Usage of IASI at global NWP centres and intercomparison of IASI impact assessment

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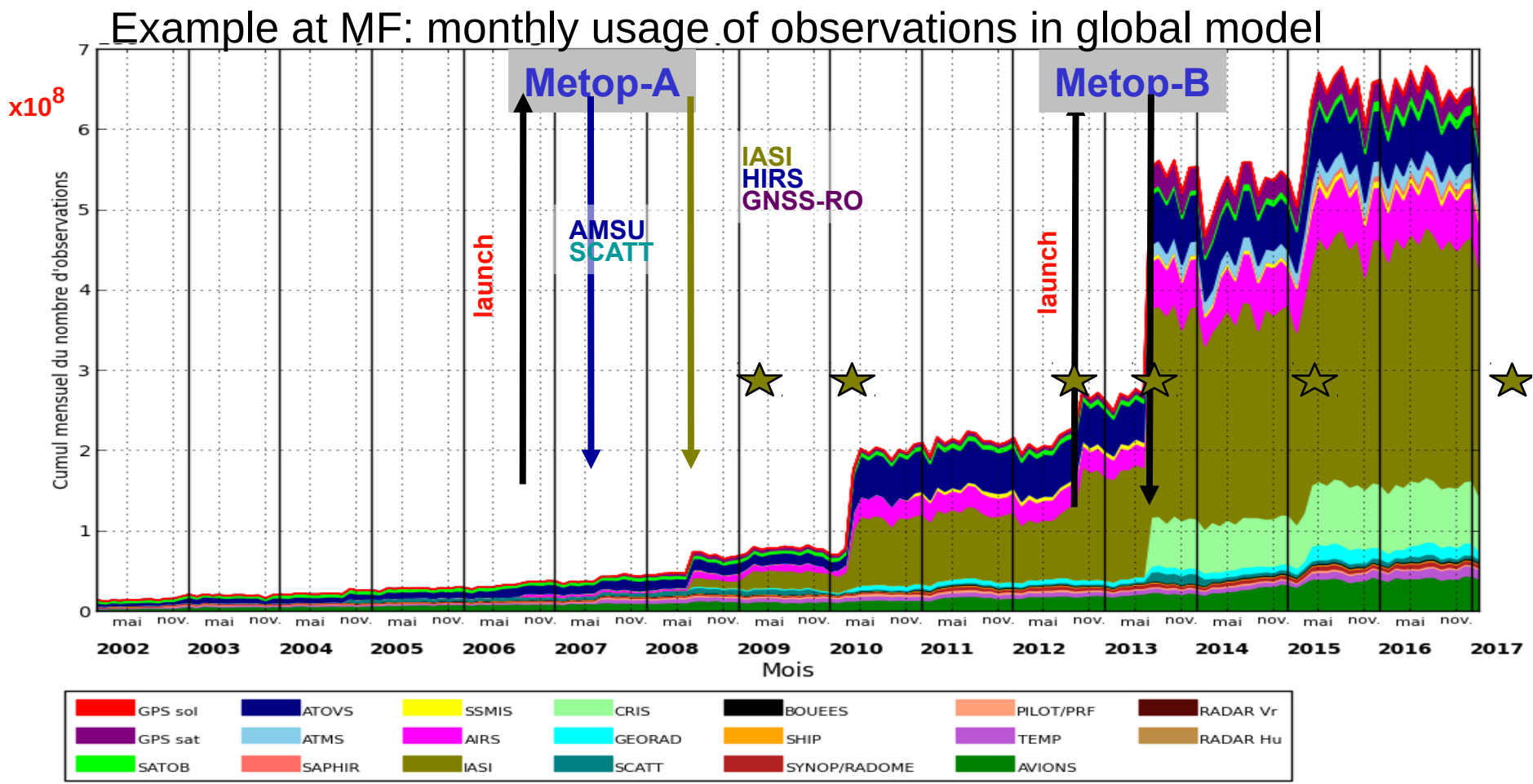
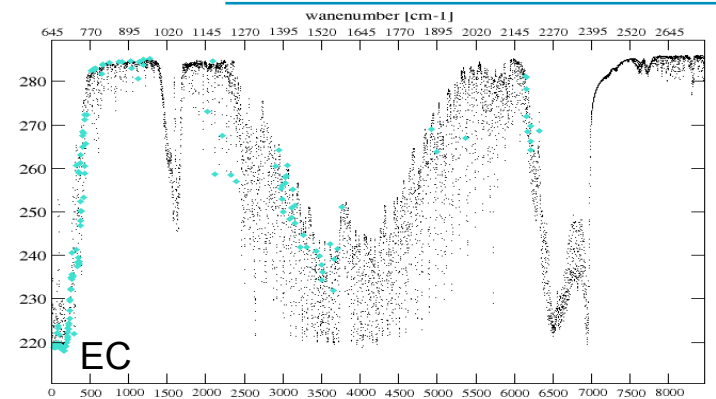
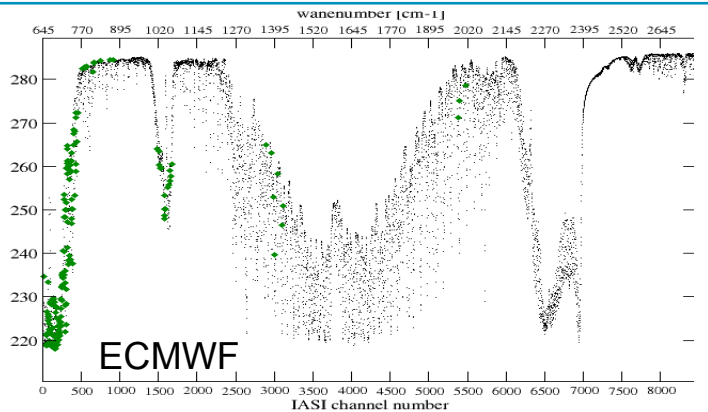
ITSC-21, Darmstadt, Germany

