

Polar OSEs and Applicate

Aim: Understand the role of current observing systems and guide the design of future observing systems in polar regions

I. Sandu, H. Lawrence, N. Bormann, J. Day, J. Farnan, P. Bauer
S. Laroche, E. Poen
A. Cress
R. Randriamampianina

ECMWF
ECCC, Canada
DWD, Germany
MetNo, Norway

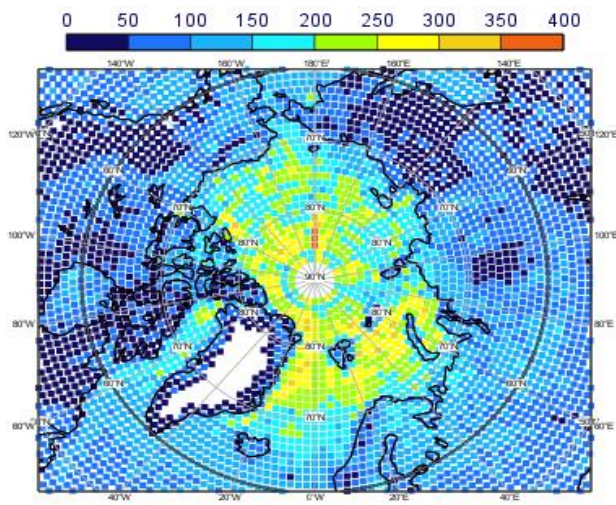
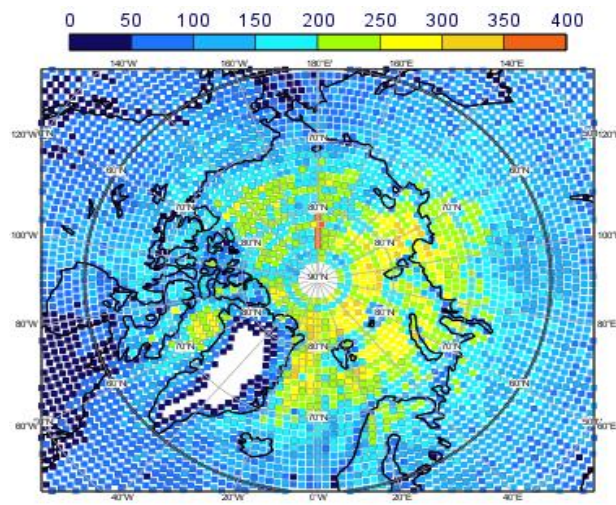
Presented by Stephen English to IPETSUP-5 Agenda Item 9.6, 11 February 2019

Satellite observations

Summer 2016

Winter 2017/2018

Nb obs

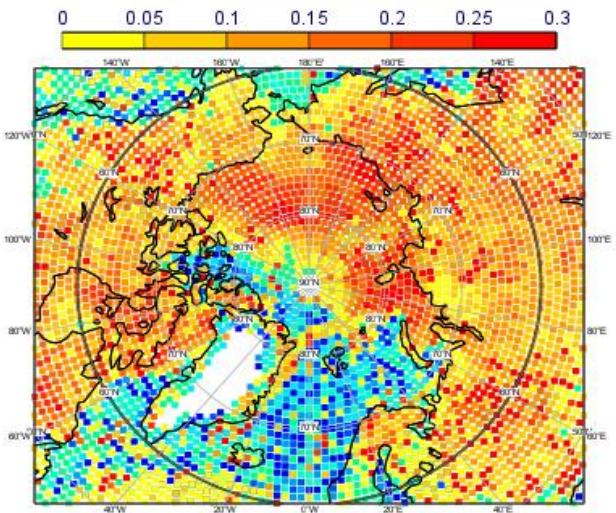
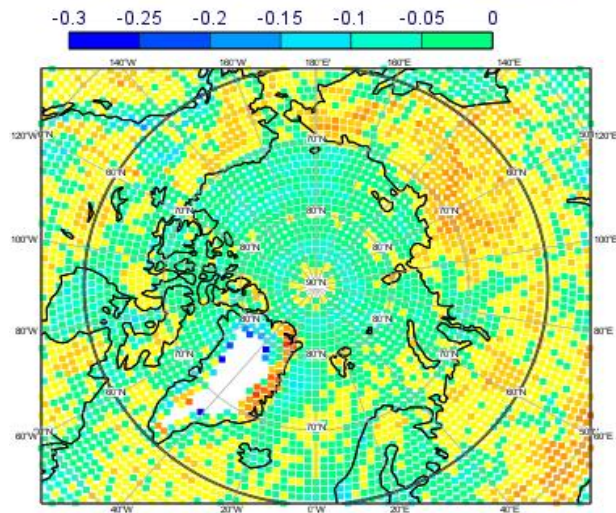


