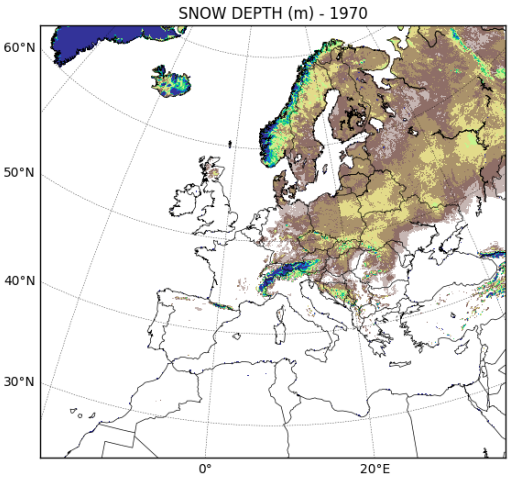
Wind, Sw↓ Lw↓

surface analysis at 5.5Km : T2m, Rh2m
24h-Precipitation (Soci et al. 2016)

SURFEX V8.0 (Masson et al. 2013)

Snow depth, snow cover, snow albedo,
snow density, soil moisture, etc …

UERRA D2.8 Bazile et al. (2017)
and D4.8 Le Moigne et al (2017)



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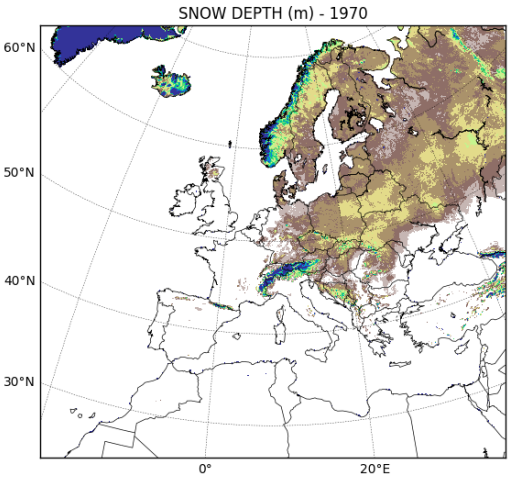
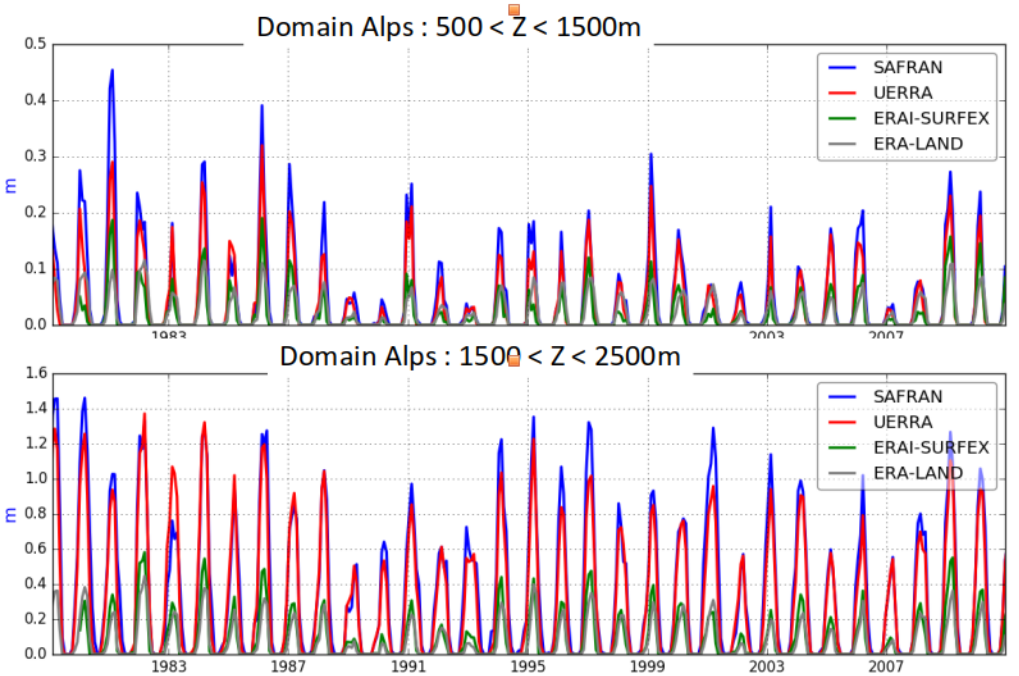
Within C3S_322_Lot1 the UERRA production was extended to July 2019 in addition to the CERRA production (Oral Schimanke et al. see poster Verrelle et al.)



UERRA-Land first validations :

Snow height comparison between SAFRAN,UERRA-MESCAN-SURFEX, ERA-Land & ERAI-SURFEX.