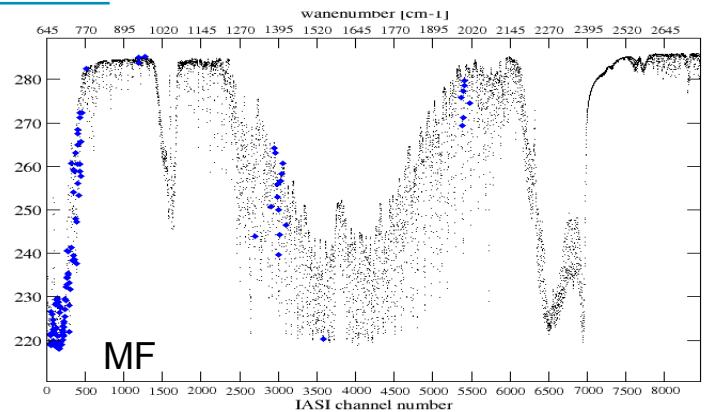
IASI, a key player in global NWP models

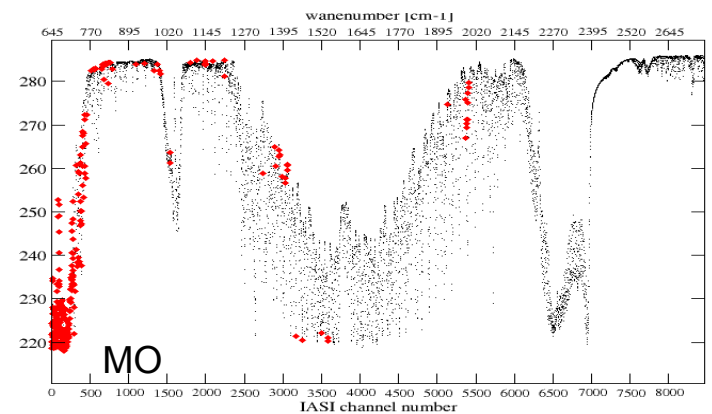


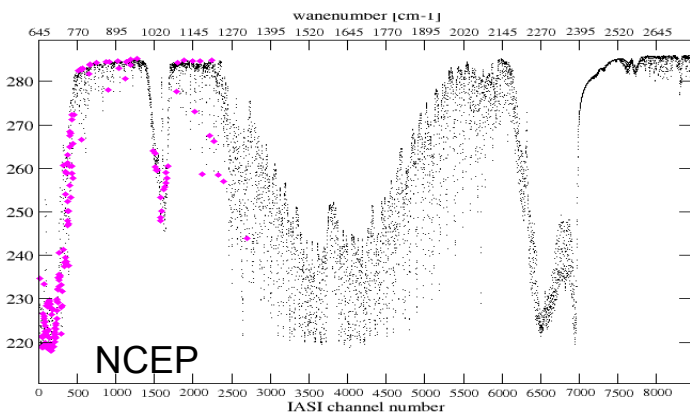
Channels used in global NWP models

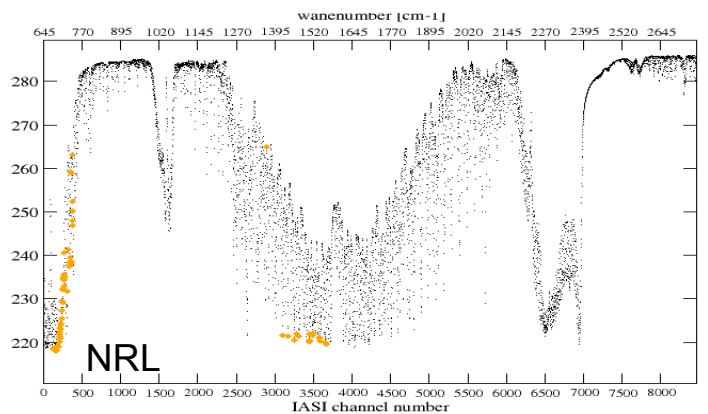








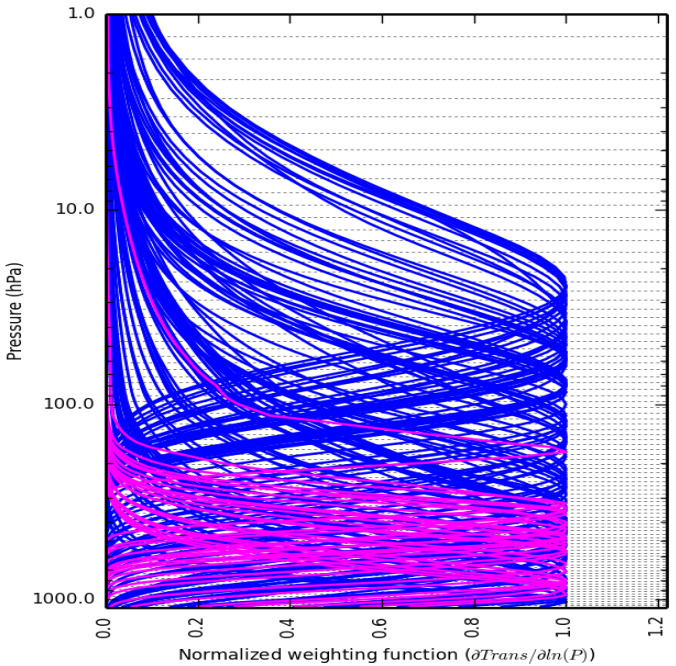




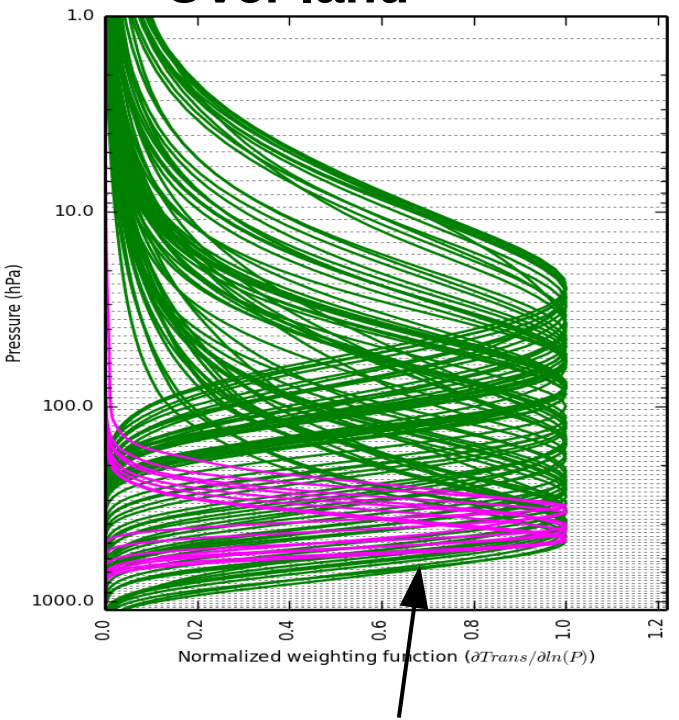
Channel selection – example at Météo-France

Which channels were assimilated in 2015 ?

Over sea



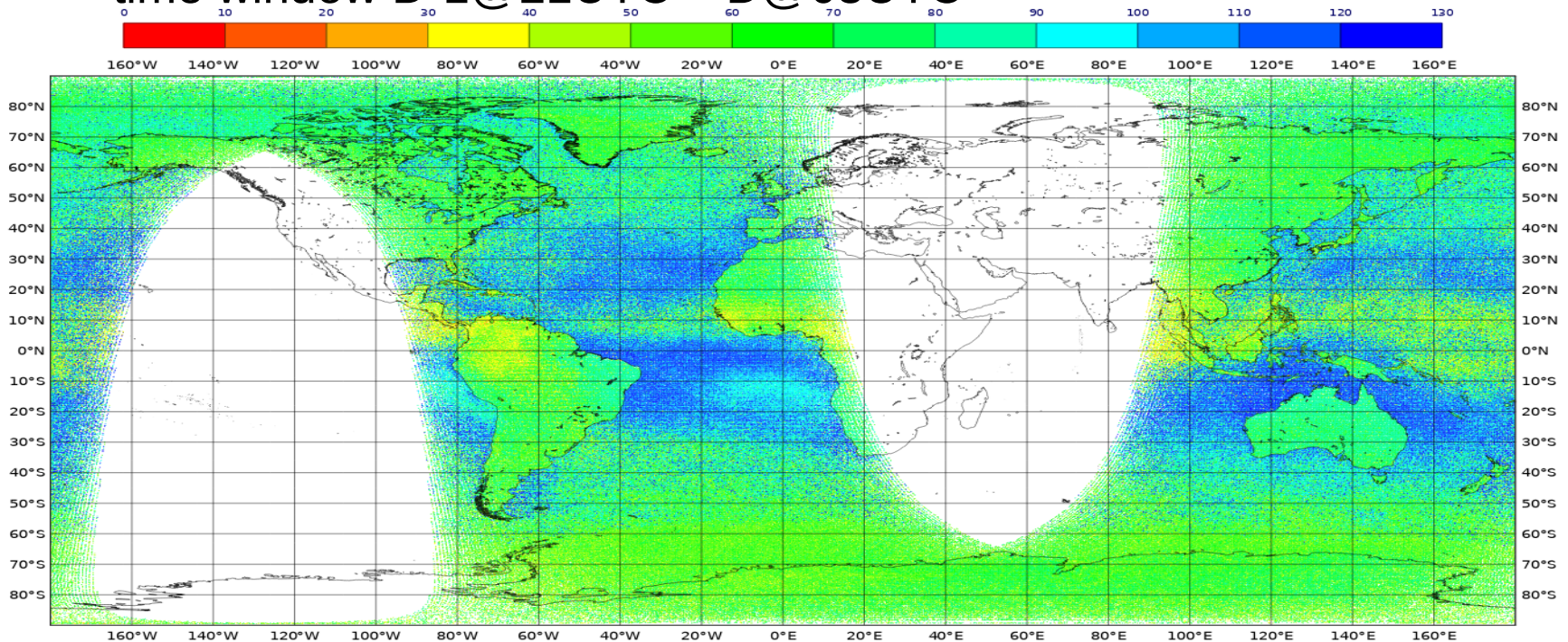
Over land



No surface-sensitive channel over land

IASI data coverage

Example at MF:
Average number of channels assimilated per pixel over 3 months time window D-1@21UTC – D@03UTC

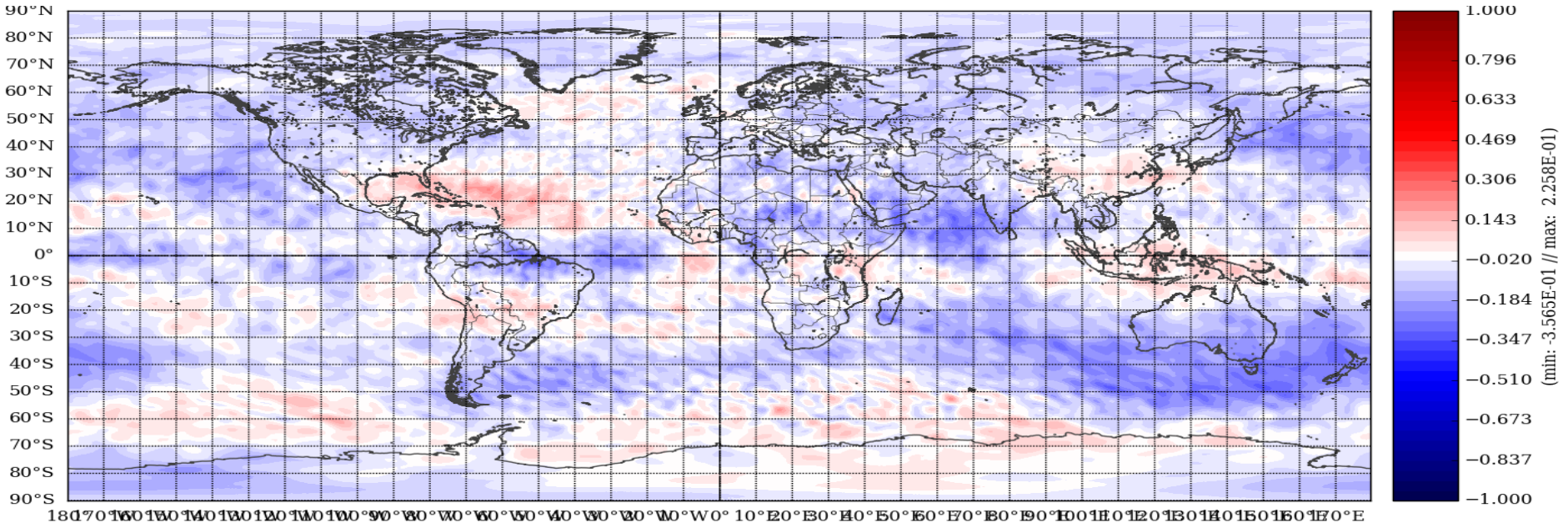


Experimental design

- **3-month assimilation experiments** in global NWP models from 1 August 2015 to 31 October 2015
  - **Control**
    - Also called **IASI** hereafter, should corresponds to **operational** version
  - **Denial**
    - Also called **noIASI** hereafter
    - Control minus IASI data

