

# Use of low peaking channels from ATOVS in regional data assimilation

Sigurdur Thorsteinsson &  
Roger Randriamampianina

# outline

- The emissivity of the surface effectiveness in emitting energy as thermal radiation.
- ATOVS with emissivity file for using each month (thanks to Phillippe Champon & Florian Suzat for these files).
- Switched on dynamical emissivity & atlas when dyn. emis. fails
- Experiments defined
- Impact of ATOVS with dynamical emissivity on screening
- Impact of ATOVS obs. on the IGB model forecast accounting for
  - a) dynamical emissivity b) for availability of aircraft obs. c) ATOVS over sea via ATOVS over sea and land d) blacklisting procedure
- Concluding remarks

# IGB model



- 40h1.1 on dmihpc
- 2.5 km, Top 10 hPa  
Coupled 1 hourly
- Non-hydrostatic,
- Arome
- Caneri + OI\_Main
- Conventional obs.: T2m,  
RH2m, SYNOP, SHIP,  
AIRCRAFT, DRIBU
- Unconventional obs.:  
AMSU A/B, MHS, ATMS

# Define the experiments

Exp. name	With emissivity?	Assimilated over?	Blacklist?
noemsv2	no	s (sea)	v2
noemslv2	no	sl (sea & land)	v2
emsv2	yes	s (sea)	v2
emslv2	yes	sl (sea & land)	v2
emsv3	yes	s (sea)	v3 (T-version)
emslv3	yes	sl (sea & land)	v3 (T-version)

In version (v3) we use for AMSU-A, AMSU-B/MHS and ATMS same mf\_blacklist.b as Meteo-France (in `~hnam/harmonie-release/vendor/aladin/current/blacklist/mf_blacklist.b`)

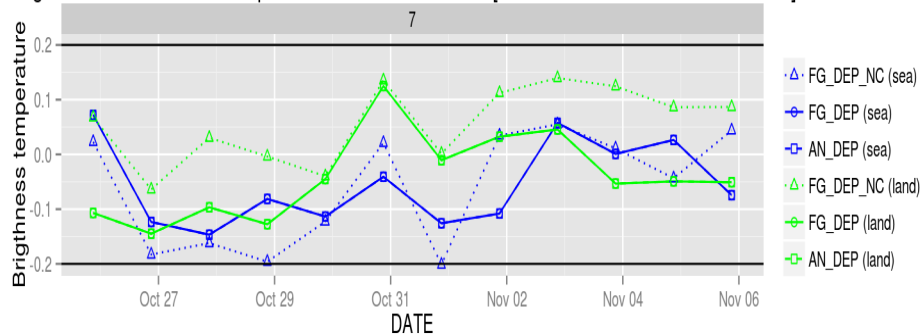
# Sensitivity of the dynamic emissivity on screening

Dyn. emis unactivated

Dyn. emis activated

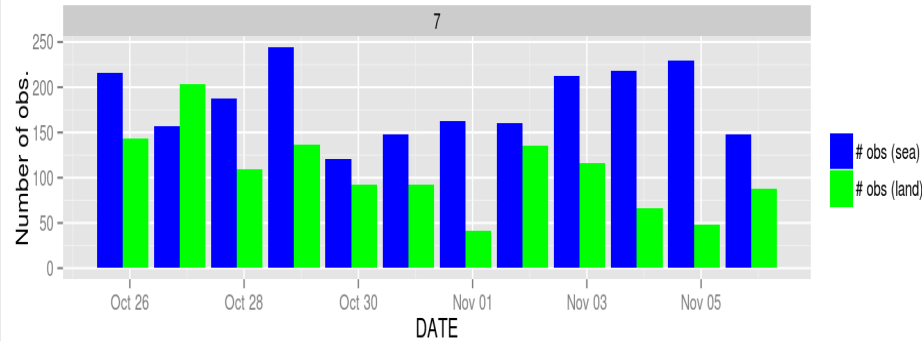
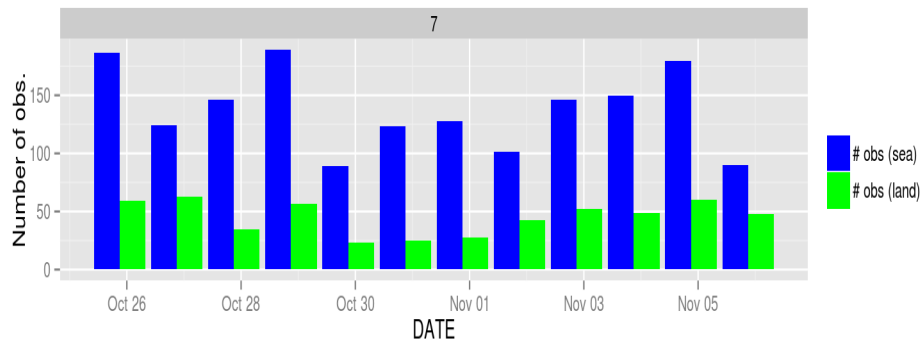
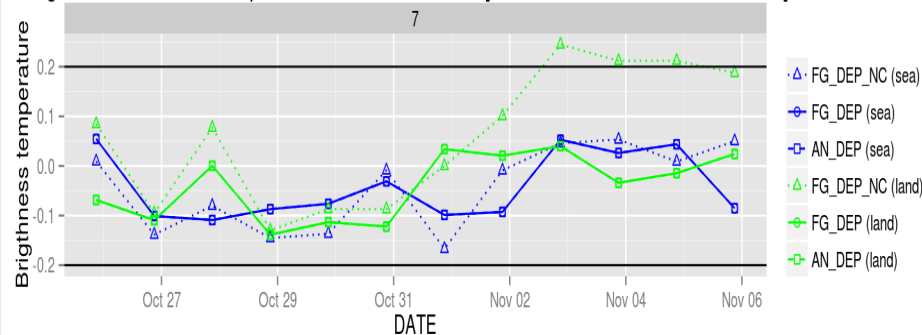
**noemslv2**

igb10noemsl : LandSeaDepartures SATEM NOAA-18 [2017-10-25 21Z - 2017-11-05 21Z]



