

# HARMONIE results and lessons

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Adam von Kraemer

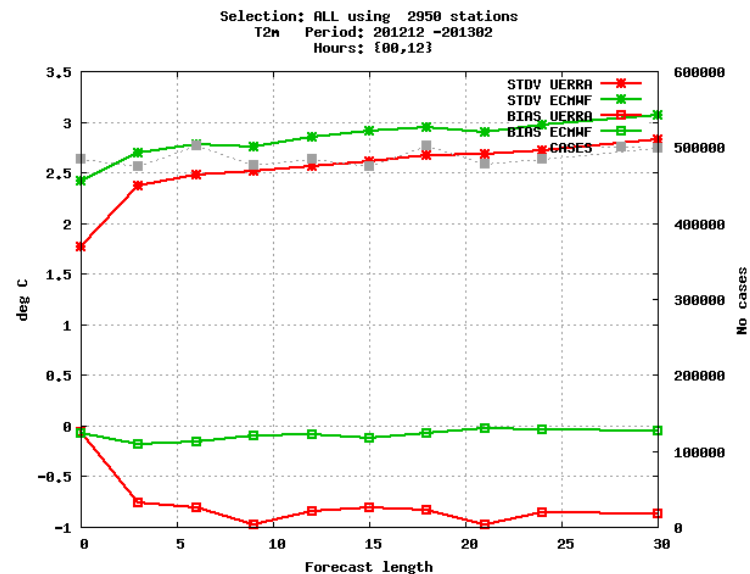
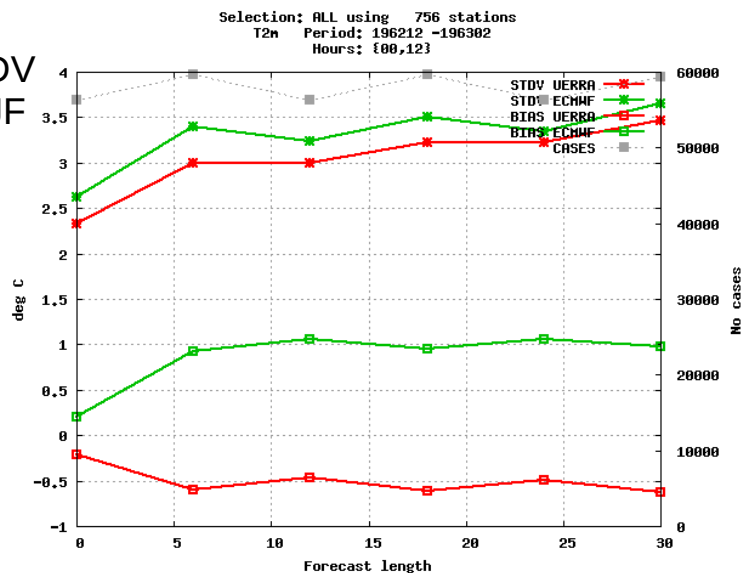
## Contents

- Verification
- Climatology
- Lessons learned

The HARMONIE verification system WebgraF has been used

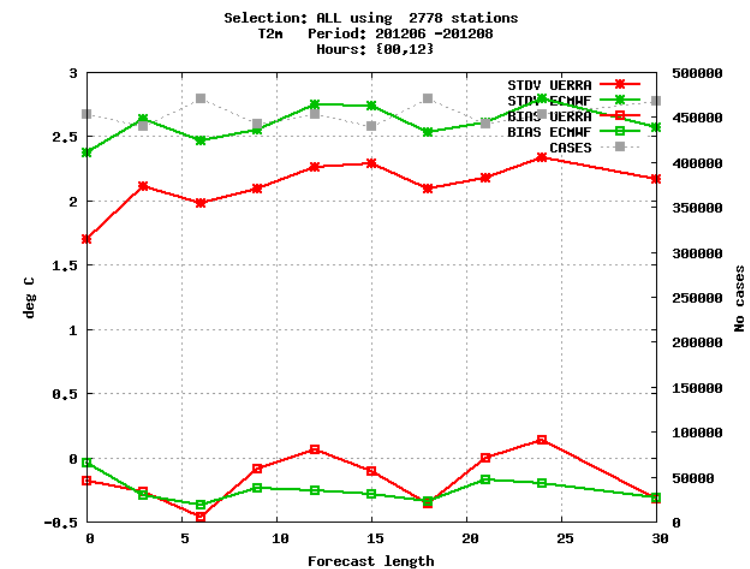
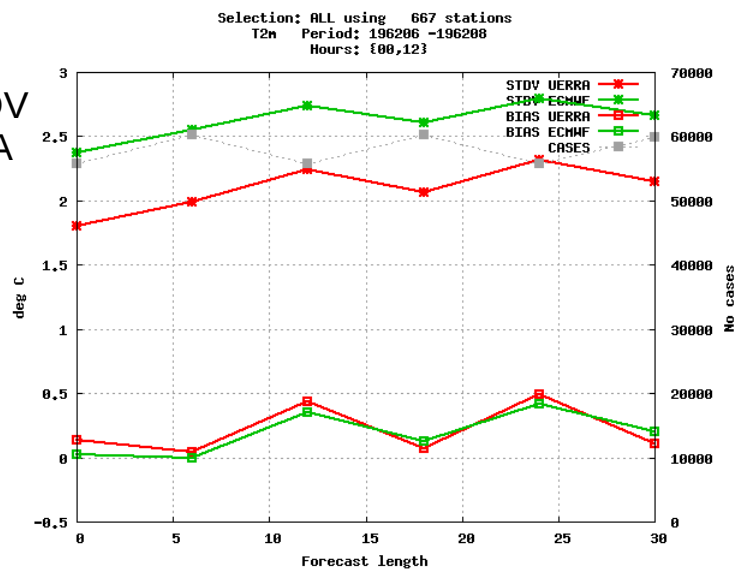
- Surface: mslp, 10m-wd, 10m-ws, t2m, td2m, rh2m, cloud cover, 12-h precip.
- Upper air: temp, rh, wd, ws, geop.
- Comparison with ERA-40/ERA-interim.
- Seasonal scores.