UERRA-Land much better than ERA-land for snow depth over the Alps



UERRA and UERRA-Land used for studies :

- Chervenkov et al (2020) use UERRA-Land to compute numerical indicators such as Heating/Cooling Degree-Days (HDD/CDD) at high resolution over Central and SouthEast of Europe. " **The study confirms the suitability of the considered dataset for index-based analysis of the near past ans present climate ….** "
- Chervenkov et al. (2021) for daily temperature comparison against independent dataset. " **The RRA within UERRA and more especially MESCAN-SURFEX, which has the highest horizontal spacing, constitute an attractive new source of highly-resolved spatial and temporal meteorological data**"
- Morin et al (2021) use **UERRA-LAND to adjust the EURO-CORDEX climate projections** (multiple GCM/RCM pairs for RCP2.6, RCP4.5 and RCP8.5) to compute the Mountain Tourism Meteorological and Snow Indicators (MTMSI)



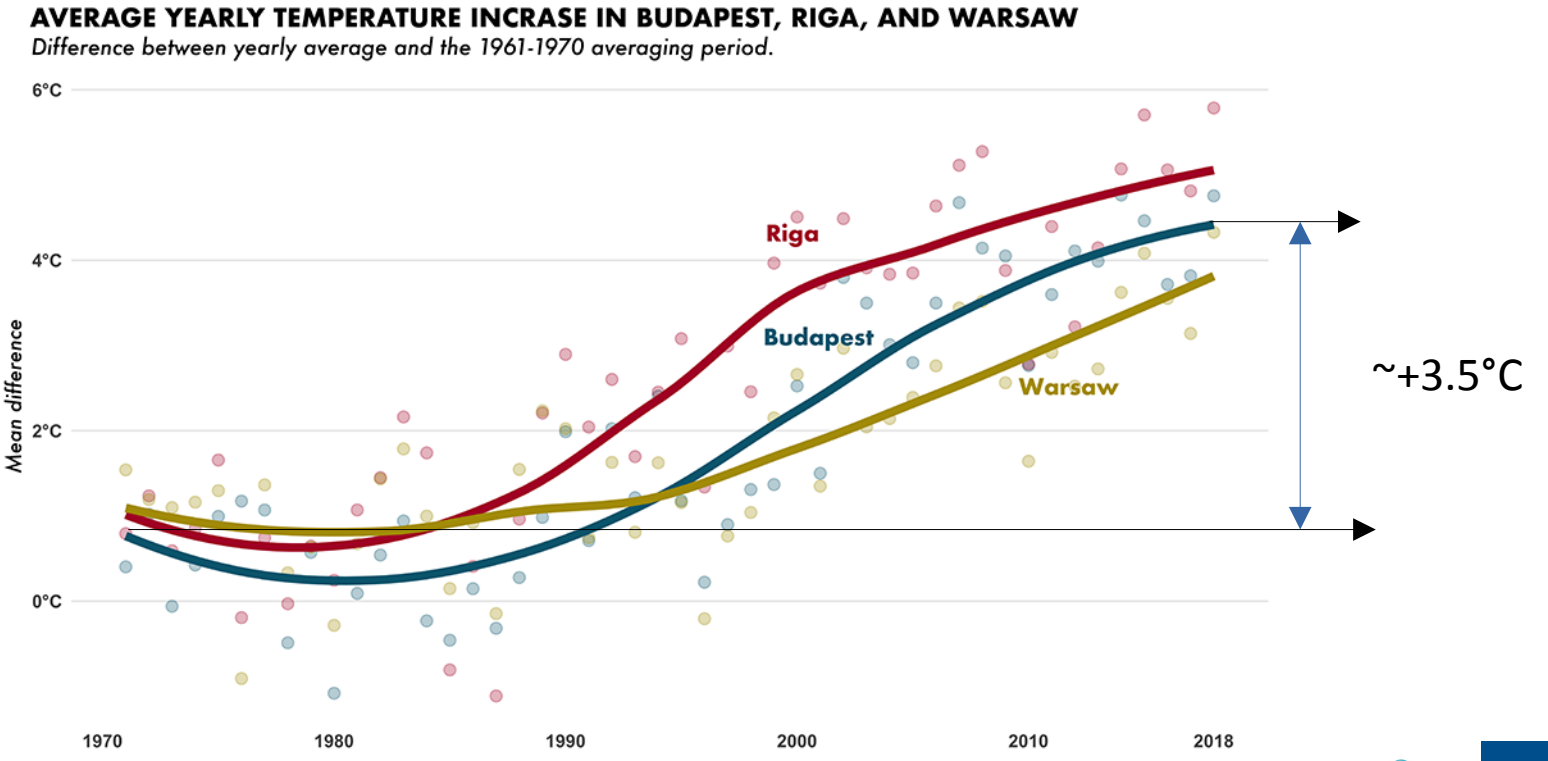
fc+5days

UERRA and UERRA-Land used for studies :

- Bezak et al (2021) “precipitation information is still a much better predictor of landslides triggering compared to the reanalyzed (i.e., not very detailed) soil moisture data”
- Hofer and Horak (2020) comparison between several product ERA5, ERA5-Land, UERRA (11km), UERRA-Land (5.5km) … **at Vernagtbach climate monitoring site (2640 MSL) in the Central European no added value of high RRA**

Some problem with UERRA-Land ?