**emslv2**

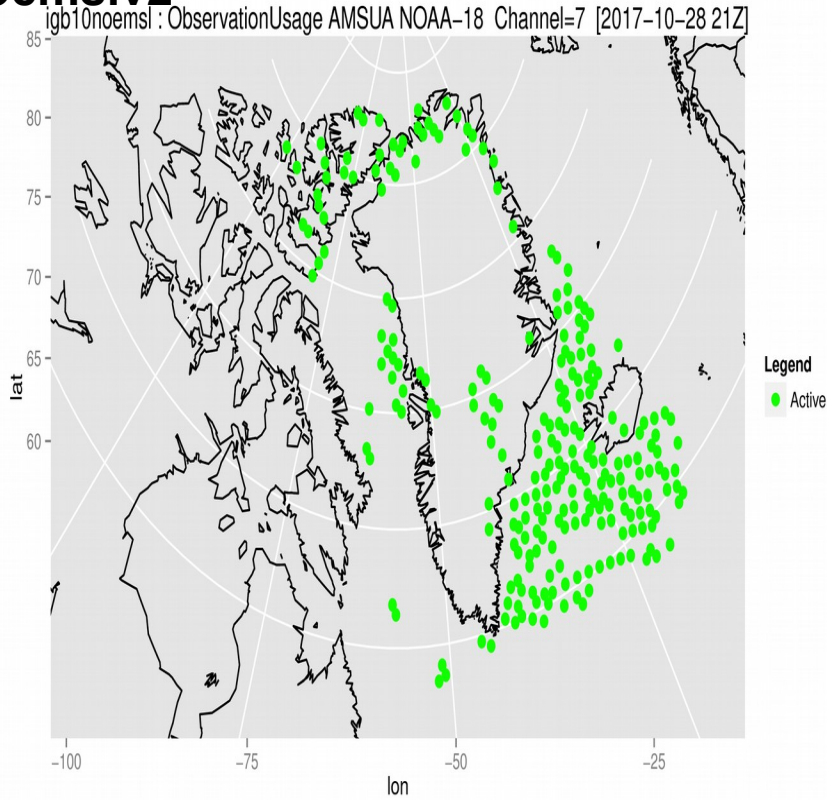
igb10emsl : LandSeaDepartures SATEM NOAA-18 [2017-10-25 21Z - 2017-11-05 21Z]



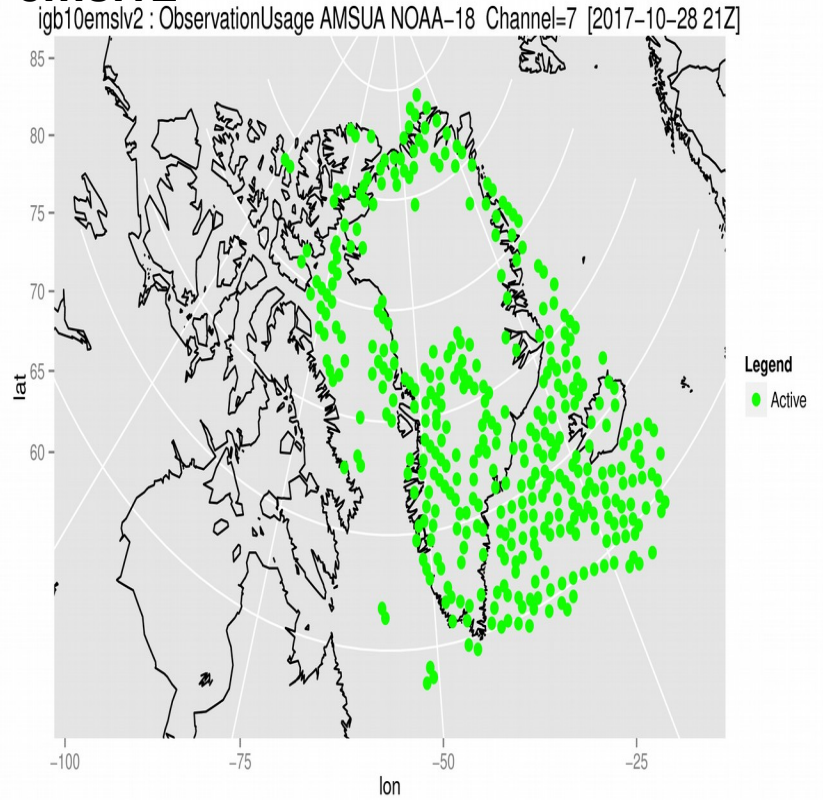
Activating ATOVS with dynamic emis. in screening gives more obs. through screening and assimilation both over sea and land ice