NOAA-15
AMSU-A channel 5
(peaks 500-700hPa)

a) AMSU-A channel 5 mean O - B summer

b) AMSU-A channel 5 mean O - B winter

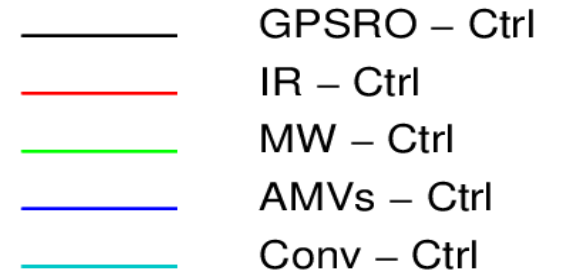
Obs - fc



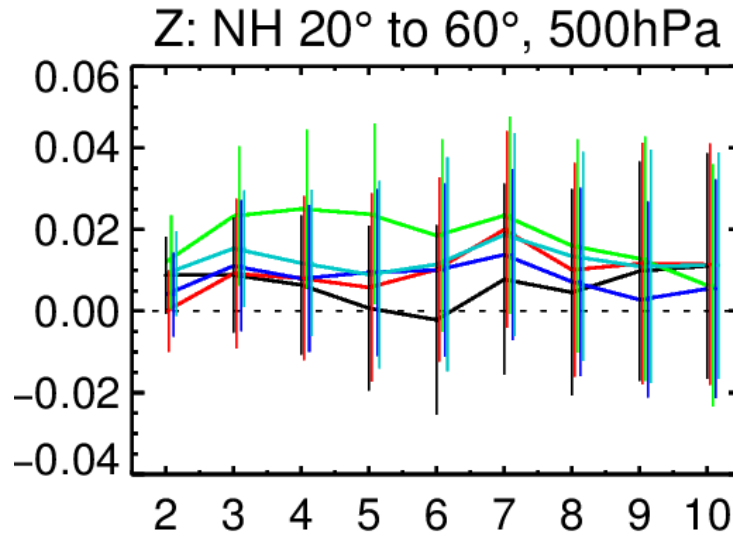
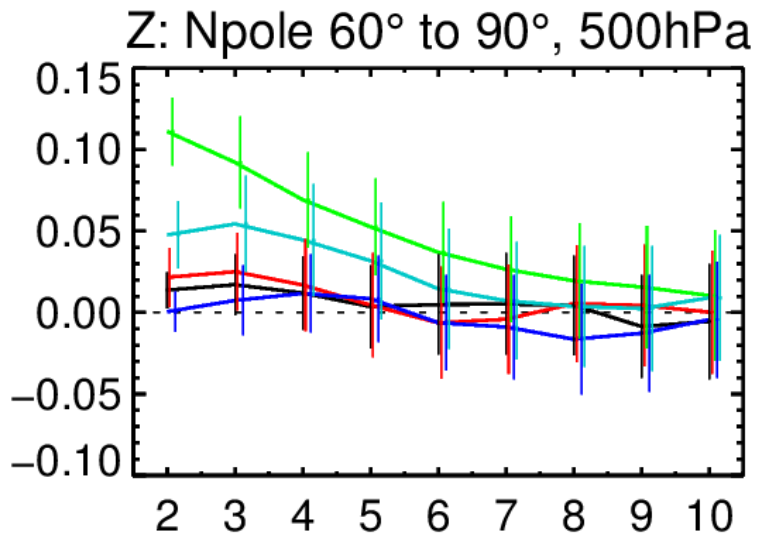
Excellent microwave and infrared sounder coverage from polar orbiting satellites.

Satellite data less well modelled in winter than summer leading to less data used.