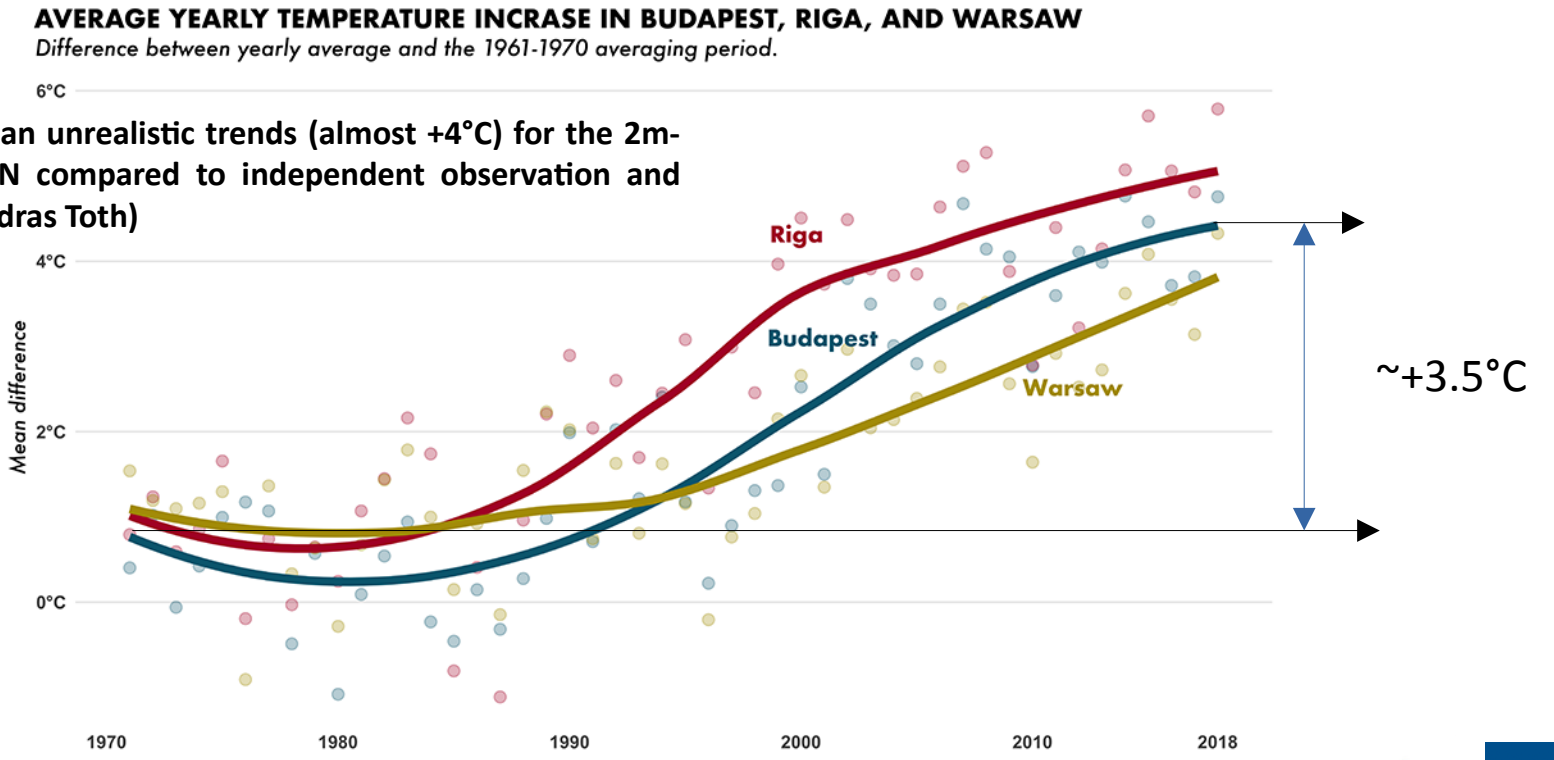
User feed-back May 2020 from CDS support



Some problem with UERRA-Land ?

User feed-back May 2020 from CDS support

Problems for 3 cities with an unrealistic trends (almost +4°C) for the 2m-temperature from MESCAN compared to independent observation and other cities ... (fig from Andras Toth)