# Running with IGB domain on dmihpc we got?

**noemslv2** ch. 7 2017-10-28 21Z



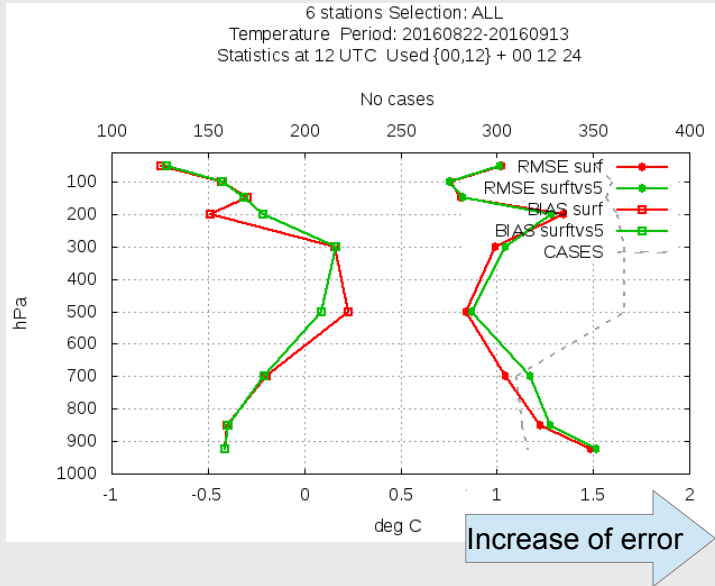
**emslv2** ch. 7 2017-10-28 21Z



More ATOVS over sea ice and land ice

# Running with IGA domain on ECMWF we got?

Assimilation of ATOVS with surface observations only

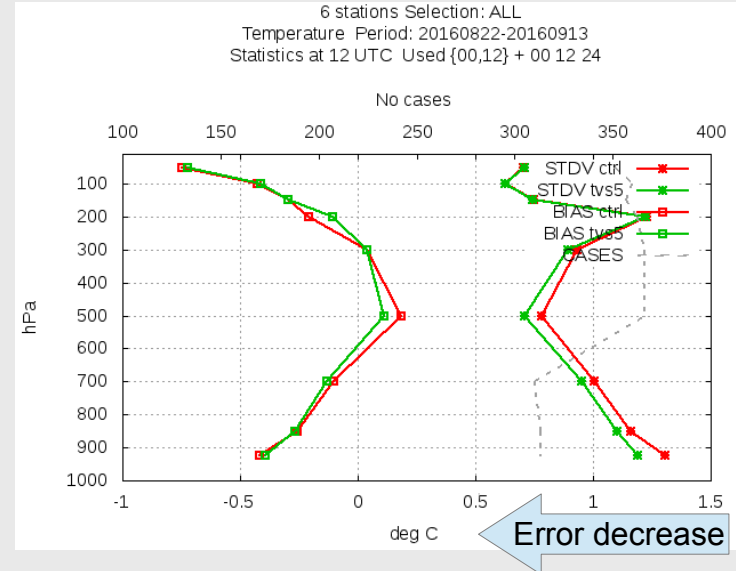


Negative impact of ATOVS

Icelandic IGA 3DVar study

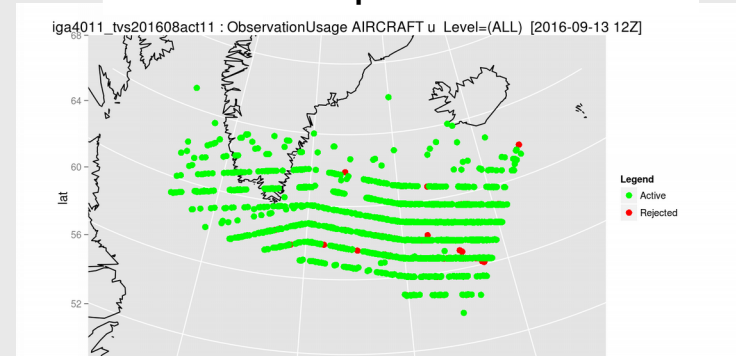
==> Radiance assimilation needs good 'anchoring' observations

Assimilation of ATOVS with surface, radiosonde and aircraft observations



Same ATOVS data in both cases

Positive impact of ATOVS



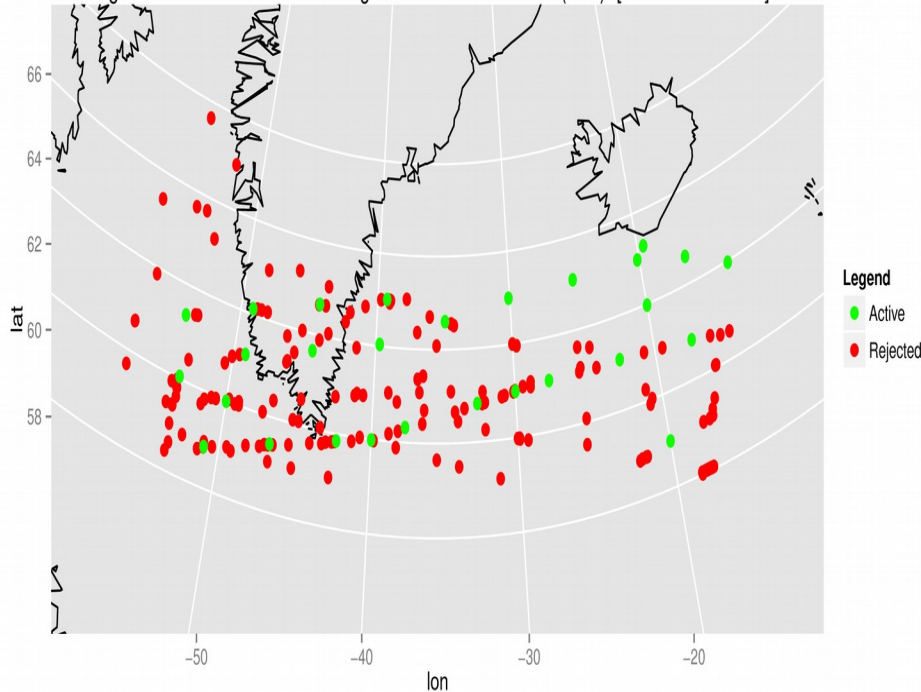
Many observations from trans-Atlantic flights