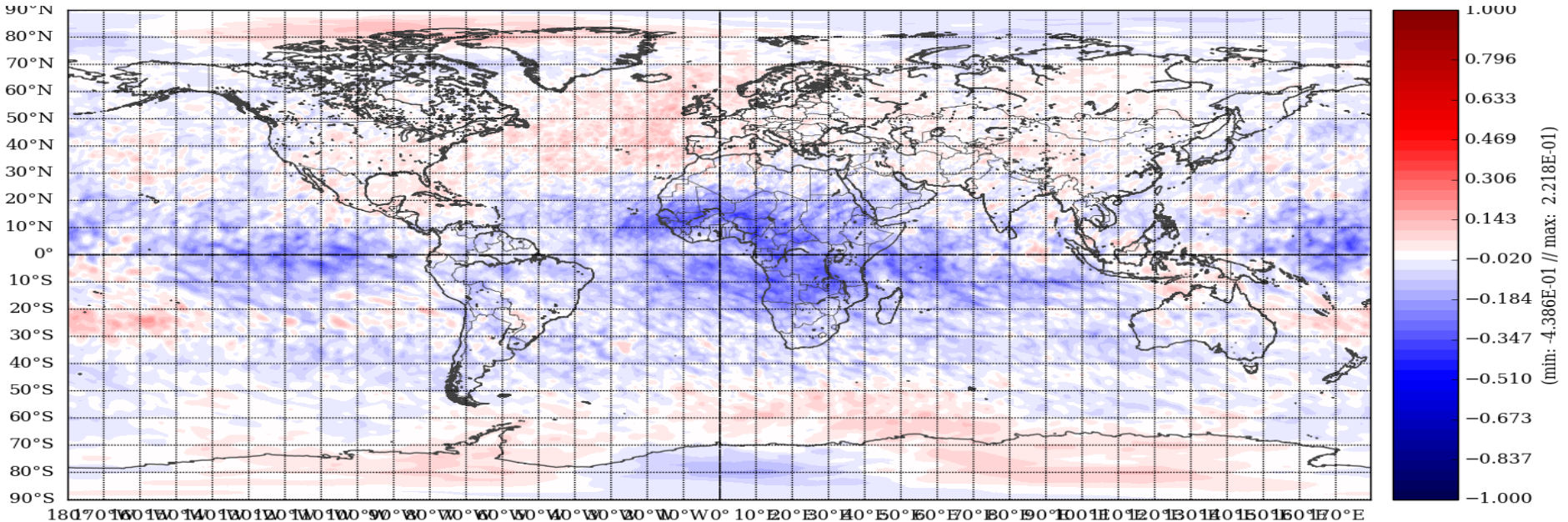
Difference of +24h forecasts – T at 10 hPa

Average difference of +24h forecasts (over 3 months)
IASI minus noIASI (MF)



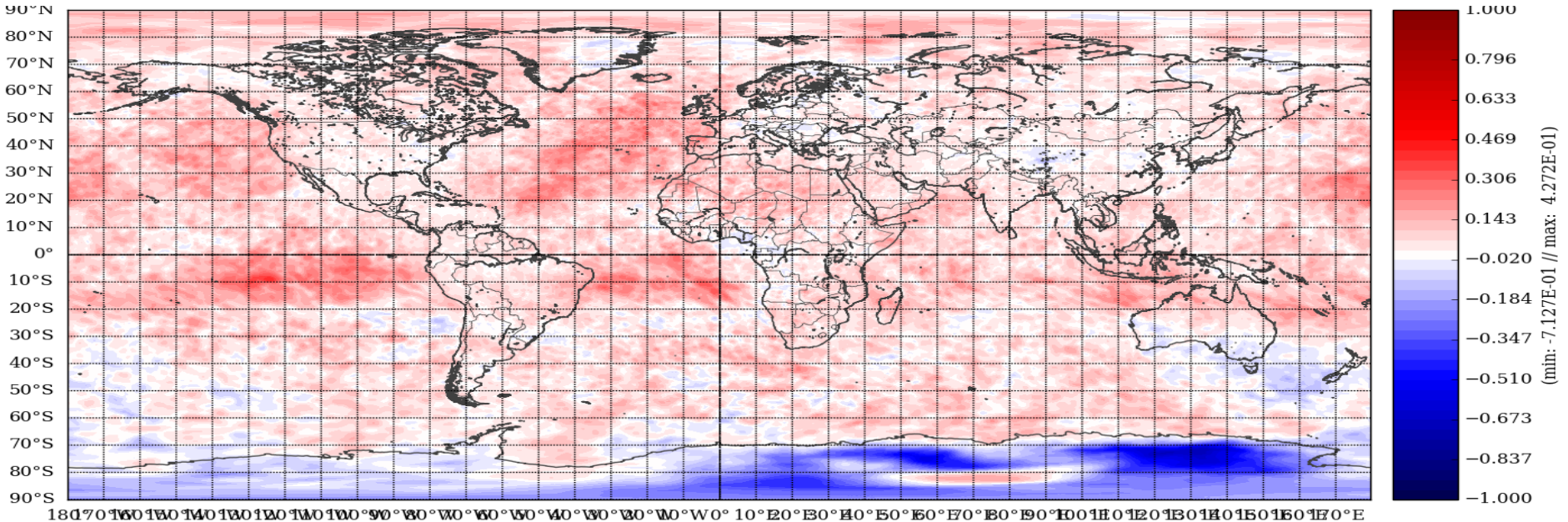
Difference of +24h forecasts – T at 100 hPa

Average difference of +24h forecasts (over 3 months)
IASI minus noIASI (MF)



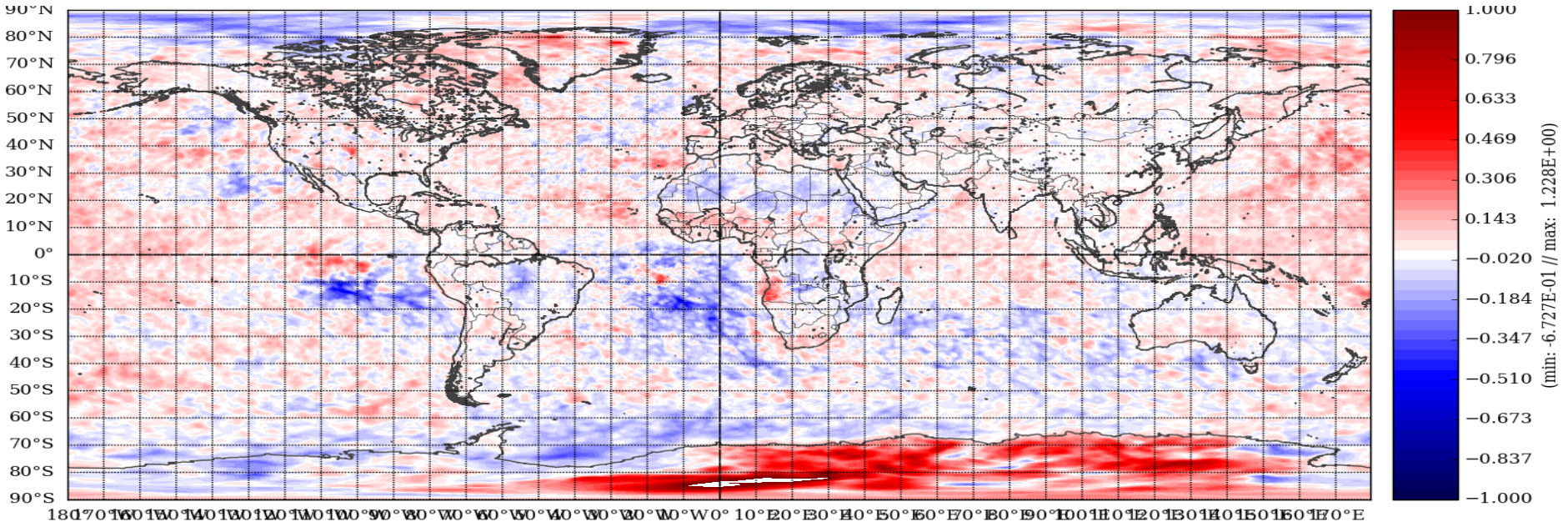
Difference of +24h forecasts – T at 500 hPa

Average difference of +24h forecasts (over 3 months)
IASI minus noIASI (MF)



Difference of +24h forecasts – T at 850 hPa

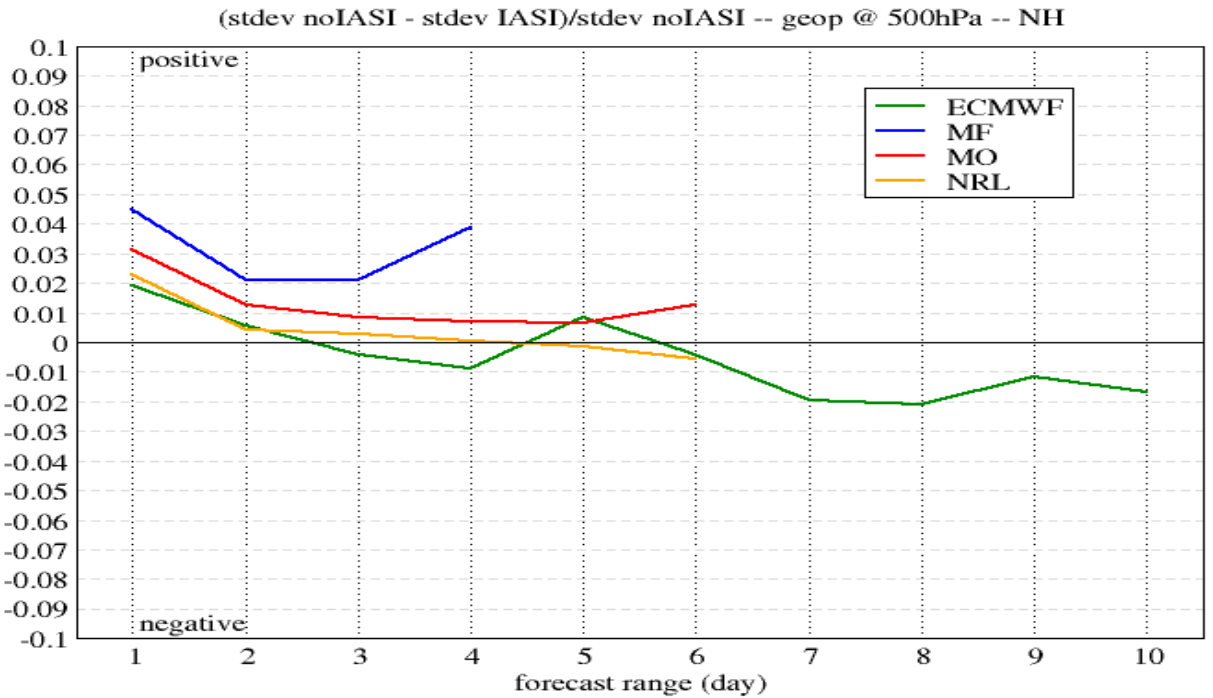
Average difference of +24h forecasts (over 3 months)
IASI minus noIASI (MF)