T2m STDV  
BIAS DJF  
1962



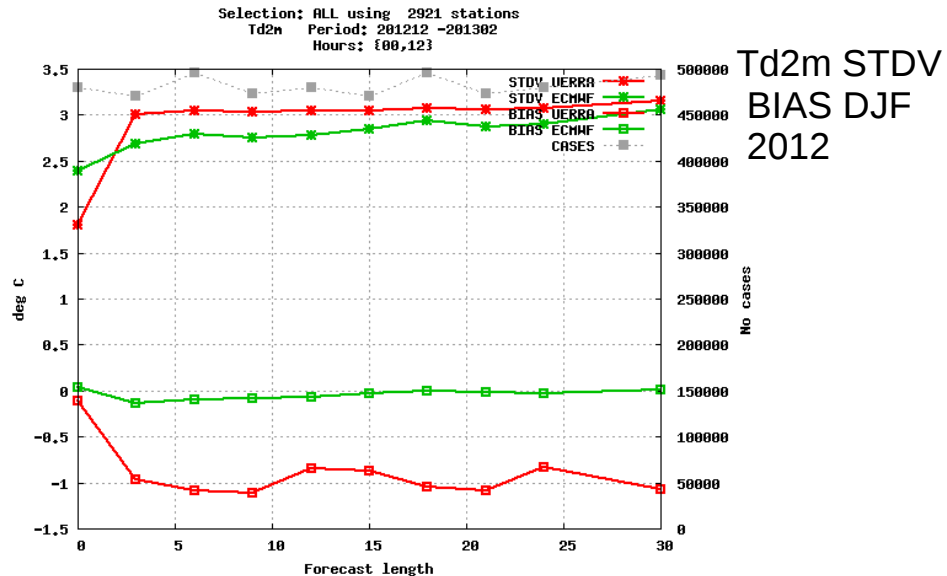
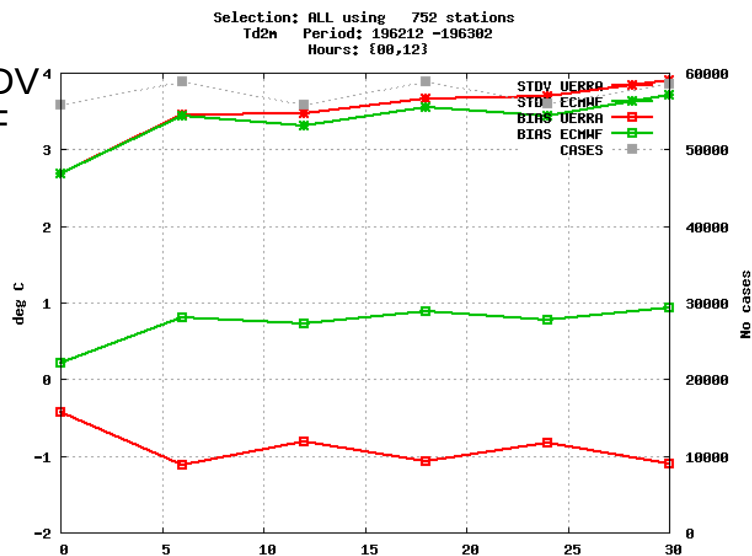
T2m STDV  
BIAS DJF  
2012

T2m STDV  
BIAS JJA  
1962



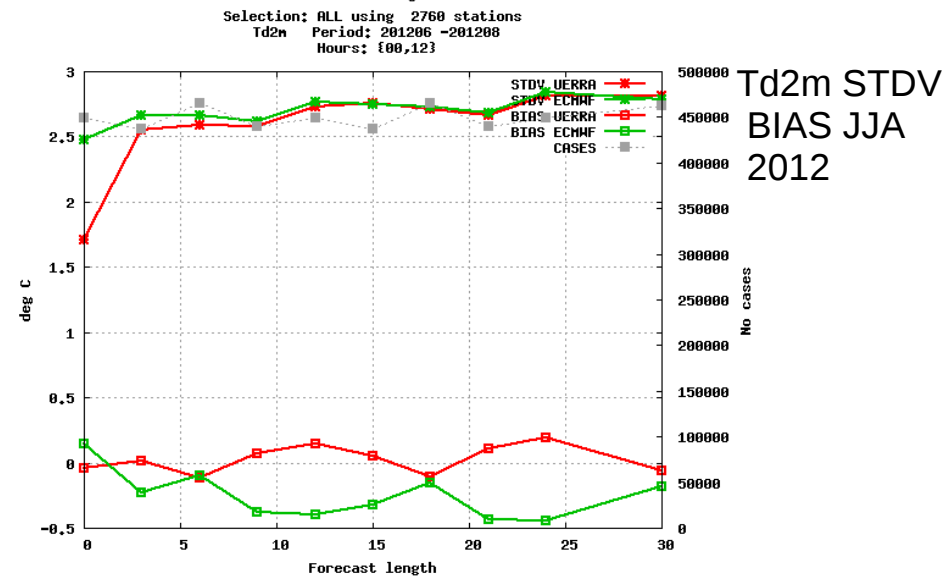
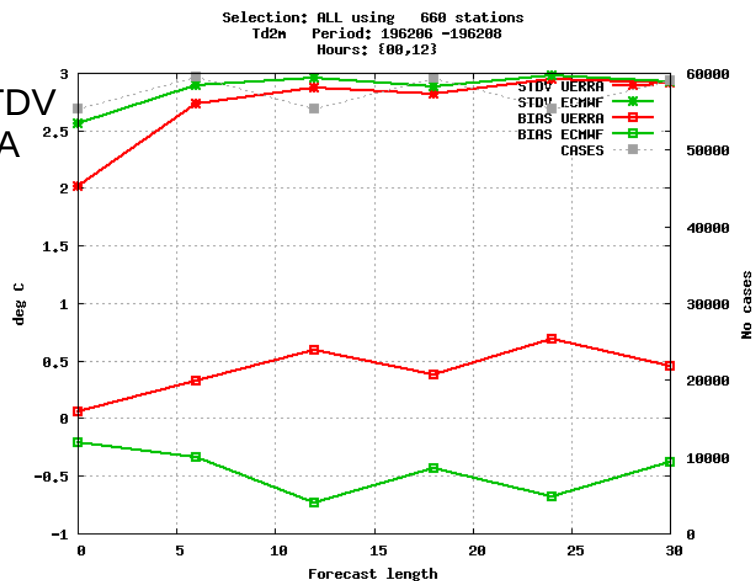
T2m STDV  
BIAS JJA  
2012