# Accounts for availability of active aircraft observations on dmihpc [1]

**emslv3**

2017-11-10 09Z

igb10emslv3 : ObservationUsage AIRCRAFT u Level=(ALL) [2017-11-10 09Z]

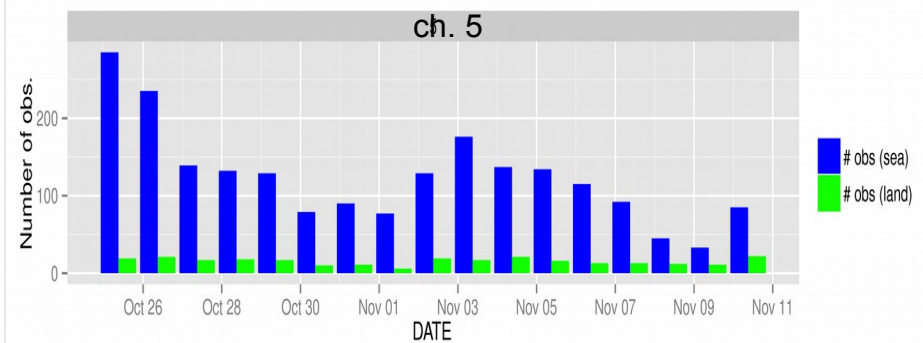
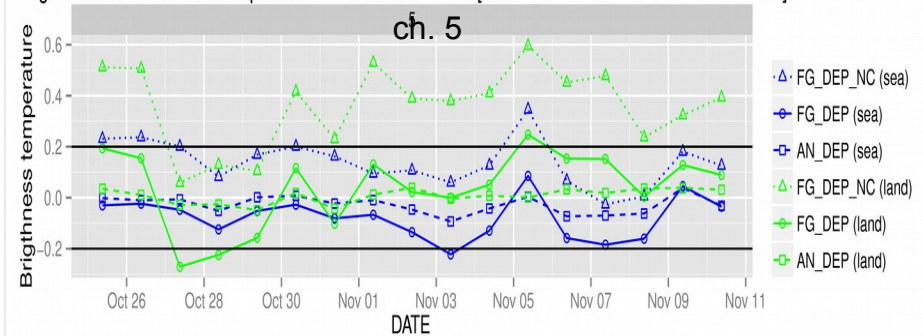


Active (green points)

**emslv3**

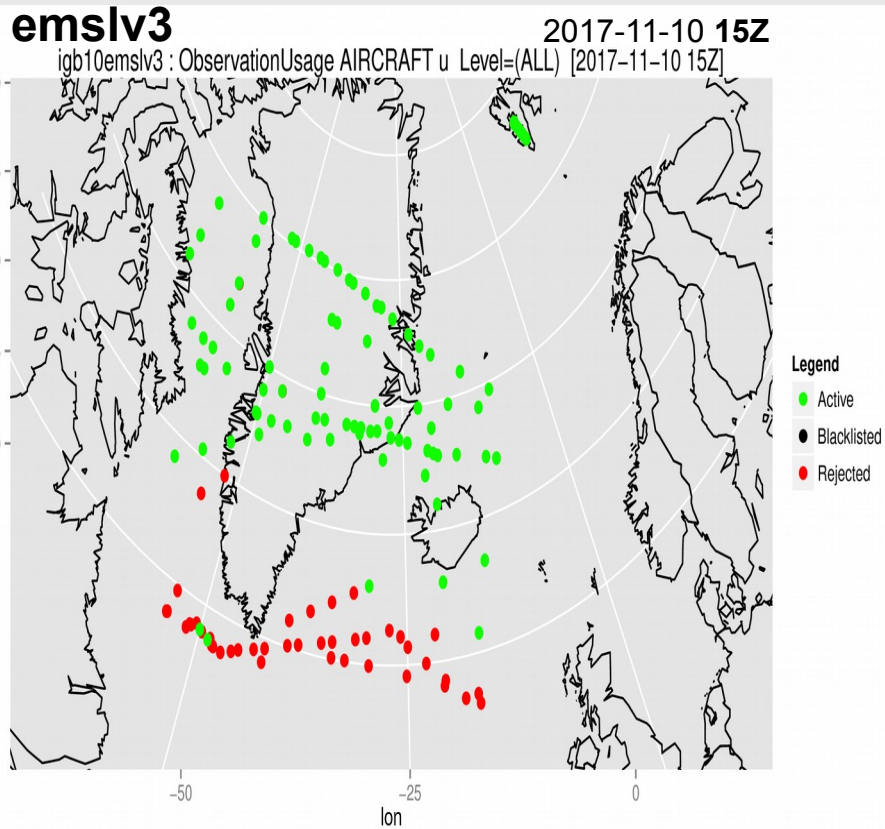
2017-10-25 09Z- 2017-11-10 09Z

igb10emslv3 : LandSeaDepartures SATEM NOAA-18 [2017-10-25 09Z - 2017-11-10 09Z]