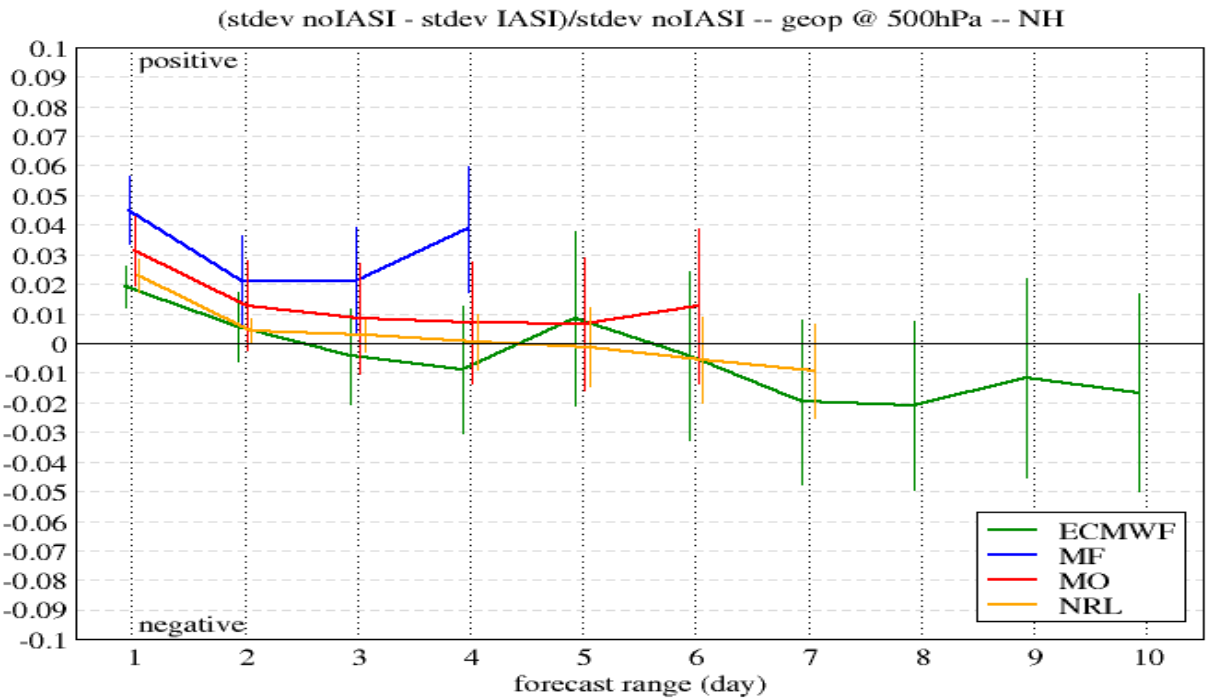
Setup

- **3-month assimilation experiments** in global NWP models
  from 1 August 2015 to 31 October 2015
  - **Control**
    - Also called **IASI** hereafter, should corresponds to **operational** version
  - **Denial**
    - Also called **noIASI** hereafter
    - Control minus IASI data
- Verification
  - Stdev IASI =
    Standard deviation of (control forecast minus control analysis)
  - Stdev noIASI =
    Standard deviation of (denial forecast minus control analysis)
  - Relative reduction of standard deviation wrt to control analysis =
    (Stdev noIASI – Stdev IASI) / Stdev noIASI
    positive value = IASI improves forecast

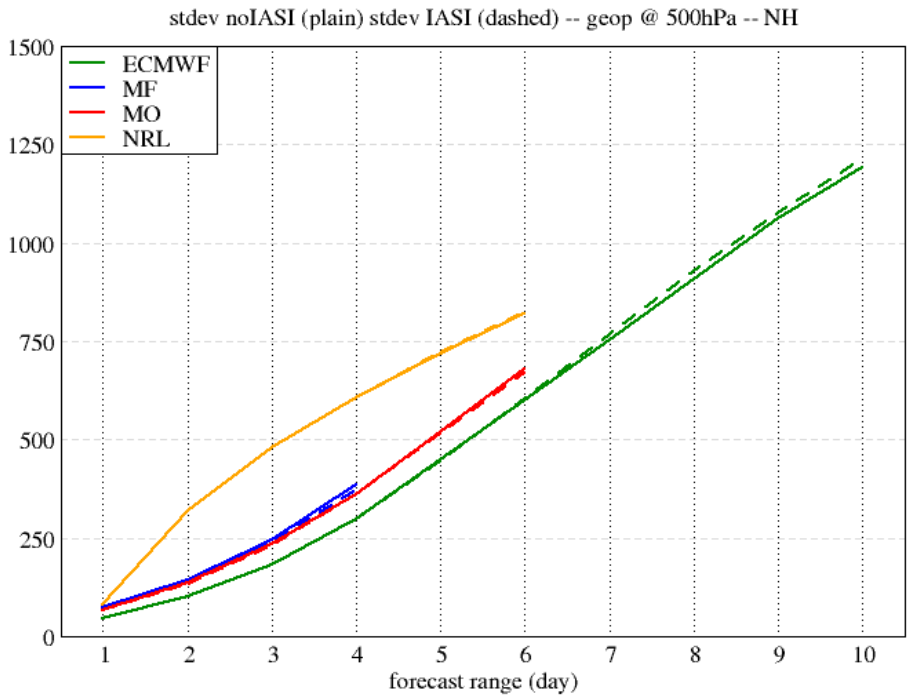
Relative reduction of standard deviation wrt control analysis – Z @ 500 hPa NH



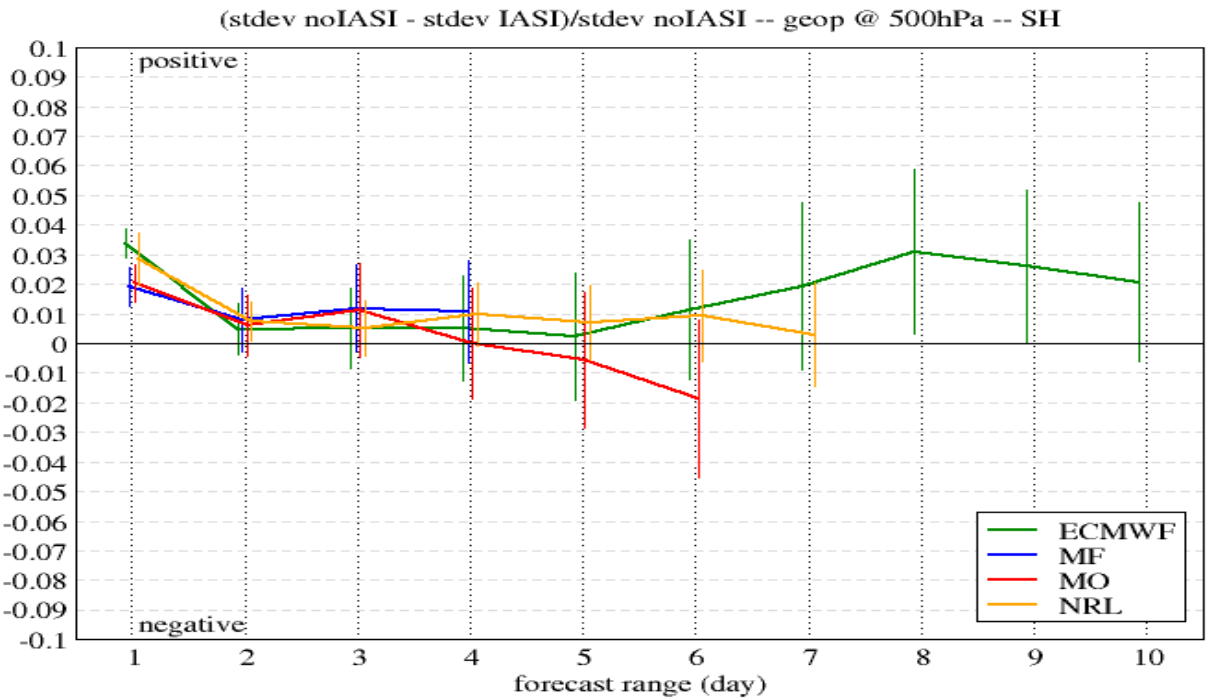
Relative reduction of standard deviation wrt control analysis – Z @ 500 hPa NH