Impact in the Arctic and Northern Mid-latitudes (OSE data denial)

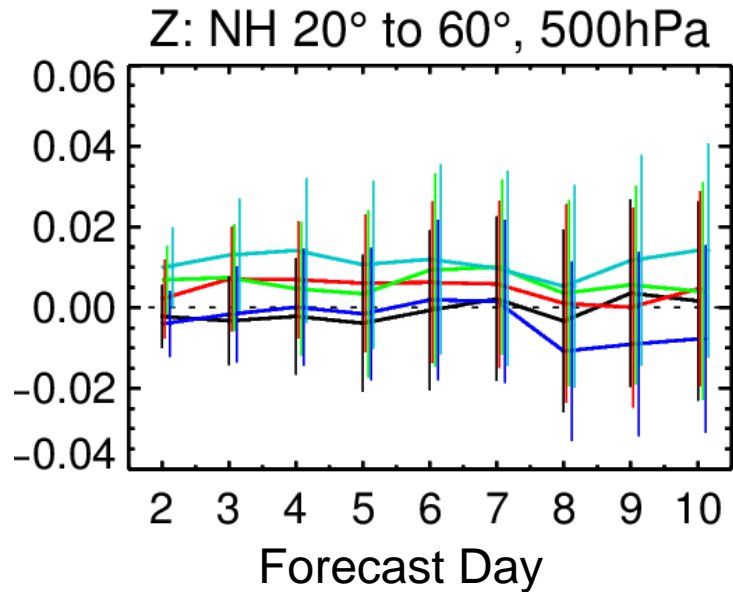
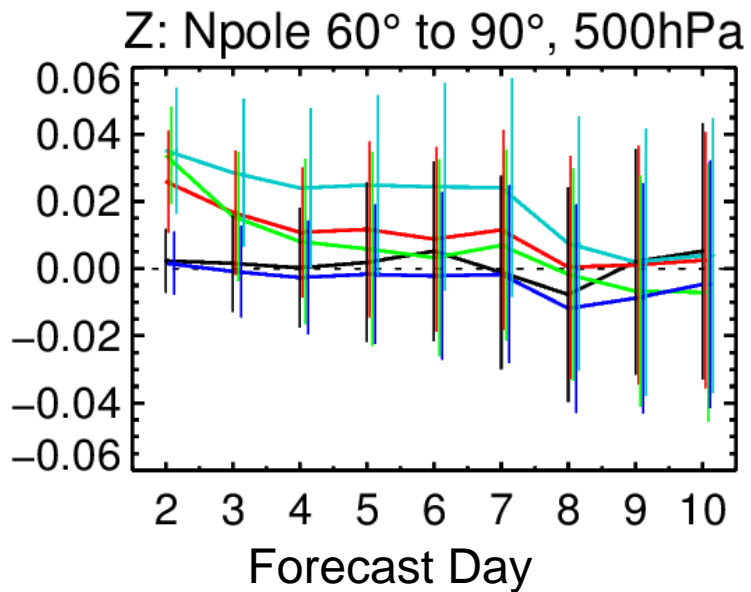