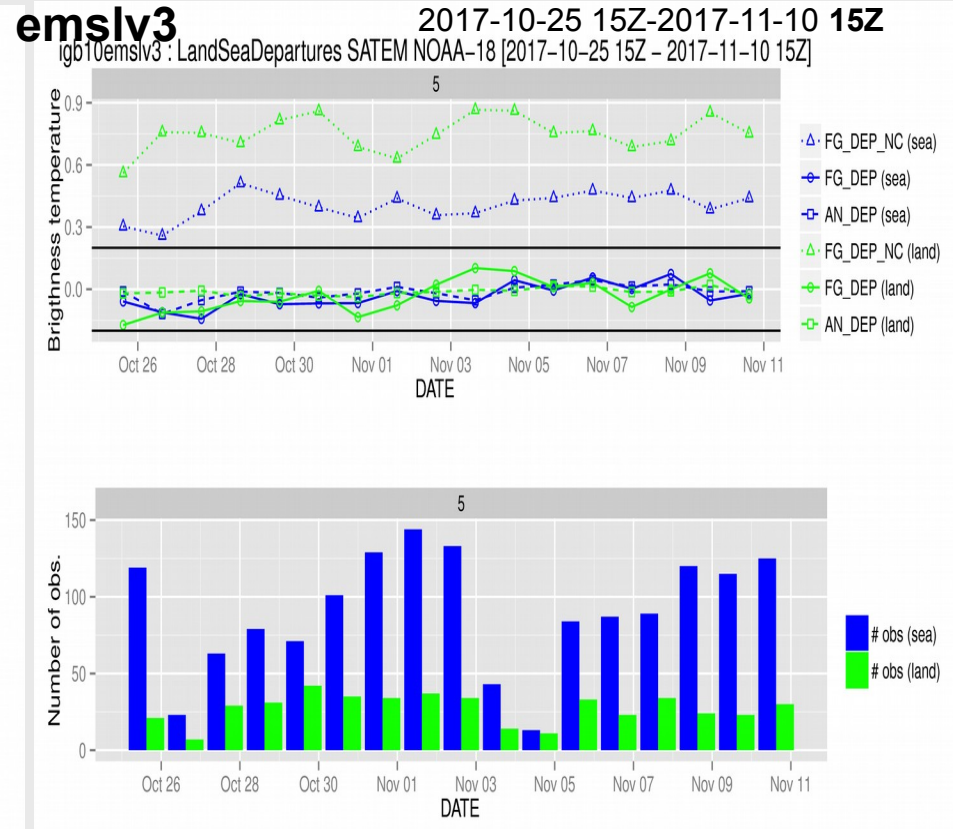




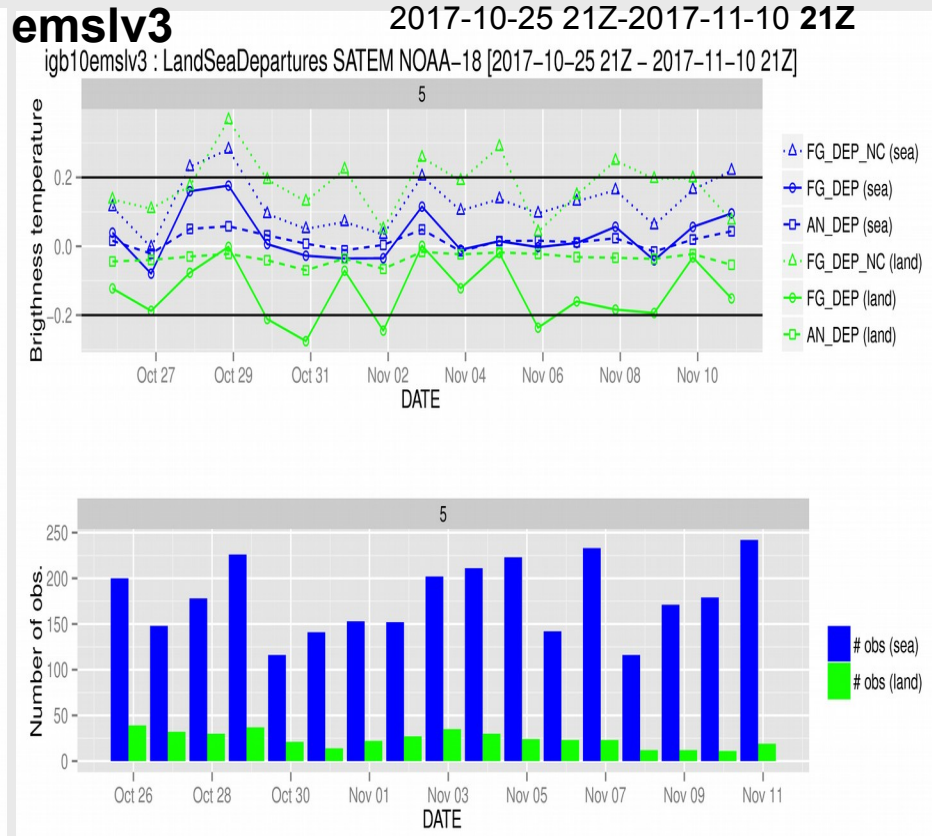
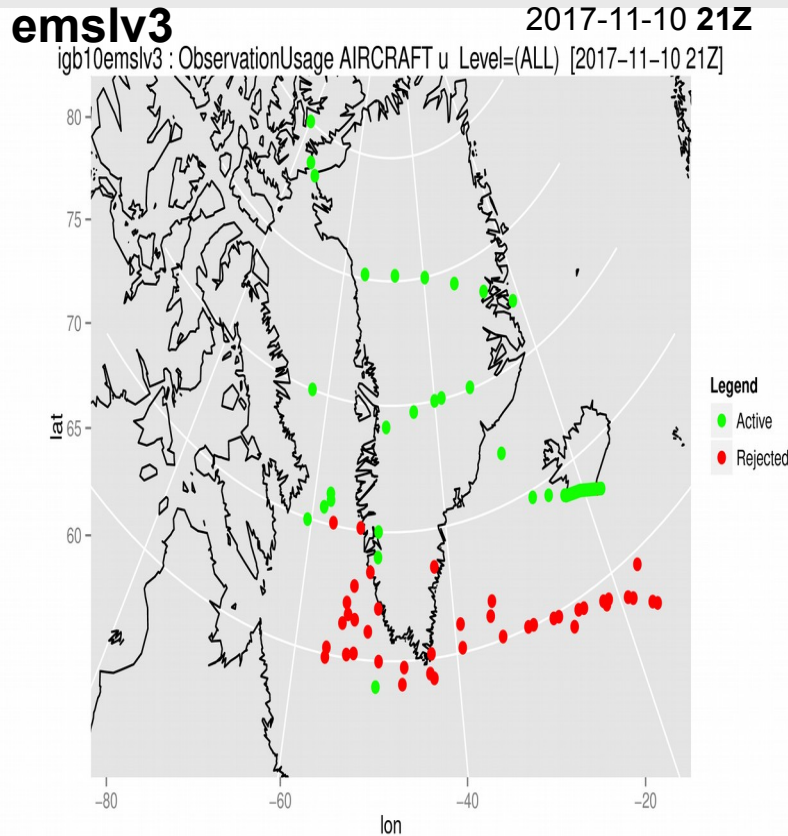
# Accounts for availability of active aircraft observations on dmihpc [2]