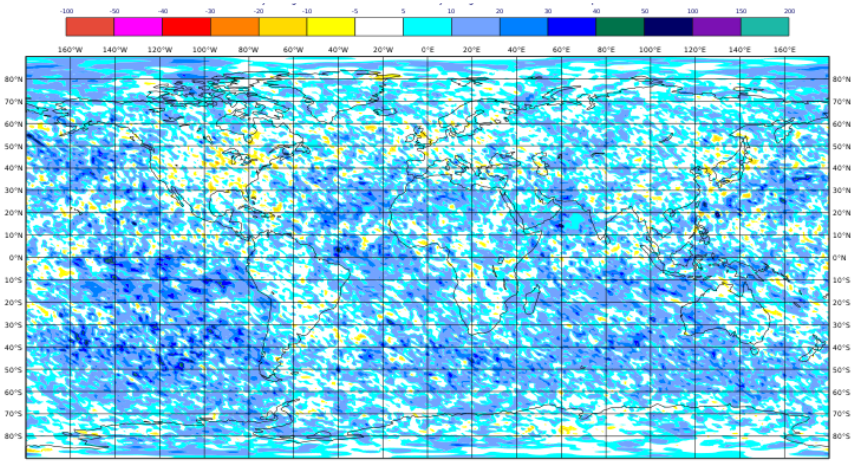
standard deviation wrt control analysis – Z @ 500 hPa NH



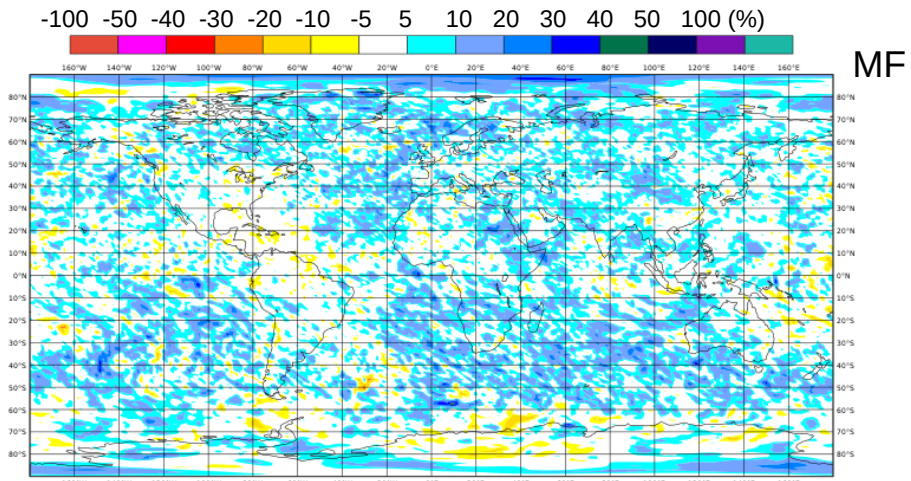
Relative reduction of standard deviation wrt control analysis – Z @ 500 hPa SH



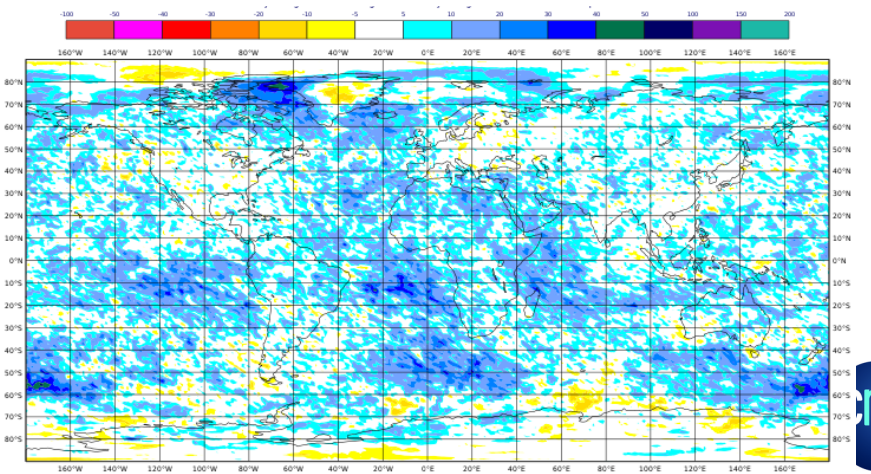
Relative reduction of stdev T @ 150 – D+1



ECMWF



MF



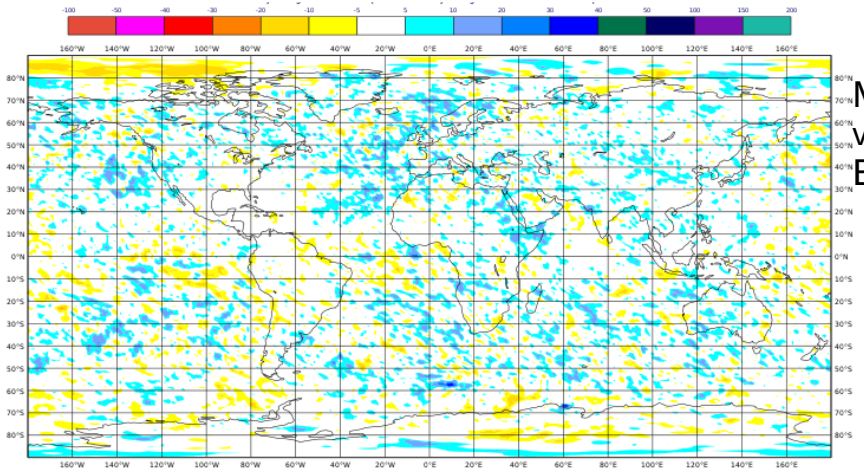
MO

Relative reduction of stdev T @ 150 – D+1

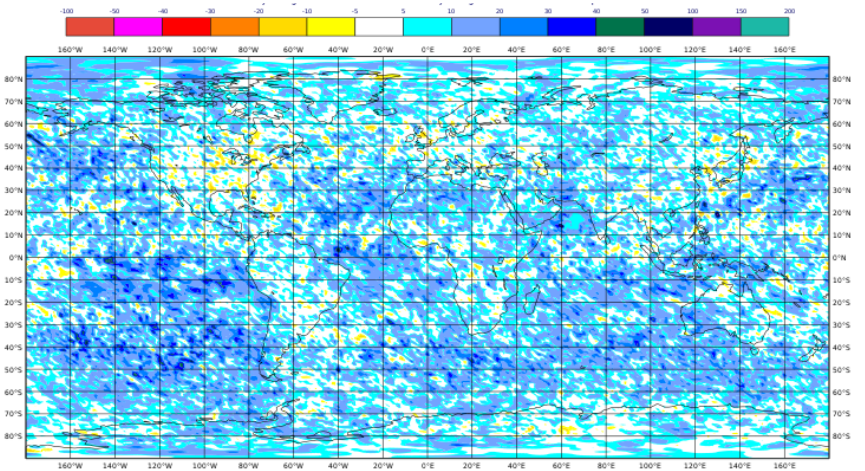
- MF means MF vs MF
  - Stdev IASI =
    Standard deviation of (MF control forecast minus MF control analysis)
  - Stdev noIASI =
    Standard deviation of (MF denial forecast minus MF control analysis)
  - Relative reduction of standard deviation **wrt to MF (own) control analysis** =
    (Stdev noIASI – Stdev IASI) / Stdev noIASI

- Should evaluate the impact of the verifying analysis!
  MF vs ECMWF
  - Stdev IASI =
    Standard deviation of (MF control forecast minus ECMWF control analysis)
  - Stdev noIASI =
    Standard deviation of (MF denial forecast minus ECMWF control analysis)
  - Relative reduction of standard deviation **wrt to ECMWF control analysis** =
    (Stdev noIASI – Stdev IASI) / Stdev noIASI

Relative reduction of stdev T @ 150 – D+1

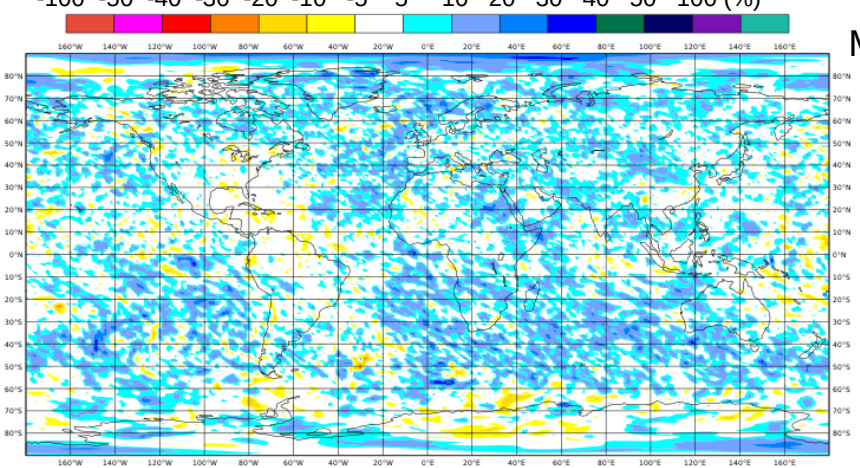


MF
vs
ECMWF



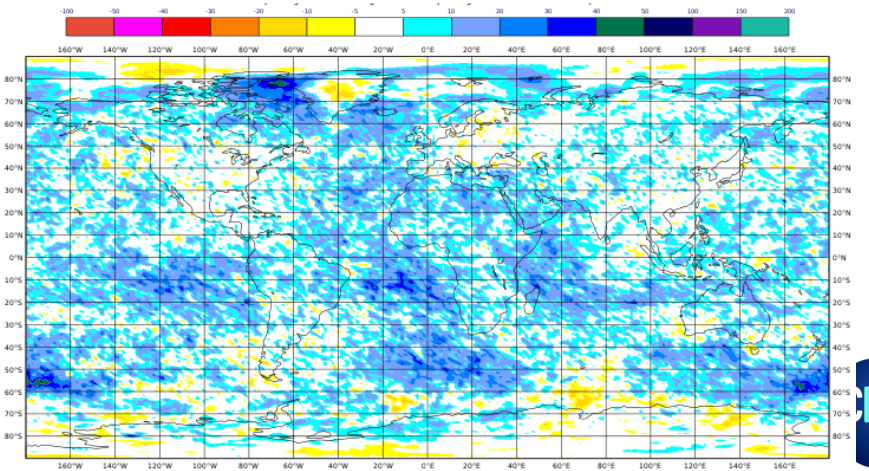
ECMWF

-100 -50 -40 -30 -20 -10 -5 5 10 20 30 40 50 100 (%)