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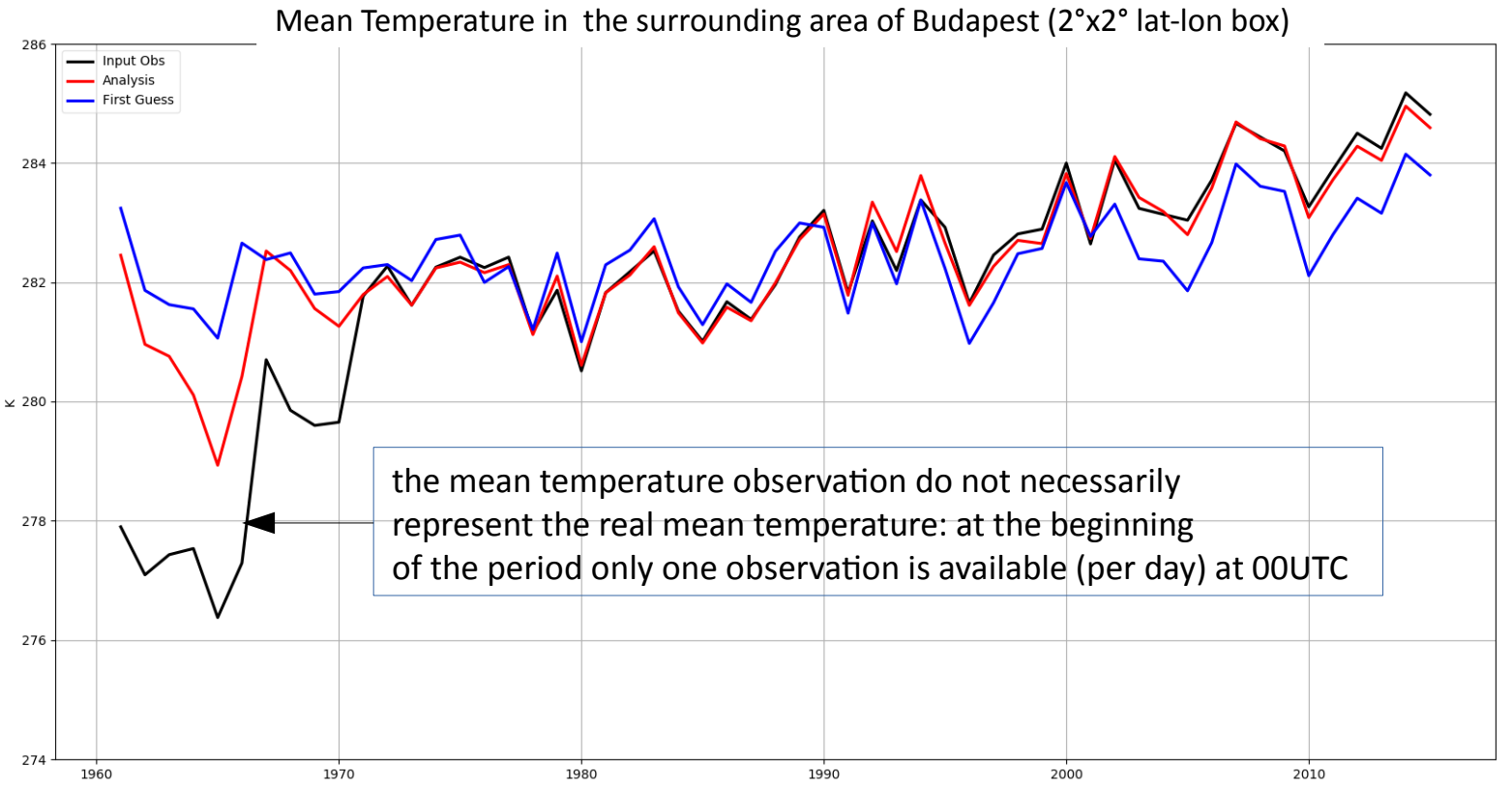

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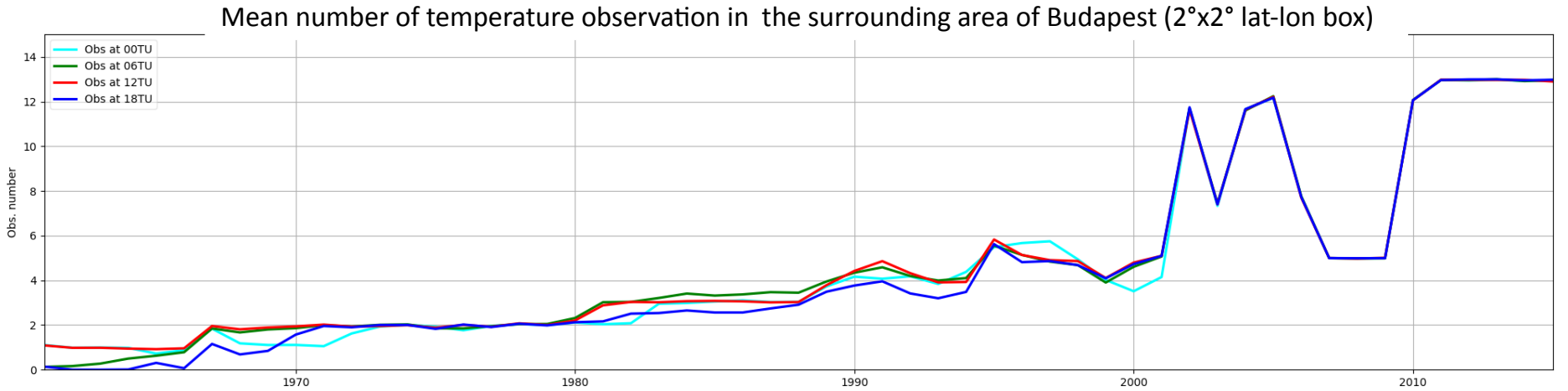

Before 1970, no observations available for at 6 or 18 UTC → could suggest that it is not really a SYNOP 2m-temperature observation !