Active (green points)



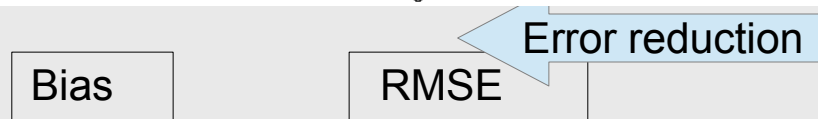
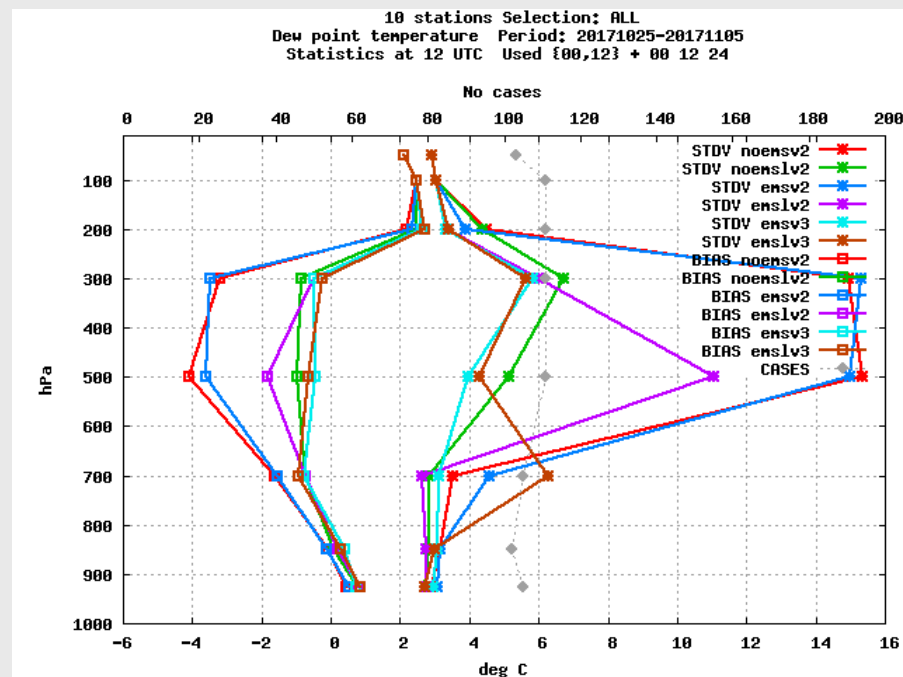
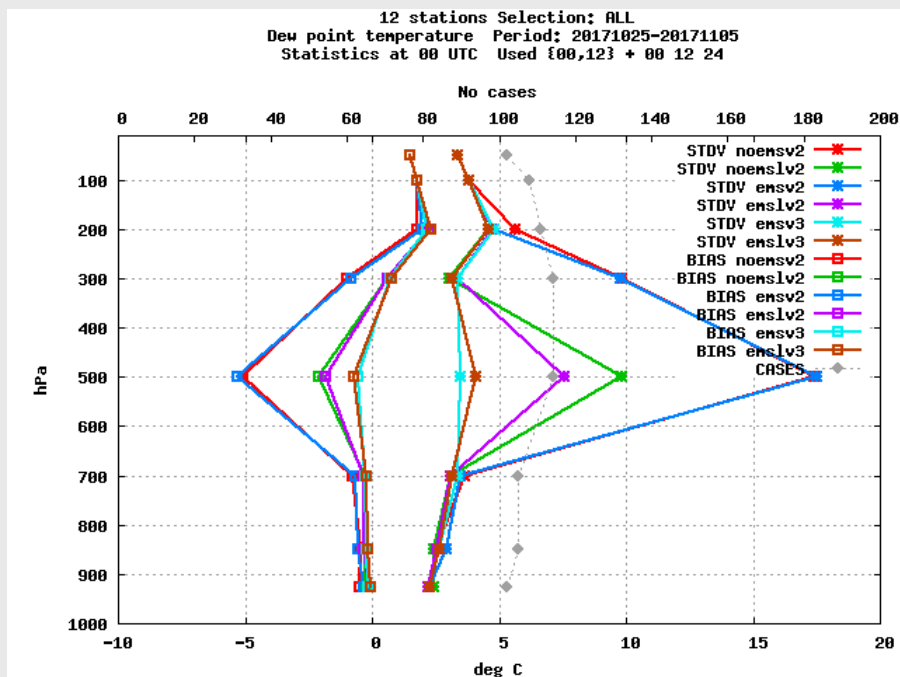
# Accounts for availability of active aircraft observations on dmihpc [3]