Td2m STDV  
BIAS DJF  
1962



Td2m STDV  
BIAS DJF  
2012

Td2m STDV  
BIAS JJA  
1962

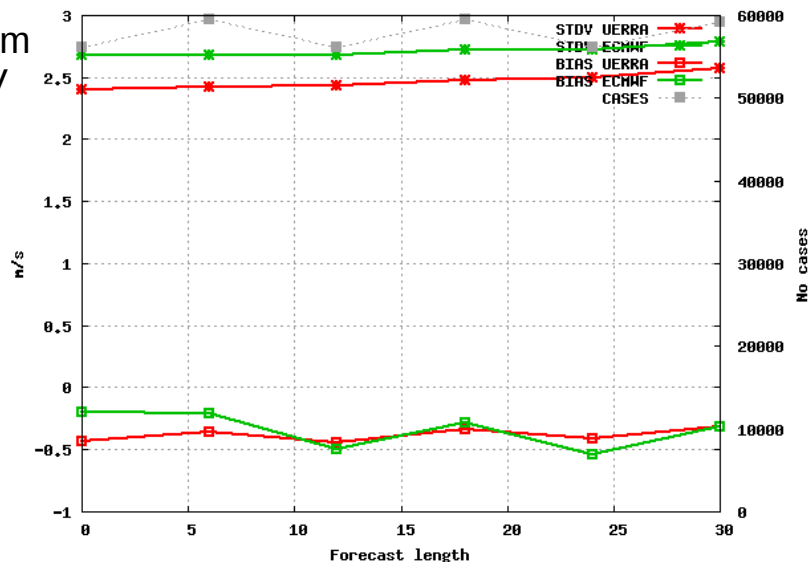


Td2m STDV  
BIAS JJA  
2012

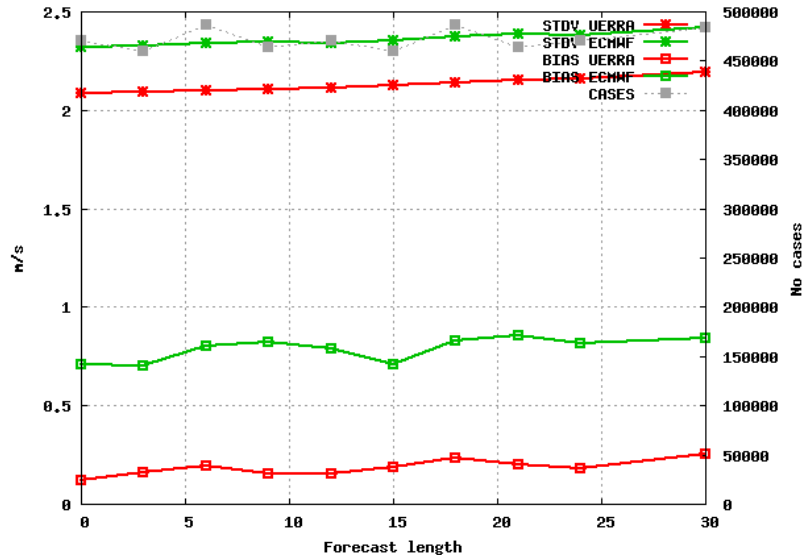
Selection: ALL using 759 stations  
U10m Period: 196212 -196302  
Hours: {00,12}

Selection: ALL using 2880 stations  
U10m Period: 201212 -201302  
Hours: {00,12}

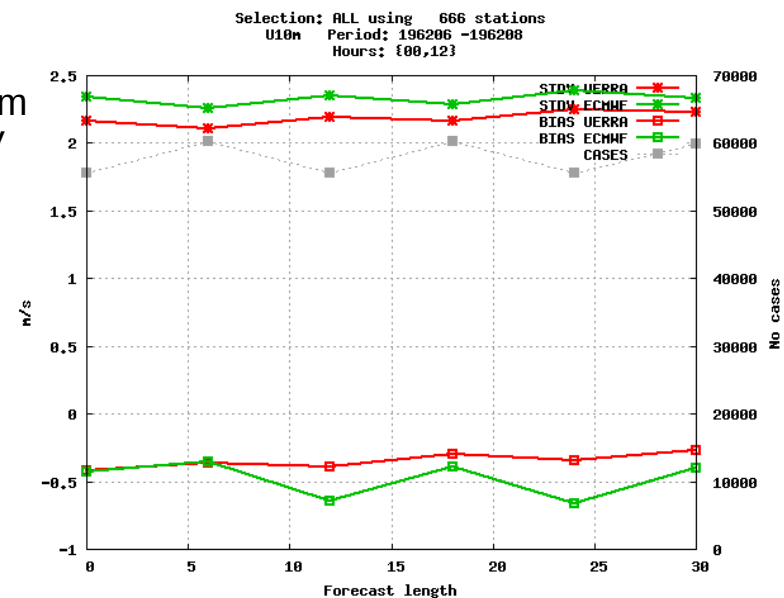
WS10m  
STDV  
BIAS  
DJF  
1962



WS10m  
STDV  
BIAS  
DJF  
2012

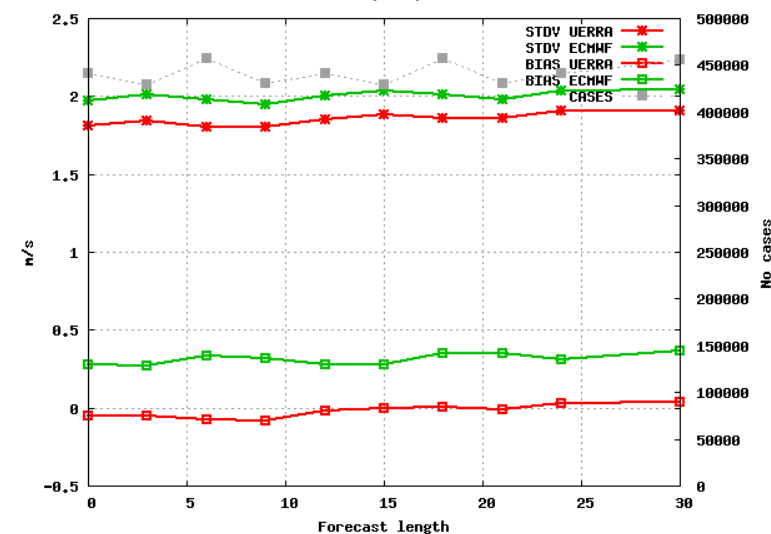


WS10m  
STDV  
BIAS  
JJA  
1962



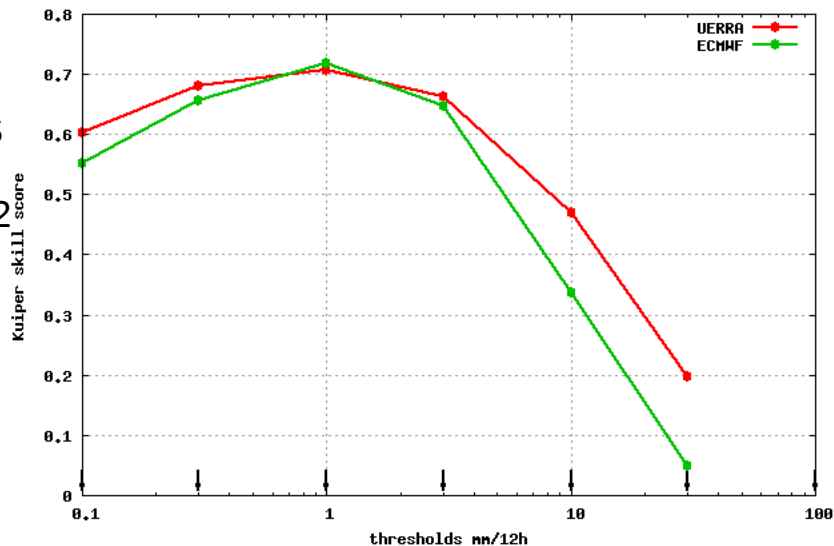
WS10m  
STDV  
BIAS  
JJA  
2012

Selection: ALL using 2738 stations  
U10m Period: 201206 -201208  
Hours: {00,12}