→ finally the explanation was found: the observation files created for the surface analysis use several input data base: BUFR from MARS + several local data sets. Unfortunately, for some stations, the lowest level of the TEMP (radiosonde) in the BUFR file is not a 2m temperature but the temperature at 850 hPa !

UERRA-Land V2:

In the V2 of UERRA-Land :

- all the observation files have been corrected for this temperature problem

- An additional quality control (based on the one used for CERRA-Land) was applied to detect “suspicious” long time series of no precipitation. The precipitation analysis has also been re-rerun for the period 1/1/1978-1/1/2016 to fix the long time series of zero values of precipitation around Stockholm for several observations since 1978

- The standard-deviation error for observation (σ_o) is set to 1.5K and for background (σ_b) is set to 1.6K. NWP tuning in ARPEGE/AROME

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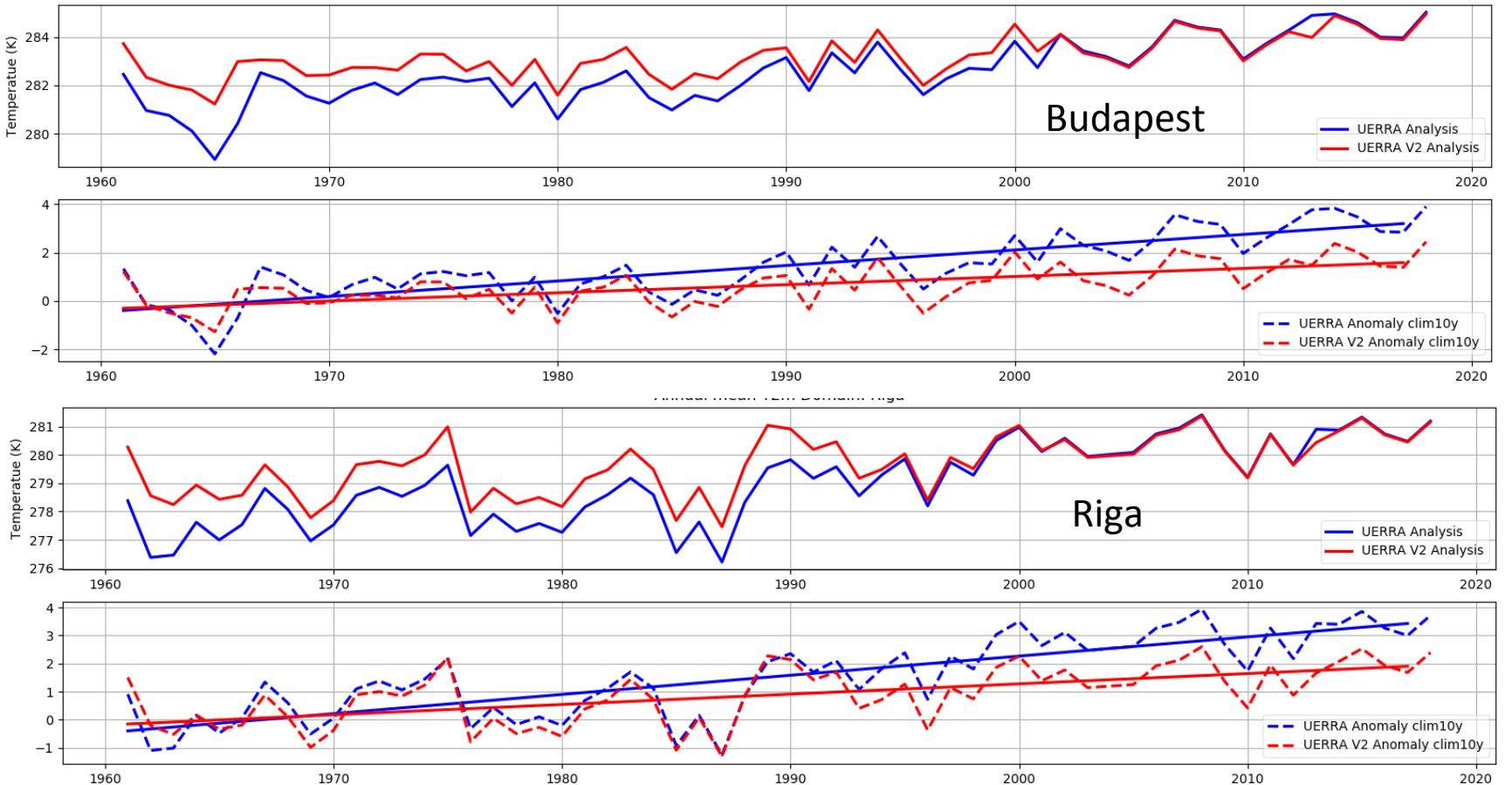
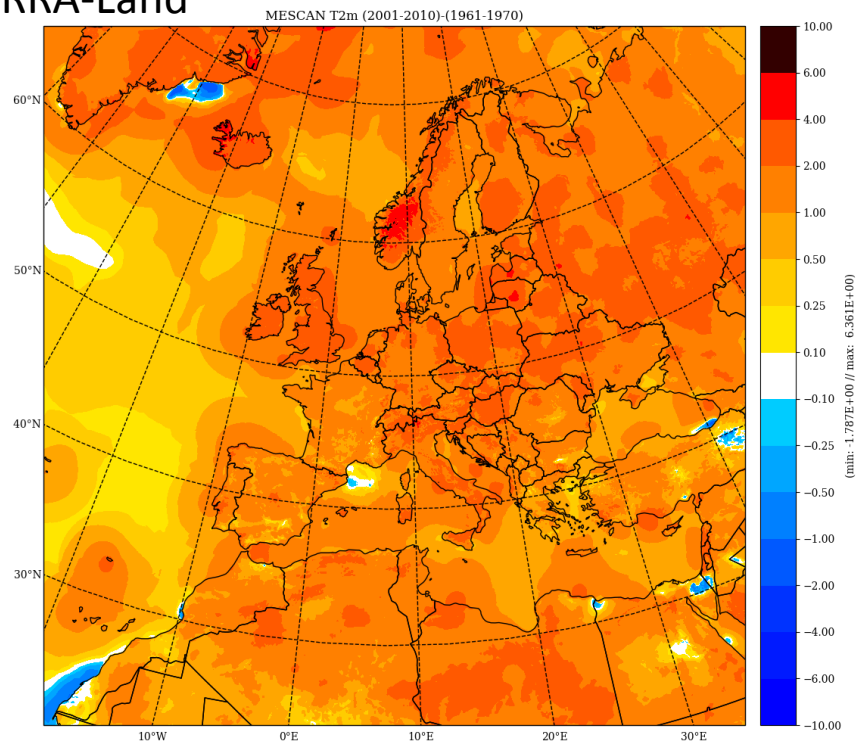
The production of UERRA-Land-V2 for the full period 1961 → July 2019 took 1.5 year at ECMWF thanks to the Météo-France ressources.