Active (green points)

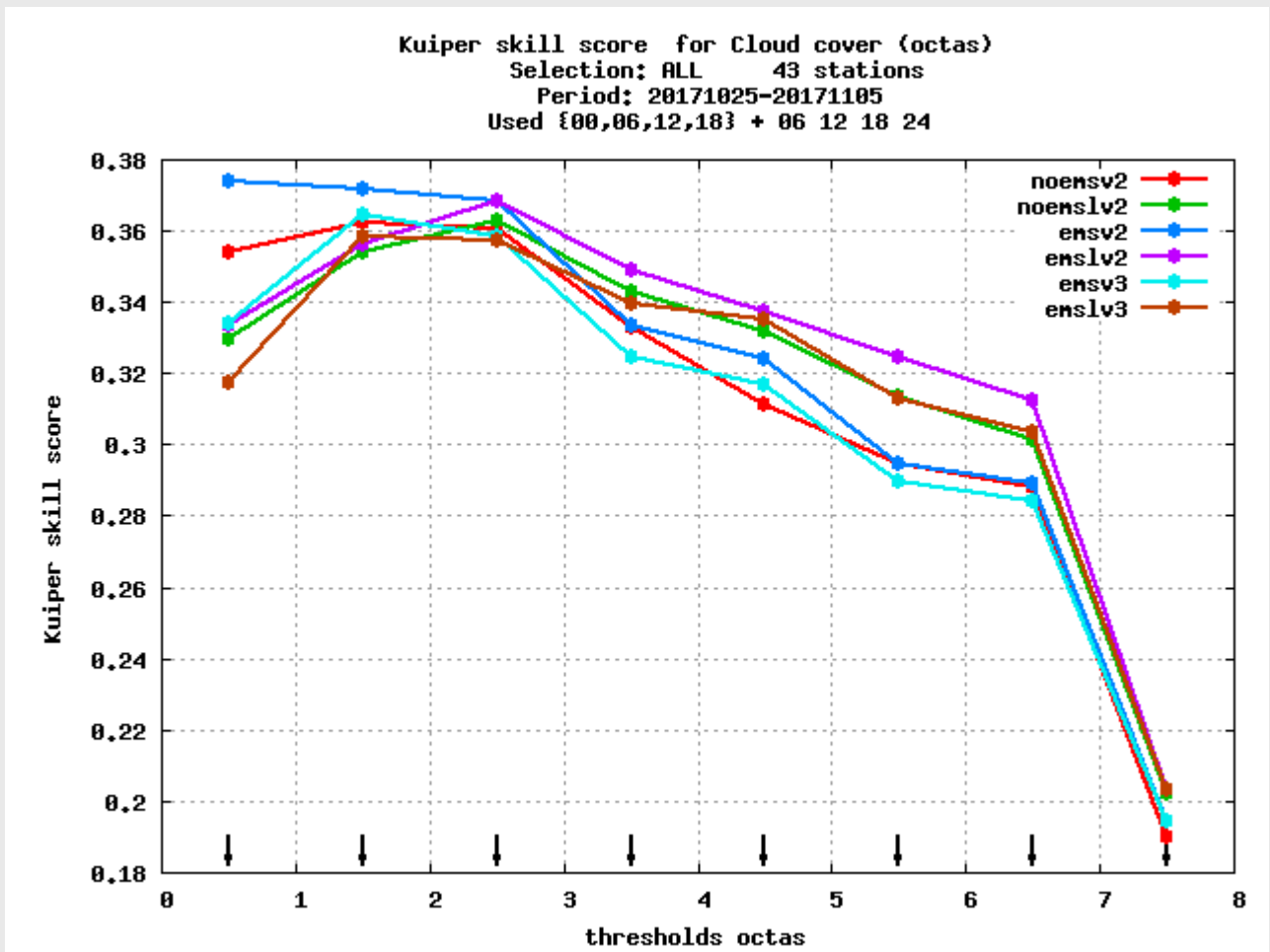
Radiance needs better “anchoring” observations from radiosondes and aircraft.