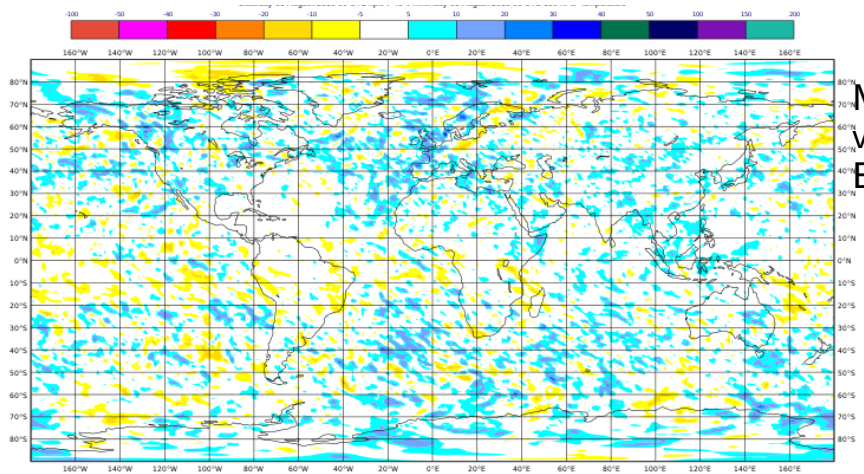


MF

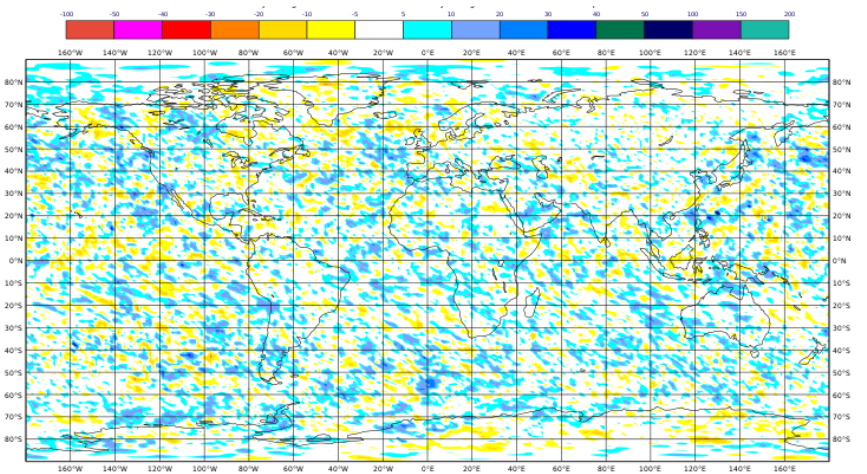
MO



Relative reduction of stdev T @ 150 – D+2

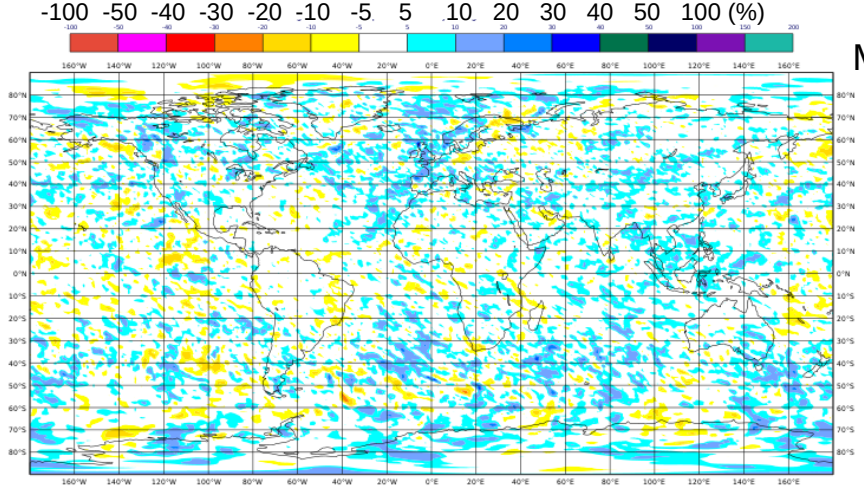


MF
vs
ECMWF

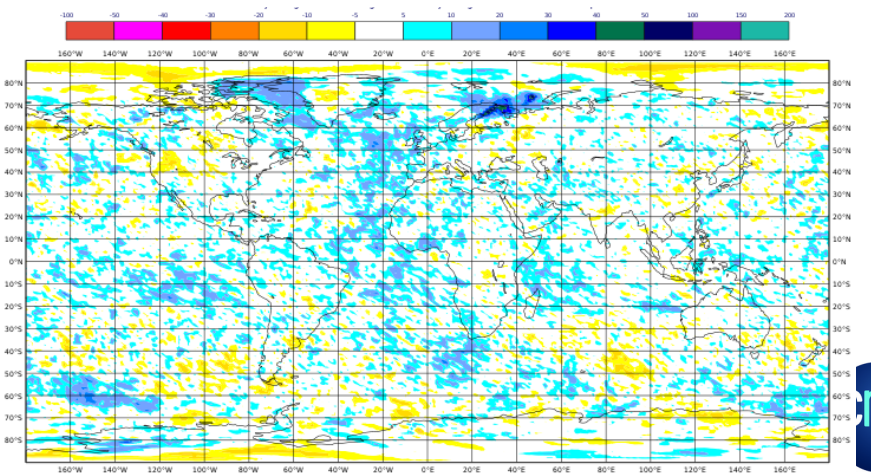


ECMWF

-100 -50 -40 -30 -20 -10 -5 5 10 20 30 40 50 100 (%)