UERRA-Land V2: Annual mean T2m and anomaly

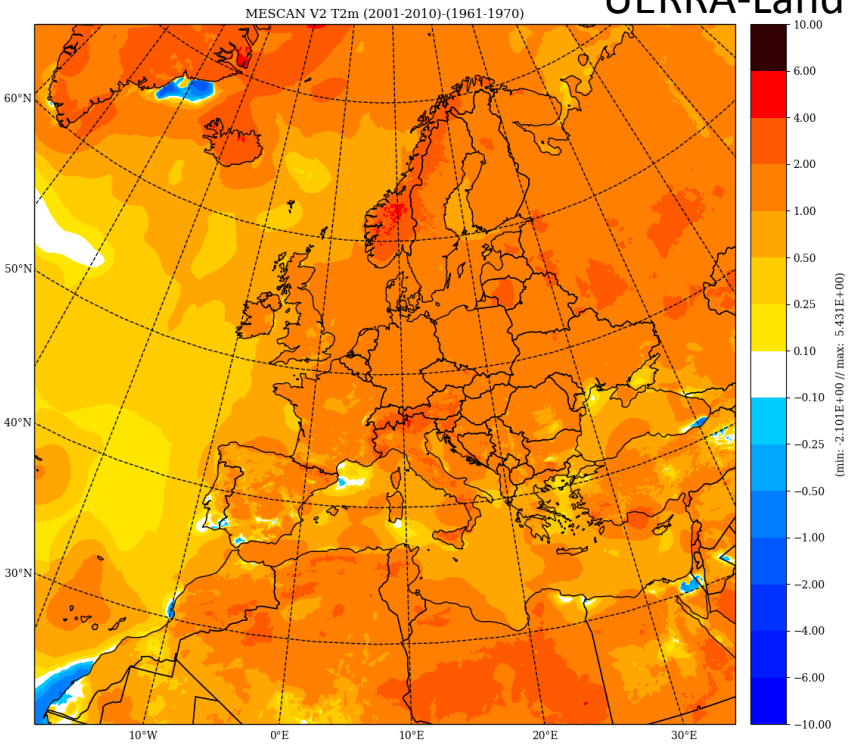


UERRA-Land V2: T2m (2001-2010) – T2m (1961-1970)