# Impact of radiances on dew point Temperature (sensitive to T and Hum)for all TEMPS



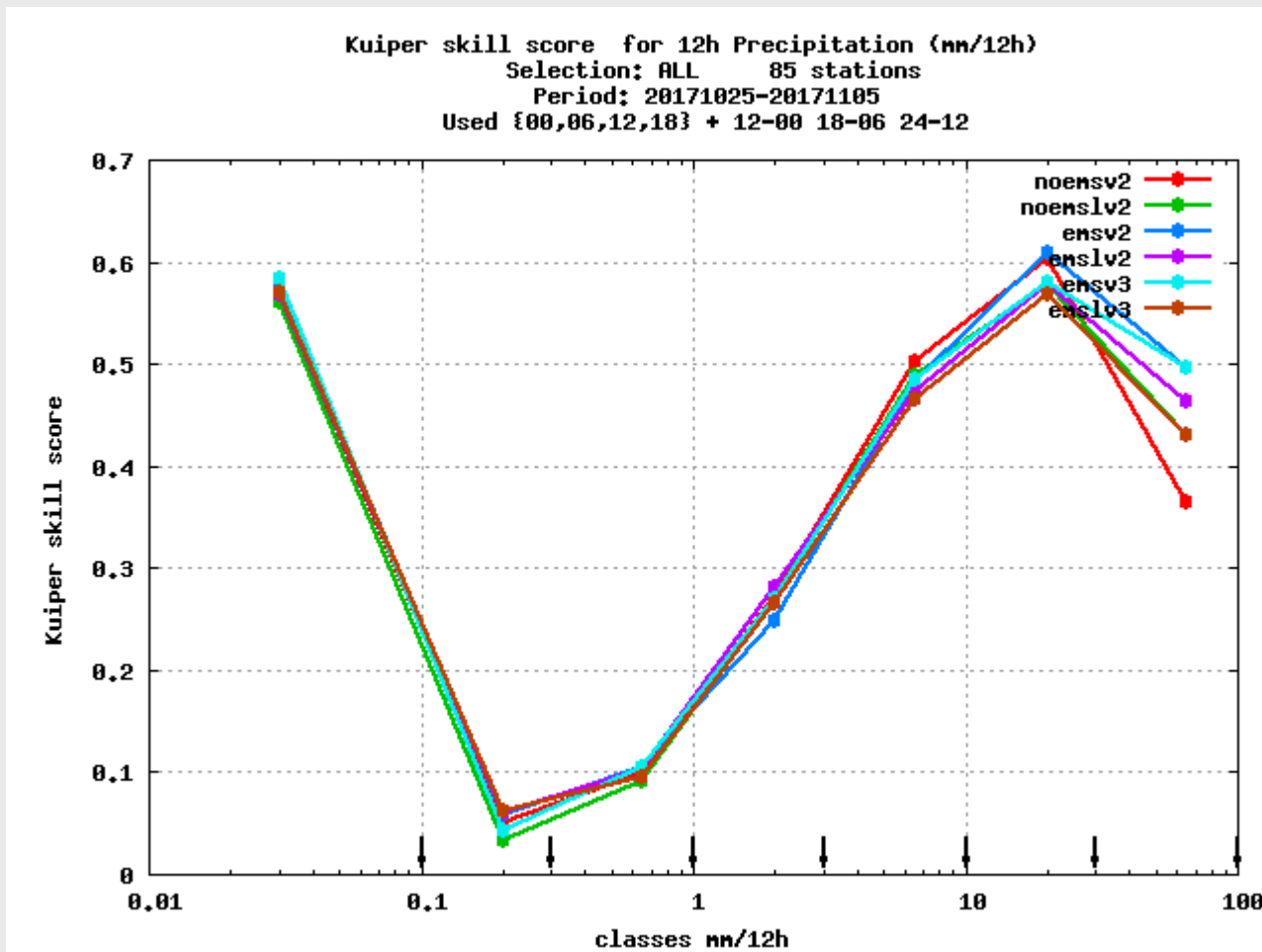
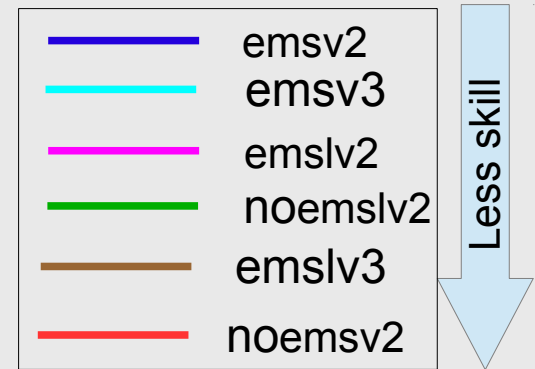
Larger positive impact from changing blacklist of ATOVS than from adding dynamic emissivity.

# Impact of radiances on cloud cover. Better for >2 when assimilated over sl



Impact of radiances on precipitation.

With dynamic emissivity we get better forecasts over sea but not as good impact over land. Some are better at higher classes, but not lower and etc.



# Concluding remarks

- Activating ATOVS with dynamic emissivity in screening gives more observations through screening and minimization, both over sea and land ice
- Radiances need good ‘anchoring’ upper-air observations to be effectively assimilated in regional models. Good active AIREP data coverage is needed.
- Larger positive impact on forecasts of Td from changing blacklist of ATOVS than from adding dynamic emissivity.
- We have to understand why in experiments v2 and v3, sl (ass. over sea and land) does not give better precipitation result than experiment s (ass. over just over sea).
- Change in blacklisting made largest impact. So blacklisting is important.