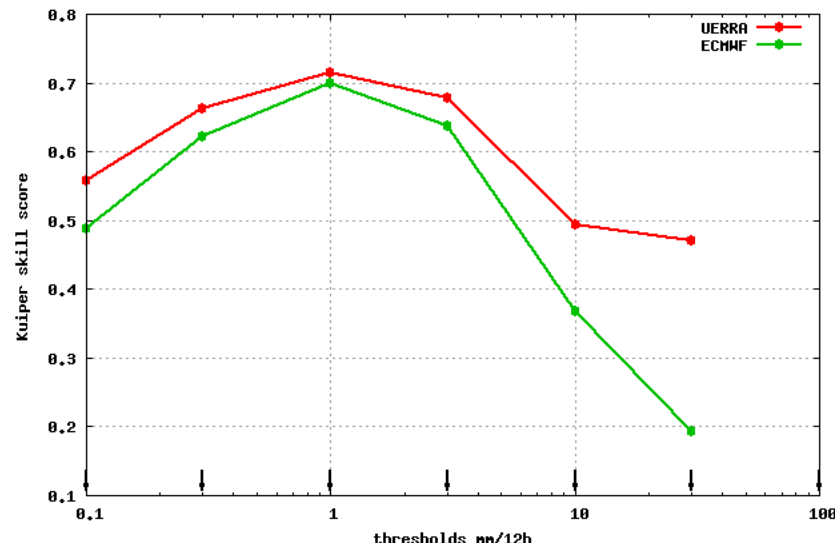
Kuiper skill score for 12h Precipitation (mm/12h)  
Selection: ALL 1555 stations  
Period: 198212  
Used {00,12} + 18-06

12h  
prec  
KSS  
DJF  
1982



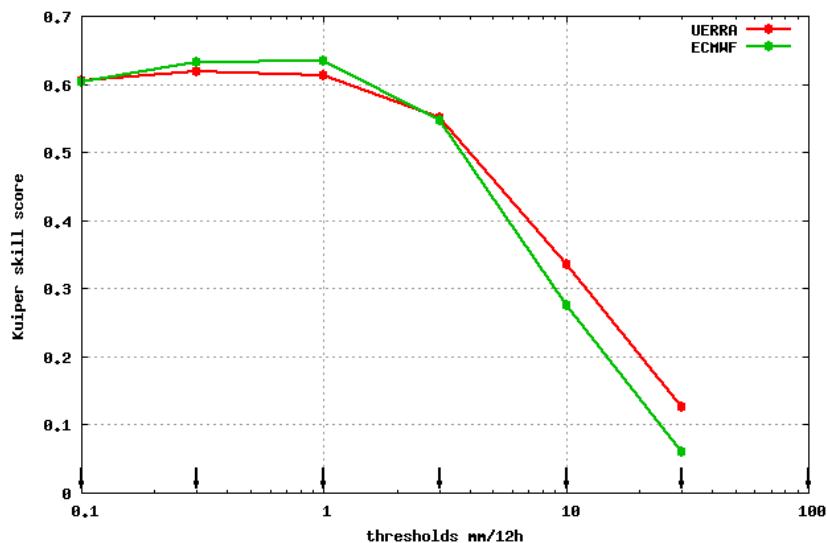
Kuiper skill score for 12h Precipitation (mm/12h)  
Selection: ALL 2486 stations  
Period: 201212  
Used {00,12} + 18-06

12h  
prec  
KSS  
DJF  
2012



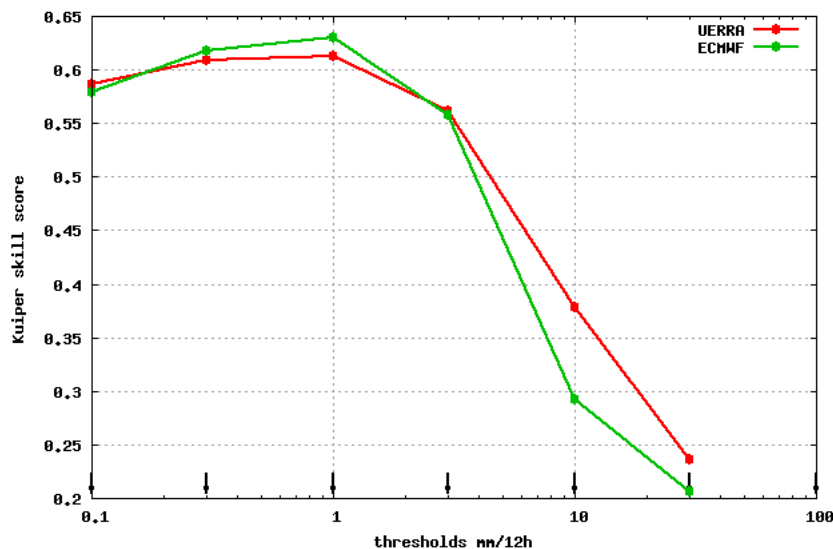
Kuiper skill score for 12h Precipitation (mm/12h)  
Selection: ALL 1483 stations  
Period: 198206  
Used {00,12} + 18-06

12h  
prec  
KSS  
JJA  
1982



Kuiper skill score for 12h Precipitation (mm/12h)  
Selection: ALL 2465 stations  
Period: 201206  
Used {00,12} + 18-06

12h  
prec  
KSS  
JJA  
2012



	1961-1969	1970-1979	1980-1989	1990-1999	2000-2010	2011-2015
PMSL STDV	▲	▲	●	●	●	●
T2m STDV	▲	▲	▲	▲	▲	▲
U10m STDV	▲	▲	▲	▲	▲	▲
Rh2m STDV	●	▼	▼	▼	●	▲
CC STDV		▲	▼	▼	▼	▼
Temp prof STDV	▲	▲	●	●	●	●
WS prof STDV	▼	▼	▼	▼	▼	●
Geop prof STDV	▲	▲	●	●	●	●
RH prof STDV	▼	▼	▼	▼	▼	▼

## Scorecard (subjective):

HARMONIE-ALADIN compared to ERA40 and ERA-Interim.