UERRA-Land



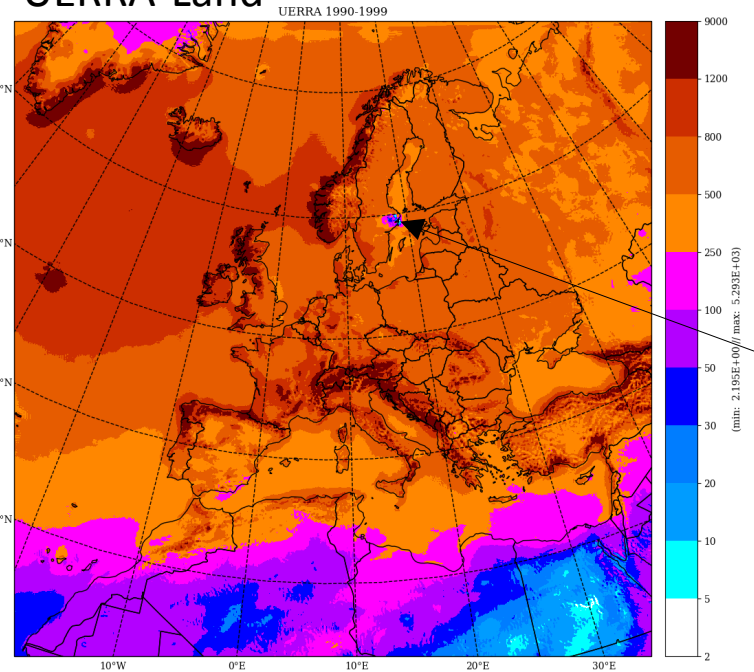
UERRA-Land V2

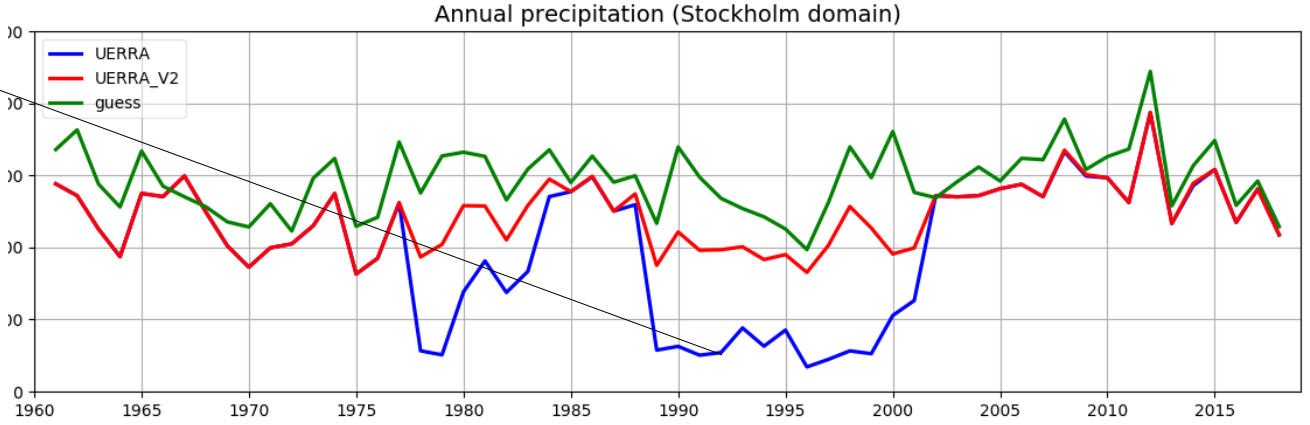


Almost no-impact over France, Scandinavia and North Africa more impact with less warming in East of Europe and UK