Normalised forecast score



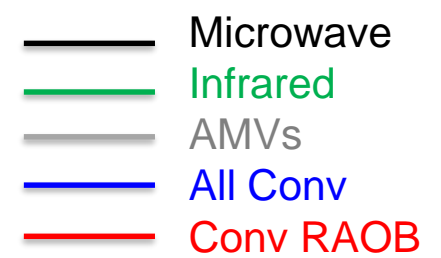
Summer

1. Microwave
2. Conventional
3. Infrared



Winter

1. Conventional
2. Infrared
3. Microwave

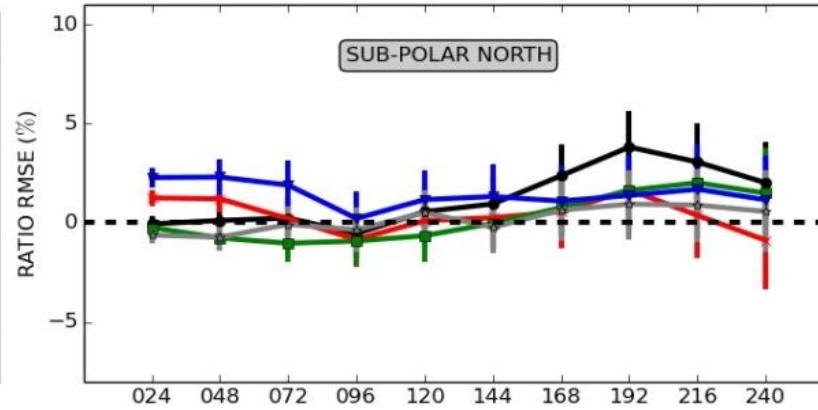
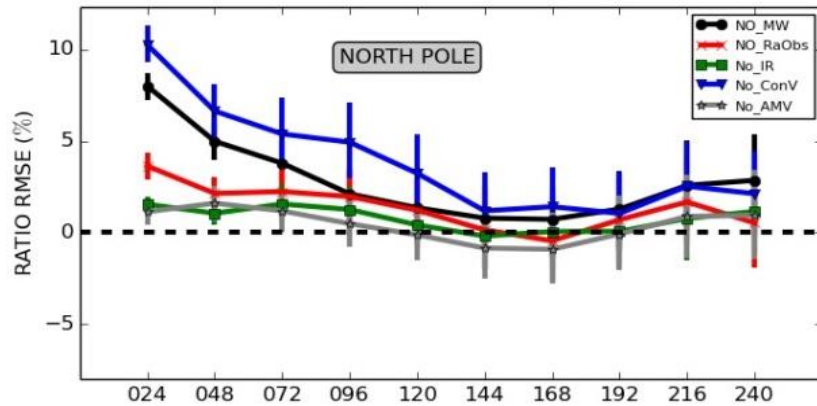


Impact in the Arctic and Northern Mid-latitudes (OSE data denial)

60 – 90 N

47 – 60 N

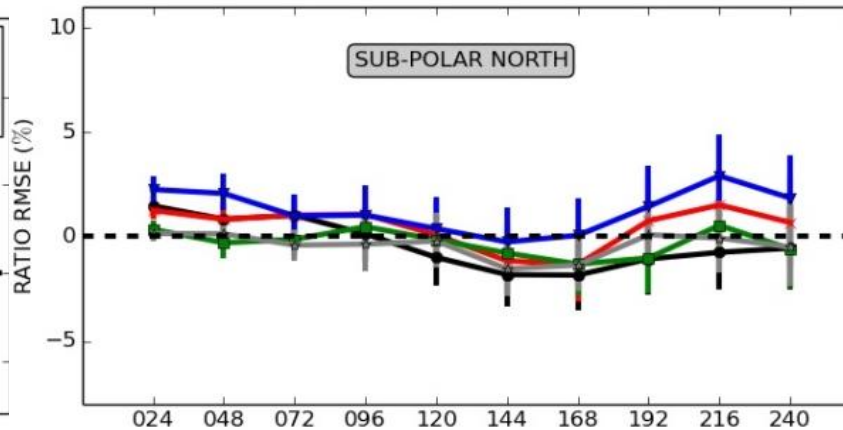
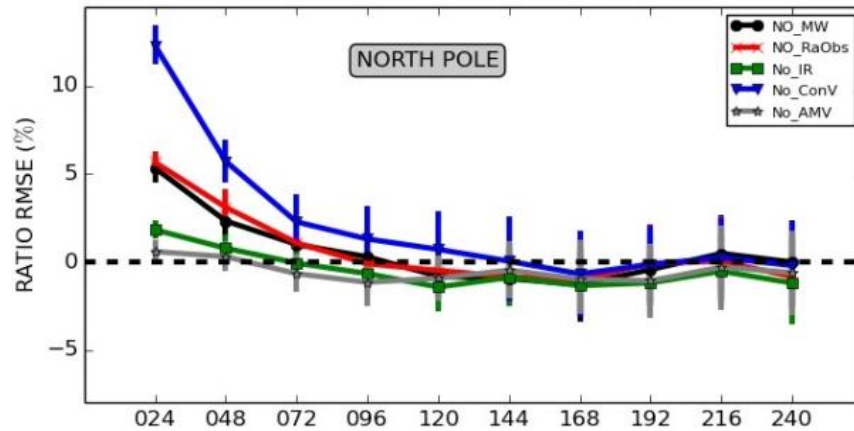
Summer 2018



Summer

1. Conventional
2. Microwave
3. Infrared

Winter 2018



Winter

1. Conventional
2. Infrared
3. Microwave

Normalized RMSE difference (%) for Z500



Conclusions

- Polar regions are **observation rich**, due to high density of **polar orbiter satellite data**
- Current polar observing systems benefit weather forecasts in the polar regions and **also middle latitudes**
- However, **satellite data is not fully exploited** in polar regions
- Evidence it is **better exploited in summer than winter**

IPETSUP-5 is invited to recognise that polar satellite observations are very valuable but may be under exploited at present, especially in winter.