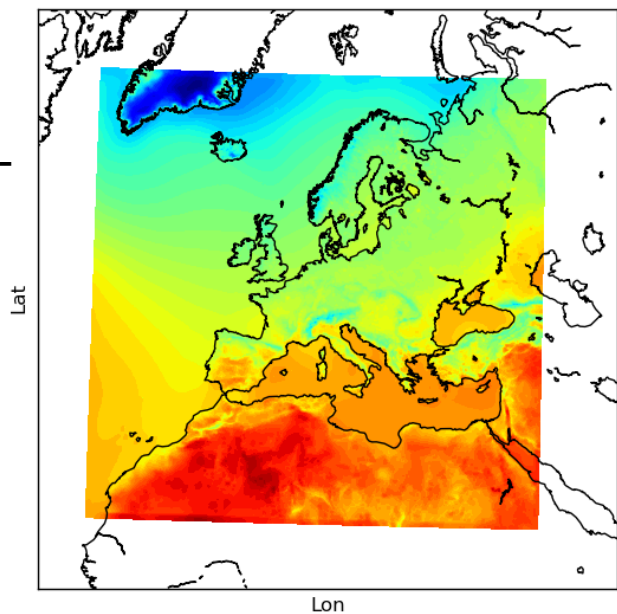
Green indicates that HARMONIE-ALADIN is better.

Red indicates that ERA is better.

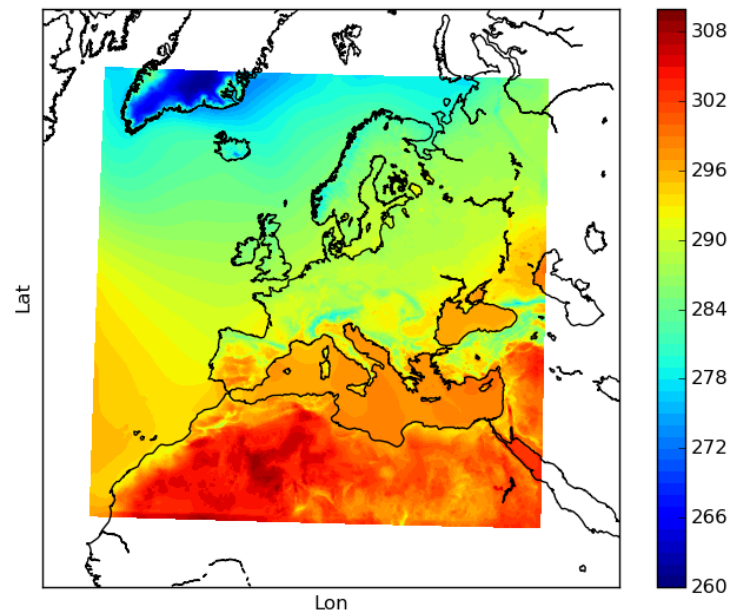
Circle means no noticeable difference between the two



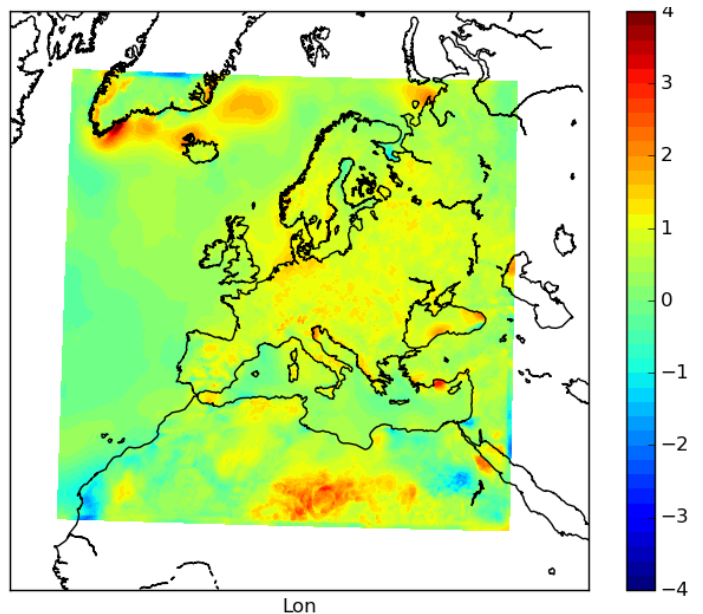
July  
T2m  
1961-  
1980



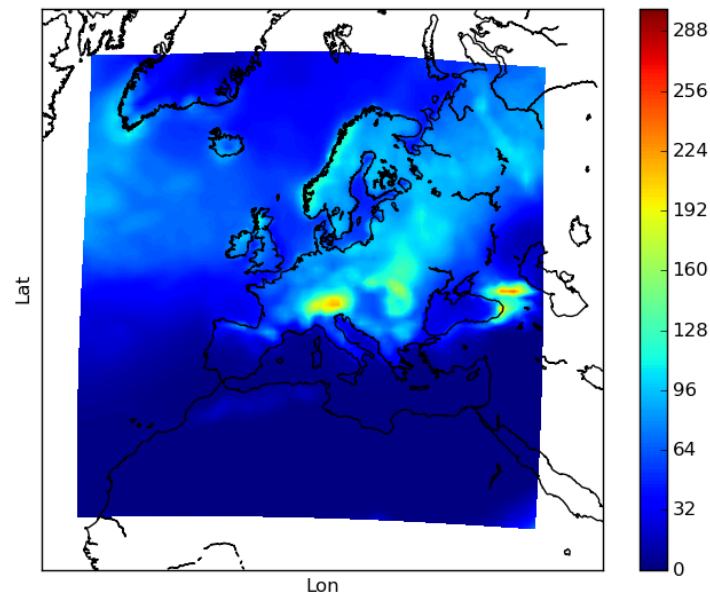
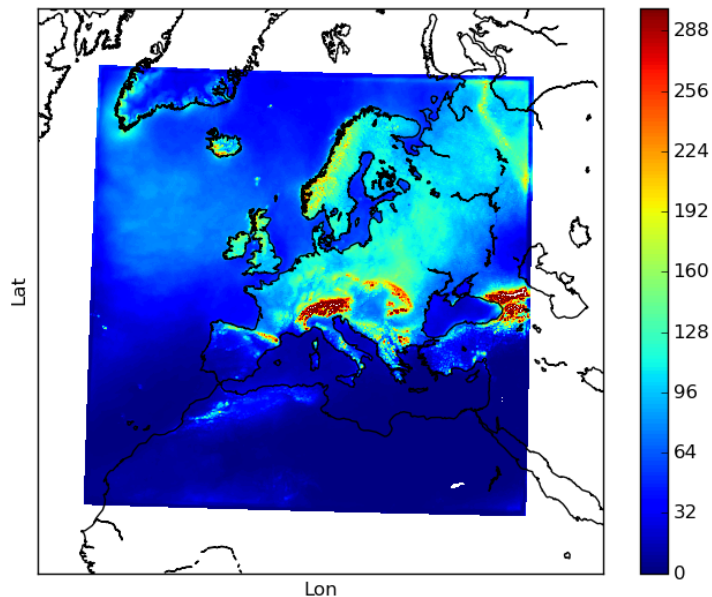
July  
T2m  
1981-  
2014