UERRA-Land V2: Precipitation analysis

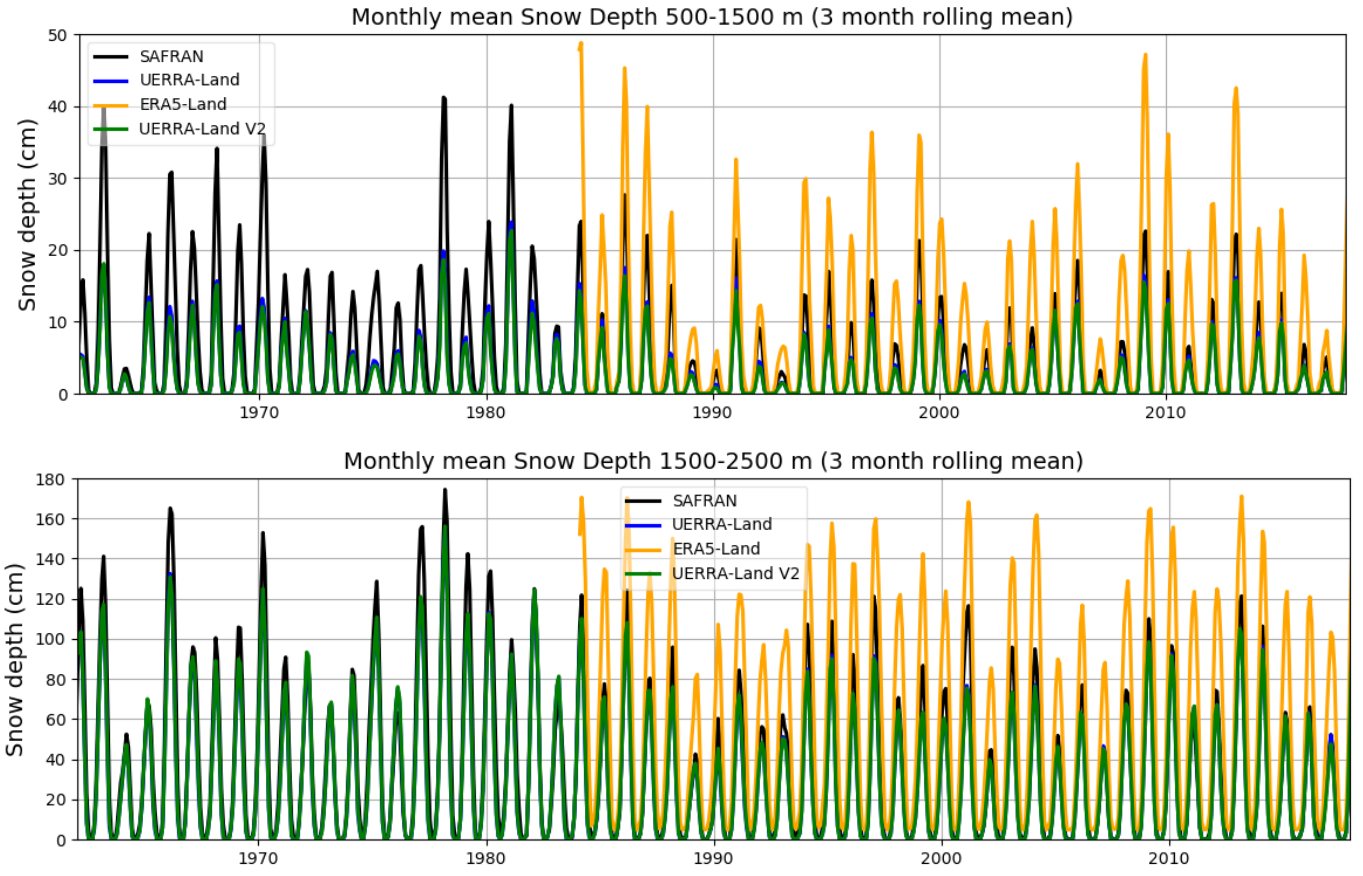
UERRA-Land





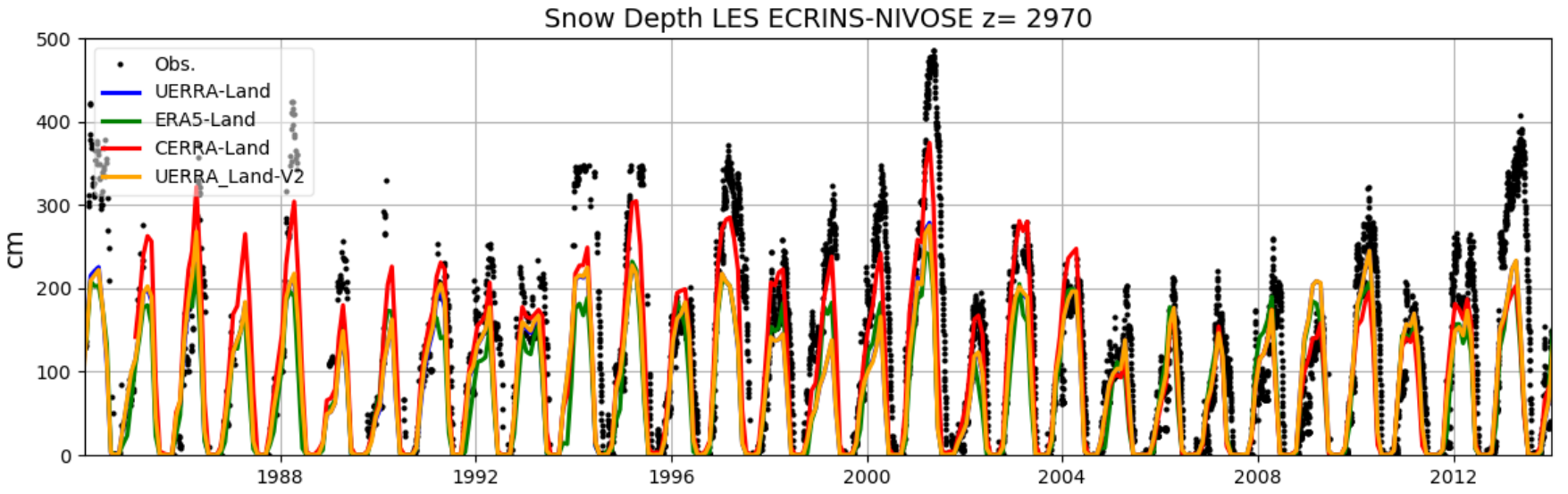
Very small impact of the V2 except around Stockholm

UERRA-Land V2: Snow depth over the Alps



UERRA-Land and the V2 are much better for snow over the Alps … almost no differences with UERRA-Land-V2

UERRA-Land V2: Snow depth over the Alps



More detail on CERRA-Land (1984-2020) see Antoine Verrelle Poster

Summary

- Thanks to the user feedback, a "problem" was found in the 1st version of UERRA-Land (UERRA-MESCAN-SURFEX) available on the Climate Data Store.

- Not all the areas in Europe are affected, however Météo-France decide to provide a V2 for the period : 01 January 1961 → 31 July 2019.

- This version UERRA-Land-V2 must be used especially for studies in UK or East of Europe

- UERRA-LAnd-V2 is not yet available on the CDS (under discussion) but NetCdf files can be provided on request.