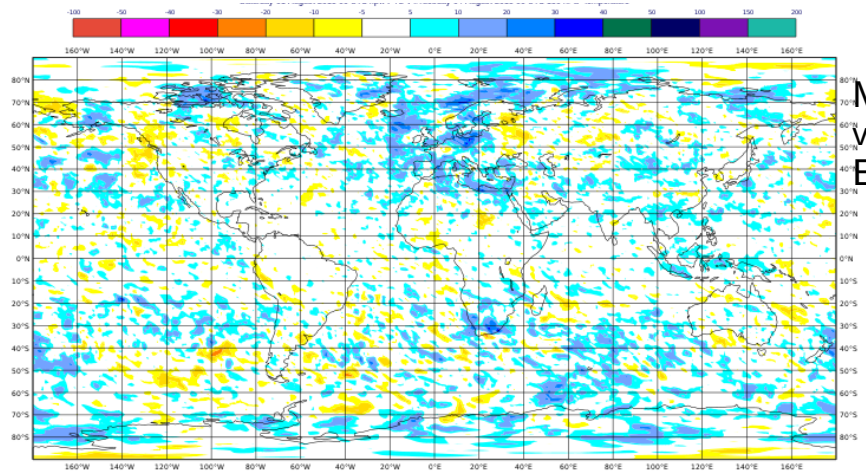


MF

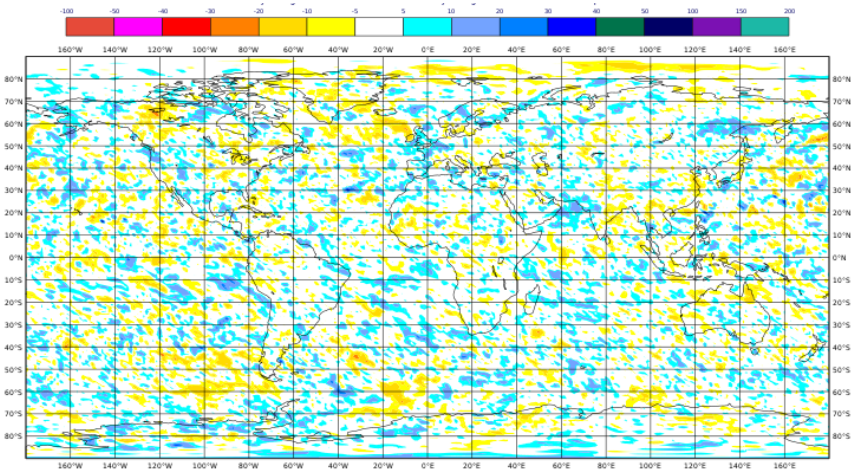


MO

Relative reduction of stdev T @ 150 – D+3

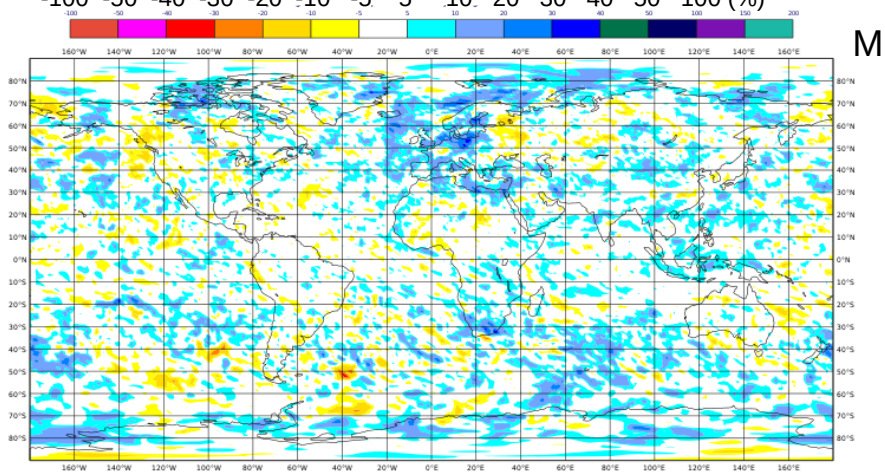


MF
vs
ECMWF



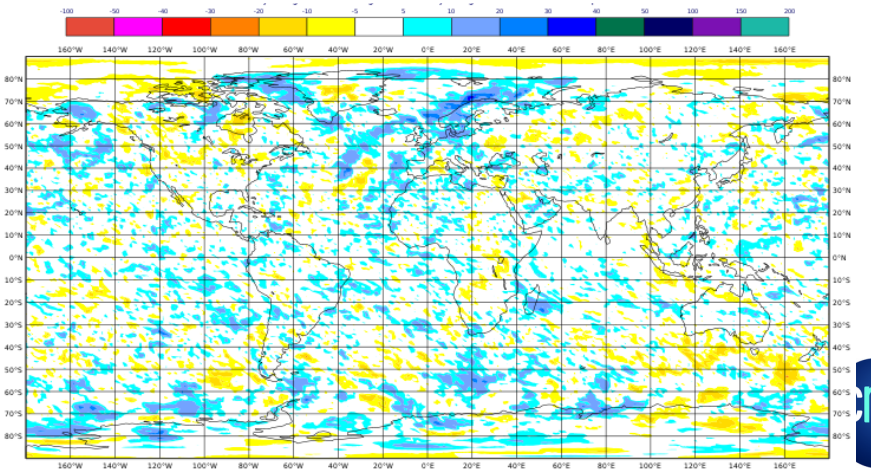
ECMWF

-100 -50 -40 -30 -20 -10 -5 5 10 20 30 40 50 100 (%)

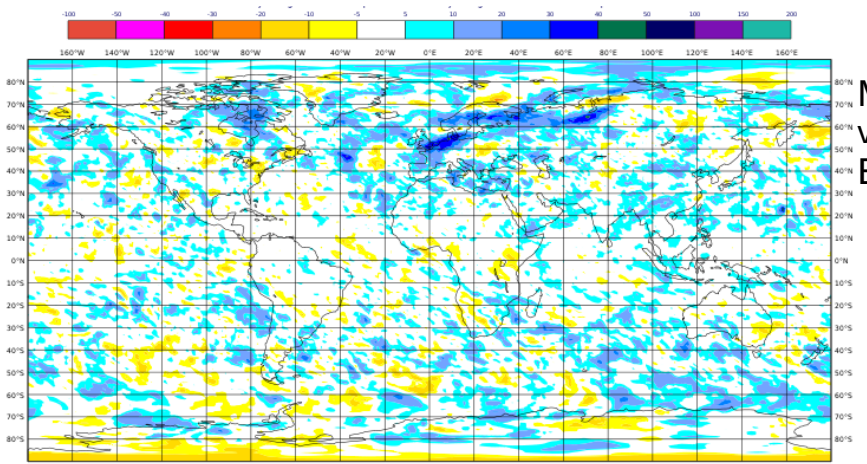


MF

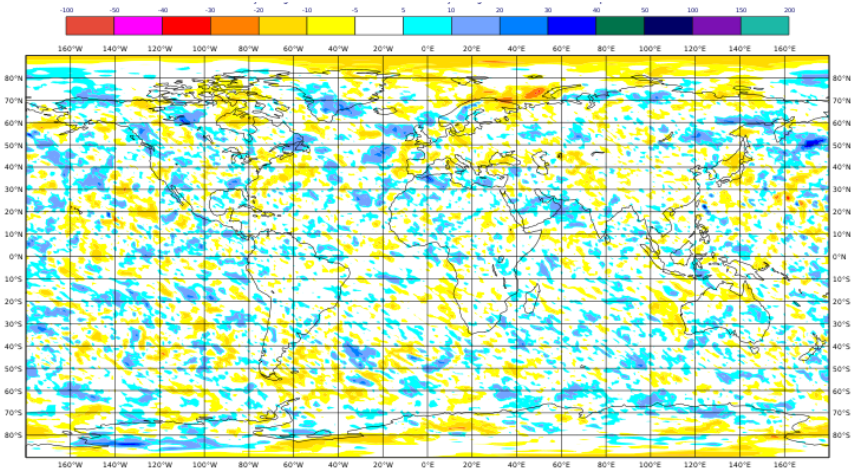
MO



Relative reduction of stdev T @ 150 – D+4

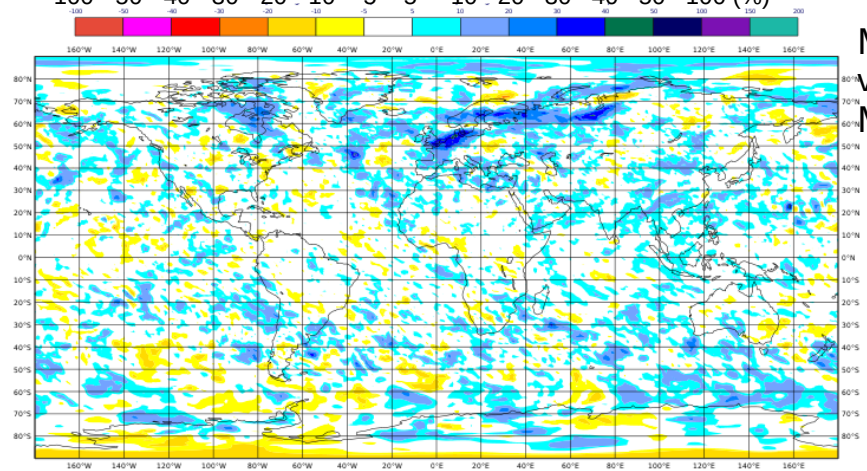


MF vs ECMWF

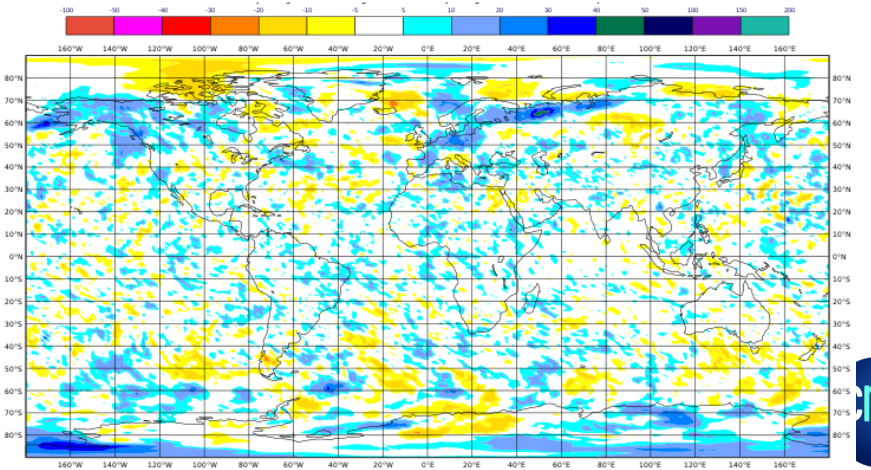


ECMWF

-100 -50 -40 -30 -20 -10 -5 5 10 20 30 40 50 100 (%)