DIFF  
(late-early)

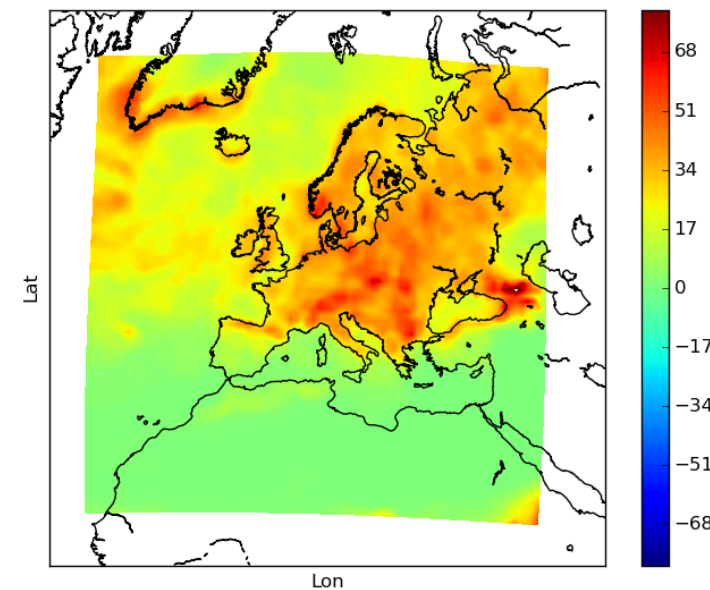
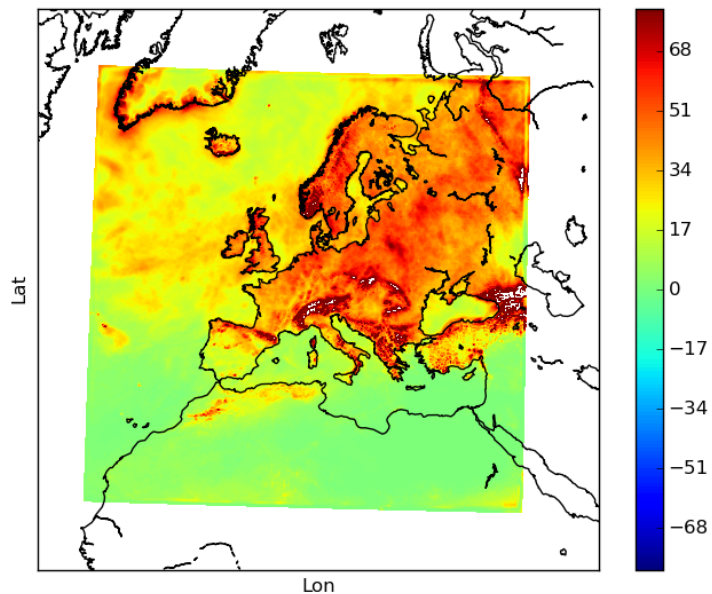


July  
prec  
1981-  
2014  
HARM



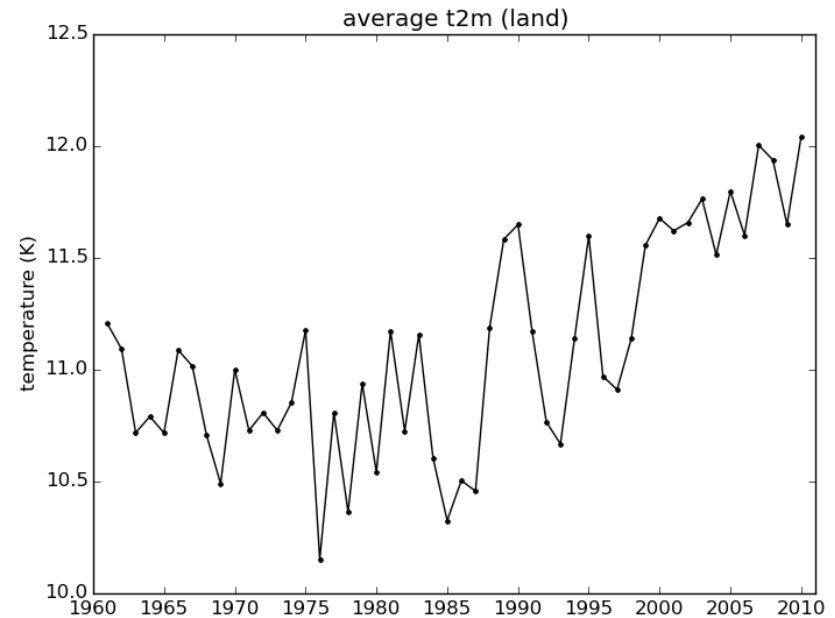
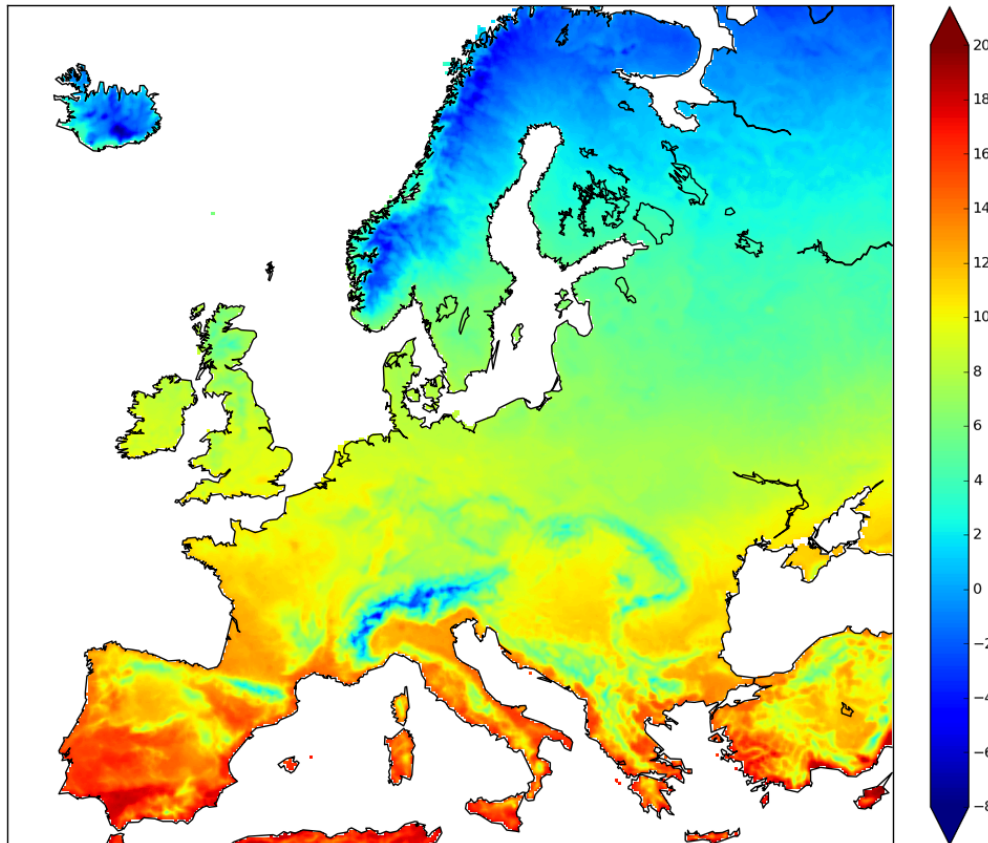
July  
prec  
1981-  
2014  
ERA-I