IPETSUP-5 is further invited to consider how steps can be taken to increase satellite data use in polar regions, in particular taking advantage of current YOPP activities.

Extra slides

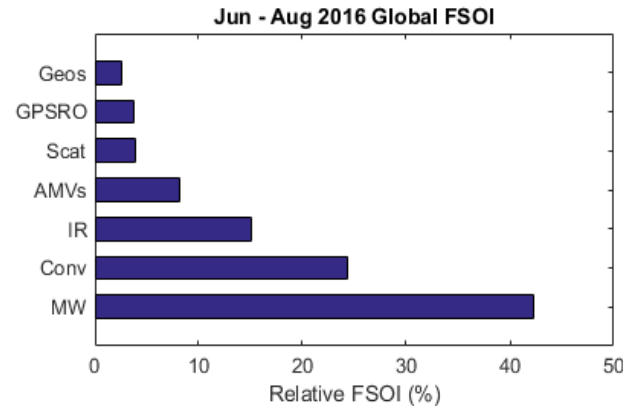
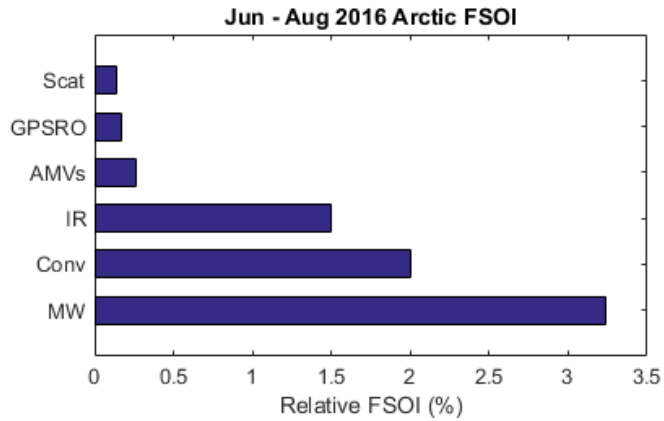
FSOI: Forecast Sensitivity to Observation Impact

Adjoint-based method of measuring observation impact (Cardinali, 2009)

Arctic:

Global:

summer



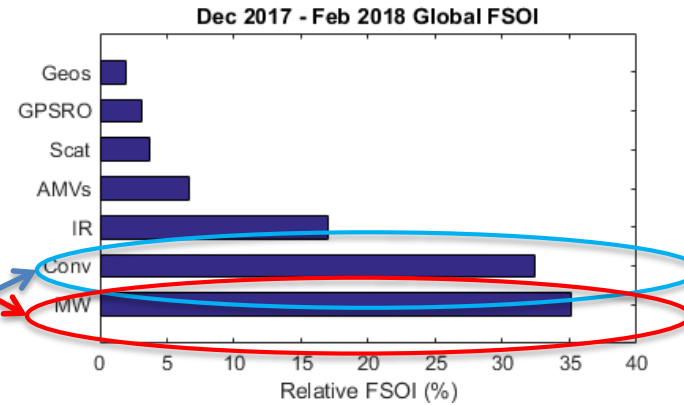
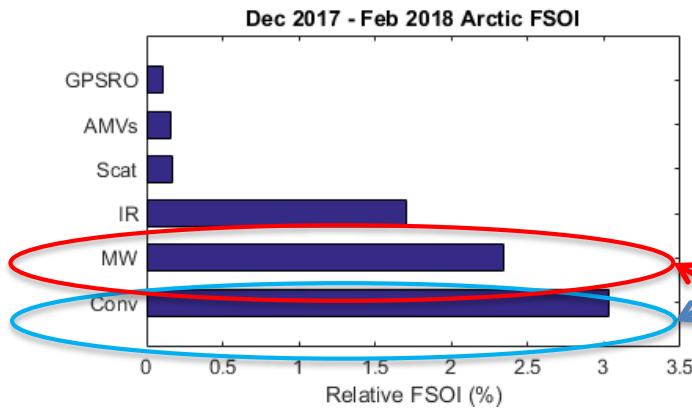
Globally:

1. Microwave
2. Conventional
3. IR

Arctic summer:

1. Microwave
2. Conventional
3. IR

winter



Arctic winter:

1. Conventional
2. Microwave
3. IR