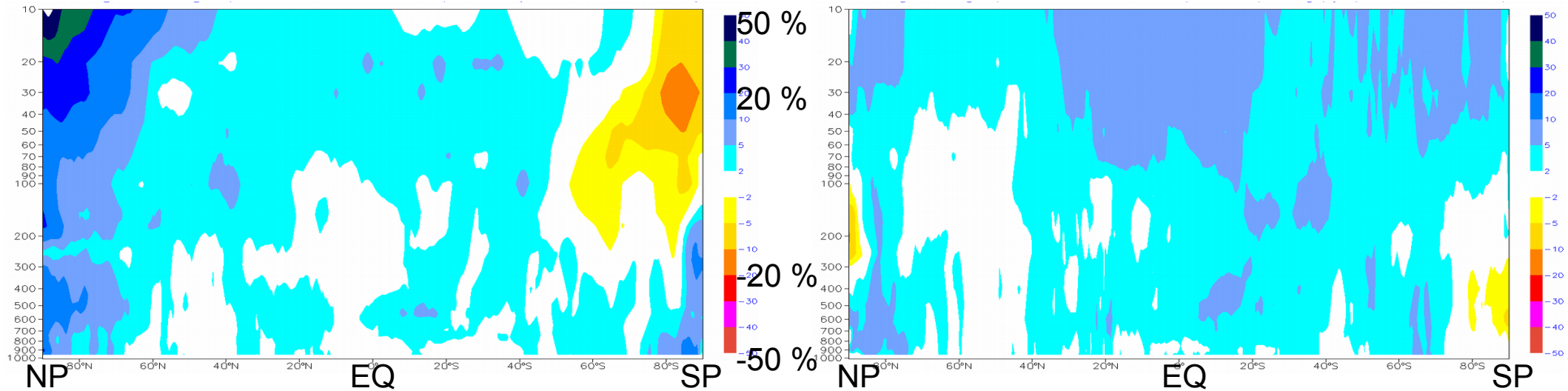


MF vs MF



MO

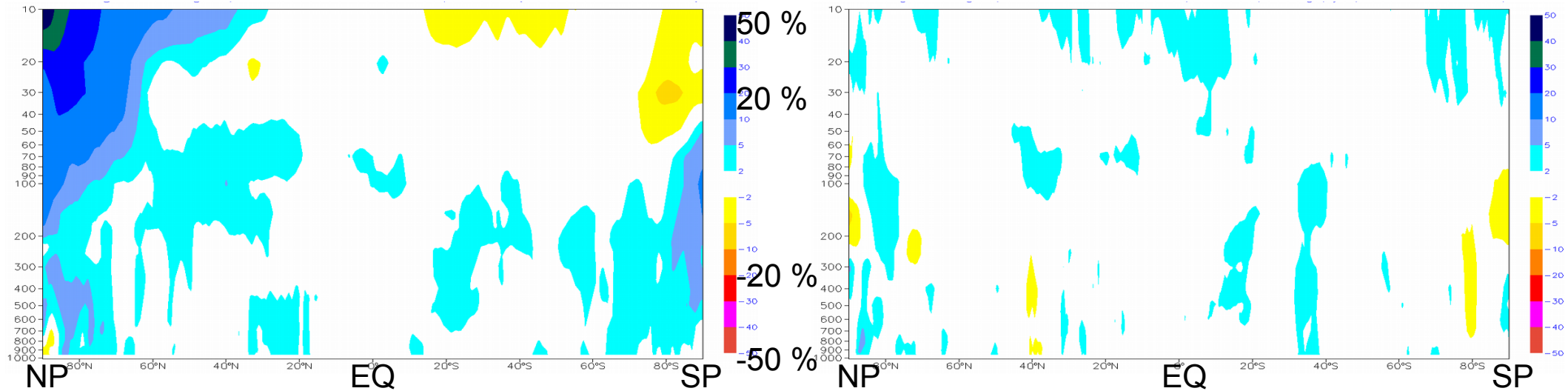
Relative reduction of standard deviation wrt to control analysis – Z – D+1 – zonal average



MF

ECMWF

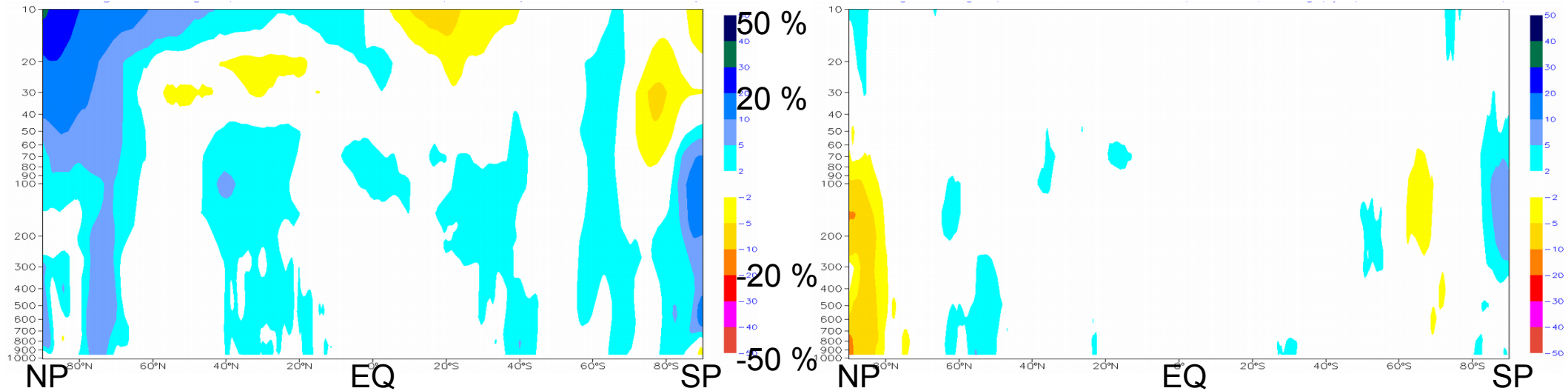
Relative reduction of standard deviation wrt to control analysis – Z – D+2 – zonal average



MF

ECMWF

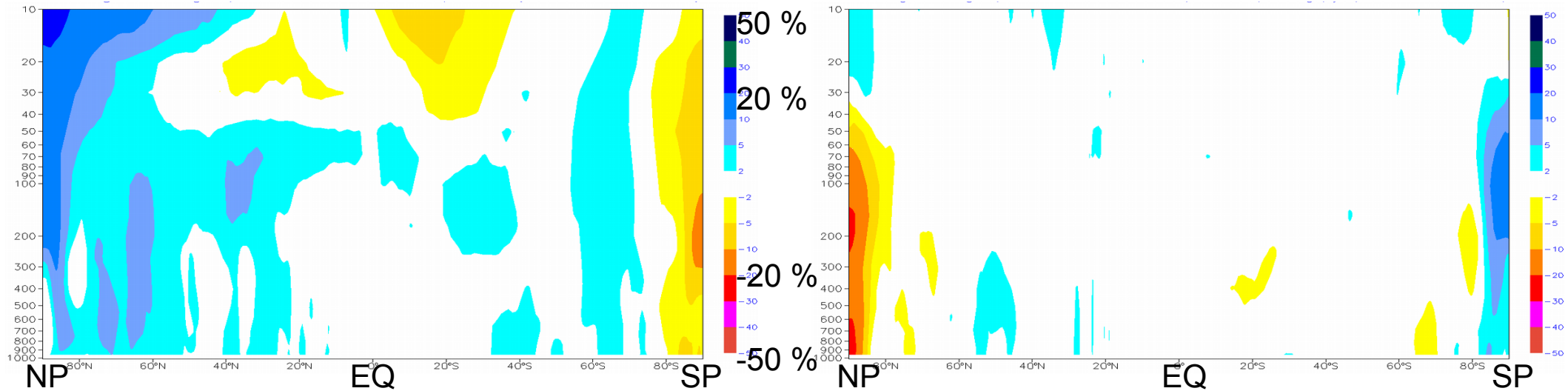
Relative reduction of standard deviation wrt to control analysis – Z – D+3 – zonal average



MF

ECMWF

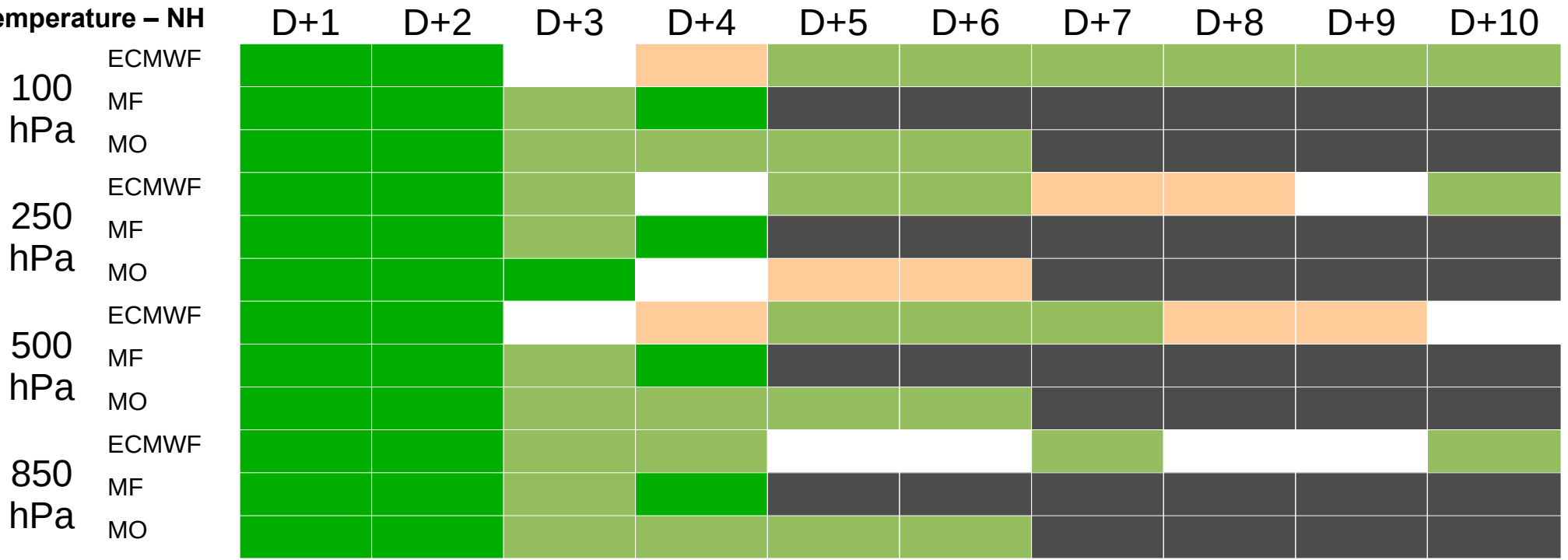
Relative reduction of standard deviation wrt to control analysis – Z – D+4 – zonal average



MF

ECMWF

Temperature – NH



No data

Positive impact – statistically significant

Positive impact – not statistically significant

Neutral impact

Negative impact – not statistically significant

Negative impact – statistically significant

Summary

- **3-month assimilation experiments** in global NWP models from 1 August 2015 to 31 October 2015
  - Many NWP centres participated
  - Lots of statistics still to compile

- IASI definitely has a positive impact on top of the whole observing systems used at NWP centres

  but result presentation is not straightforward

Summary

- **3-month assimilation experiments** in global NWP models from 1 August 2015 to 31 October 2015
  - Many NWP centres participated
  - Lots of statistics still to compile

- IASI definitely has a positive impact on top of the whole observing systems used at NWP centres

ving kitten pictures would be easier...

Summary

- **3-month assimilation experiments** in global NWP models from 1 August 2015 to 31 October 2015
  - Many NWP centres participated
  - Lots of statistics still to compile
- IASI definitely has a positive impact on top of the whole observing systems used at NWP centres

  but result presentation is not straightforward
- An article to be submitted Q2 2018