July  
prec  
STDV  
1981-  
2014  
HARM

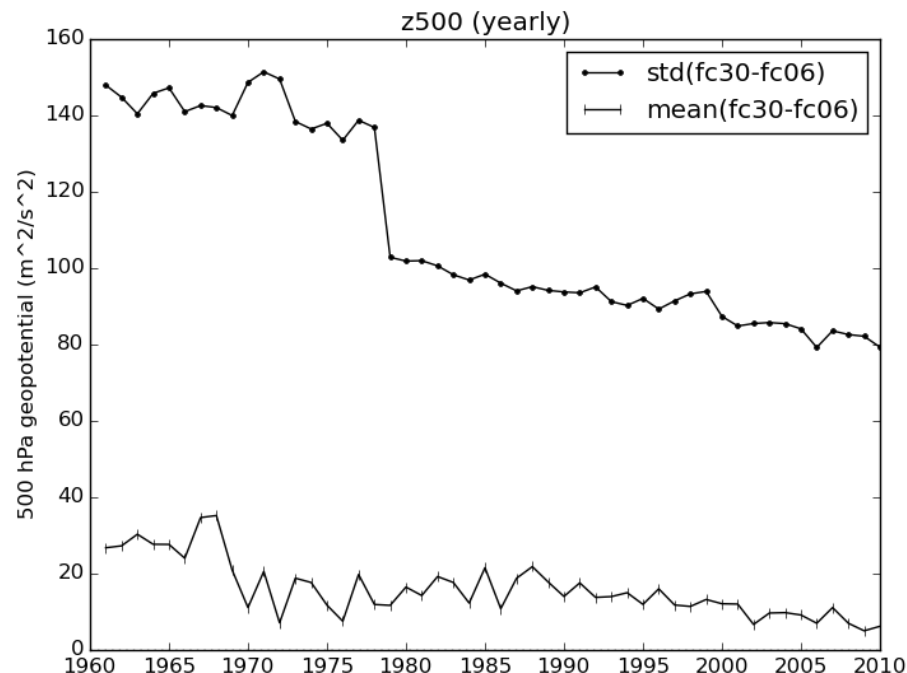
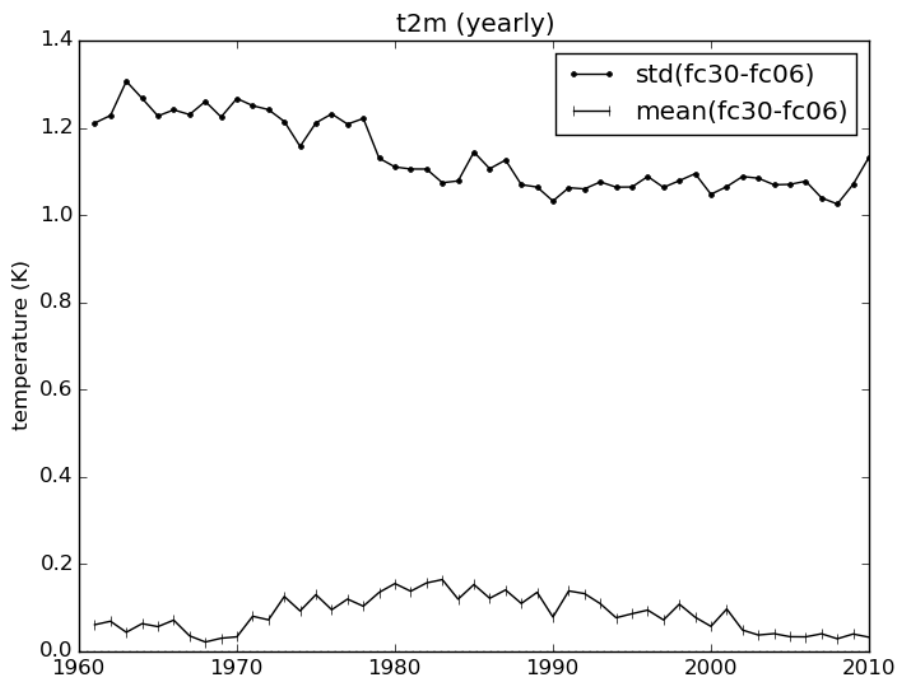


July  
prec  
STDV  
1981-  
2014  
ERA-I

## T2m analyses climatology, land points

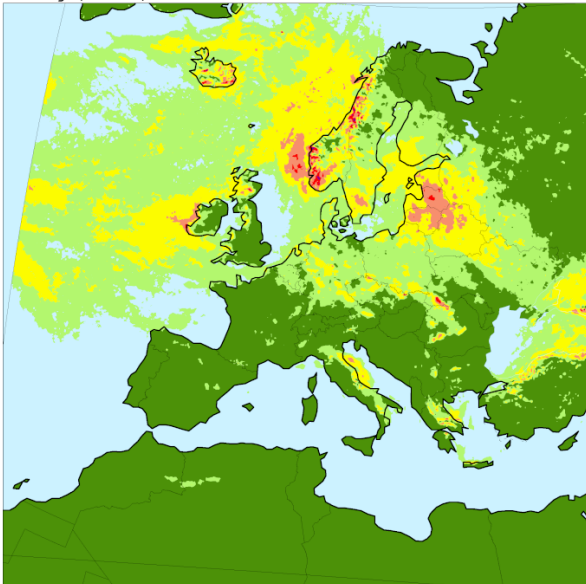


Comparing 6- and 30-hour forecasts, consistent comparison  
Considering the 6-hour forecast to be the “truth”



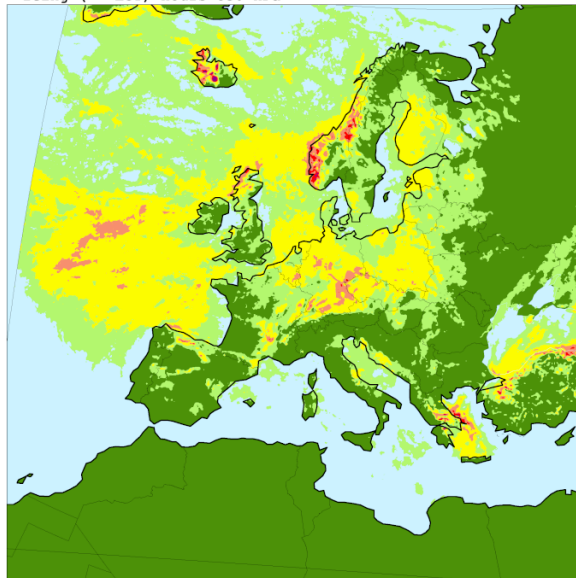
## Number of hours of active aircraft icing (>LGT) at 850 hPa

UERRA Jan 1990  
Icing ( $\geq$  LGT) hours 850 hPa



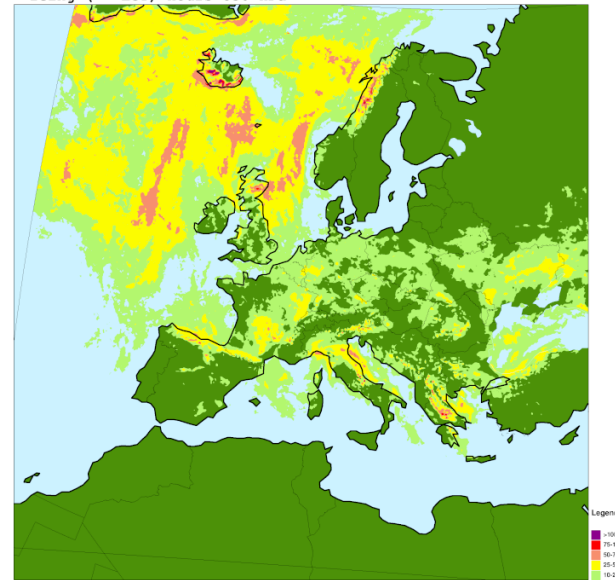
Jan 1990

UERRA Jan 2000  
Icing ( $\geq$  LGT) hours 850 hPa



Jan 2000

UERRA Jan 2010  
Icing ( $\geq$  LGT) hours 850 hPa



Jan 2010

Based on UERRA LWC and temp

- Mistake in one of the scripts that converted the model grib1-files to grib2. Changing fraction to percent.
- All model values  $\geq 1$ . was set to zero.
- Will be re-calculated and re-archived.

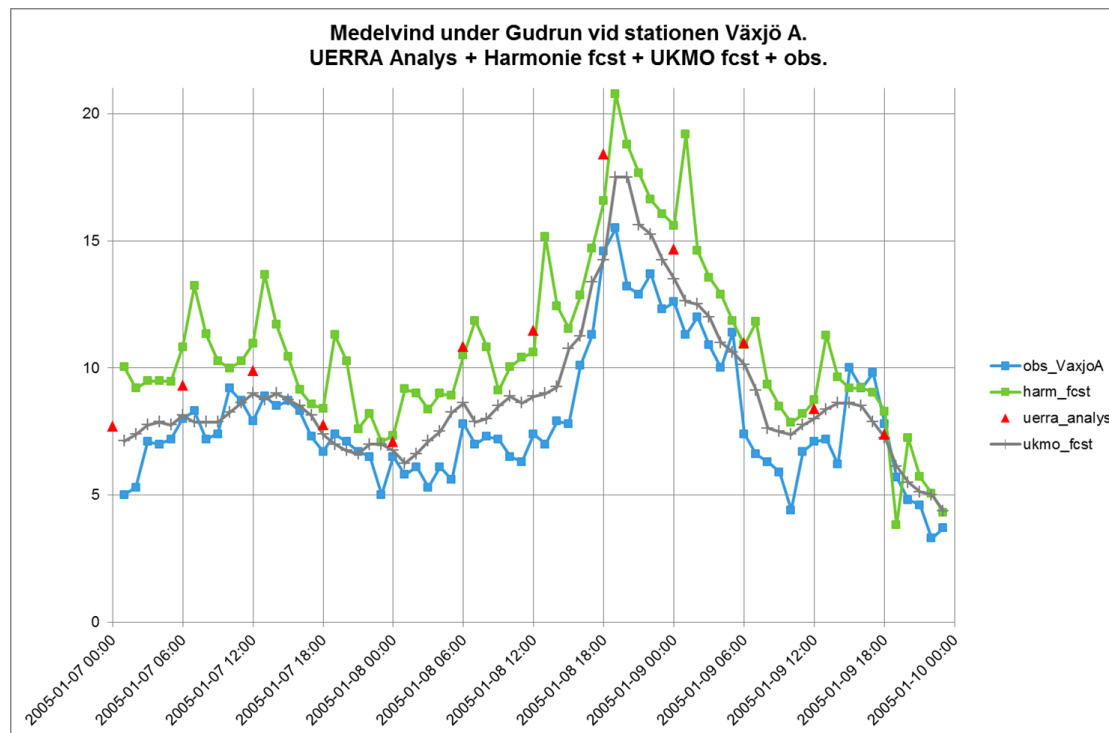


## Surface fluxes:

- Accumulated fluxes, sensible and latent heat, 1-6 hours forecasts erroneous over some land areas.
- Instantaneous fields are ok (not archived).
- Could be re-calculated and re-archived.

## 10m-wind speed and wind gust:

- In some situations too high wind speeds in the shortest forecasts (1-3 hours).
- Spin-up of TKE, the model starts with zero TKE.





Thank you

Any questions?