Verification scores including polar verification

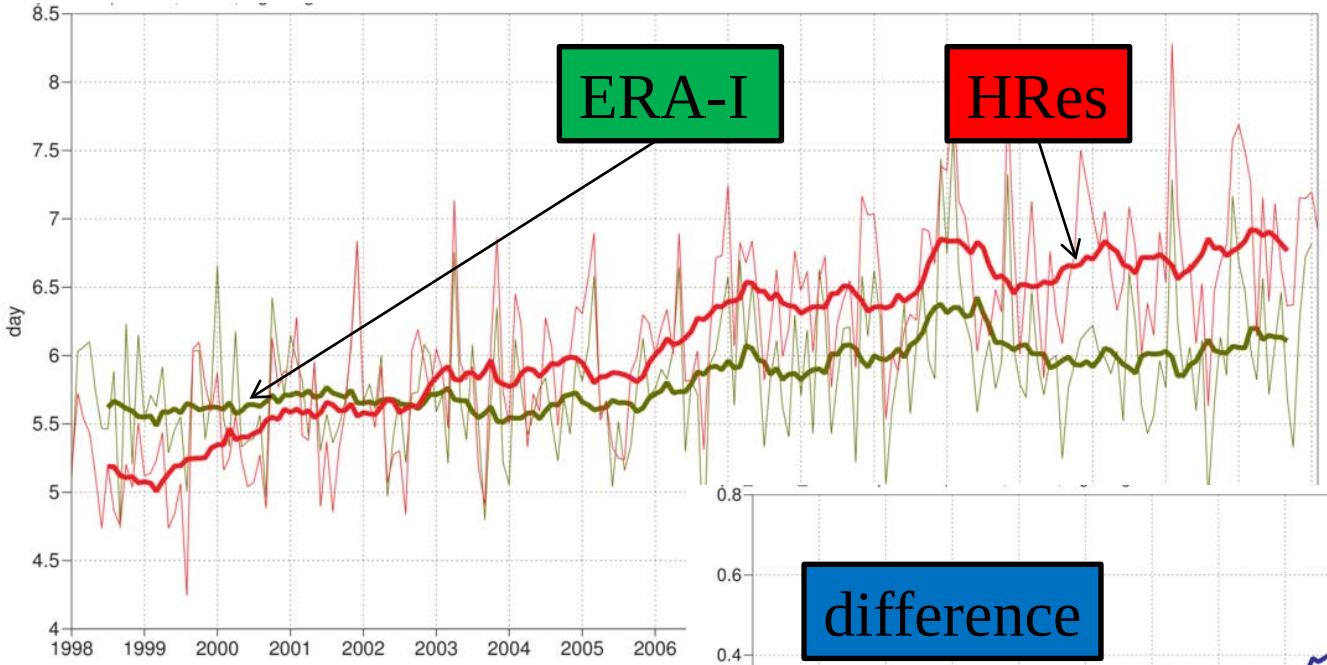
Jean-Noël Thépaut - ECMWF

- **Scores evolution between 2000 and 2015**
- **Update on ECMWF: WMO Lead Centre for Deterministic Forecast Verification**
- **Polar verification**

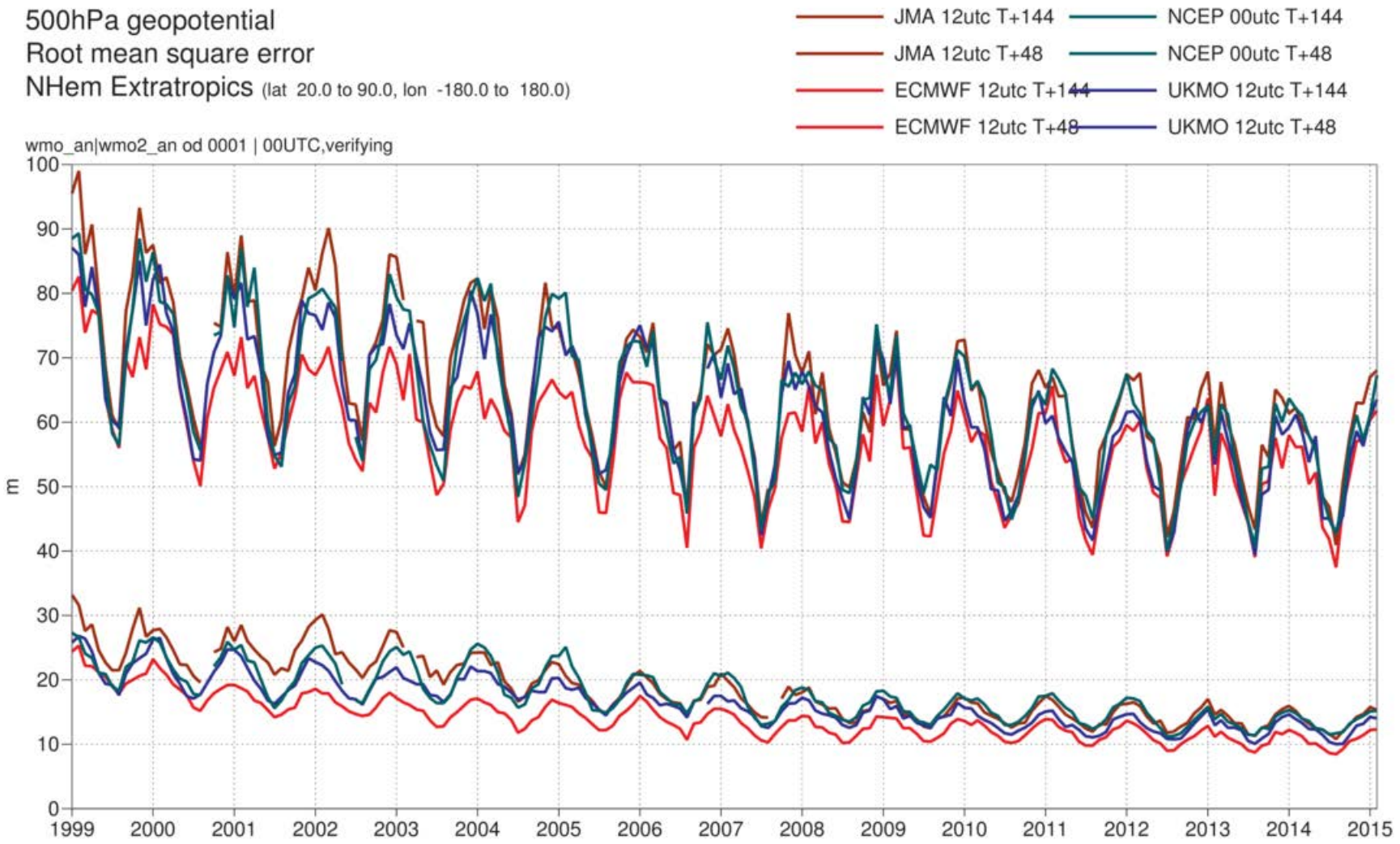
Acknowledgements: Martin Janousek, David Richardson

ECMWF

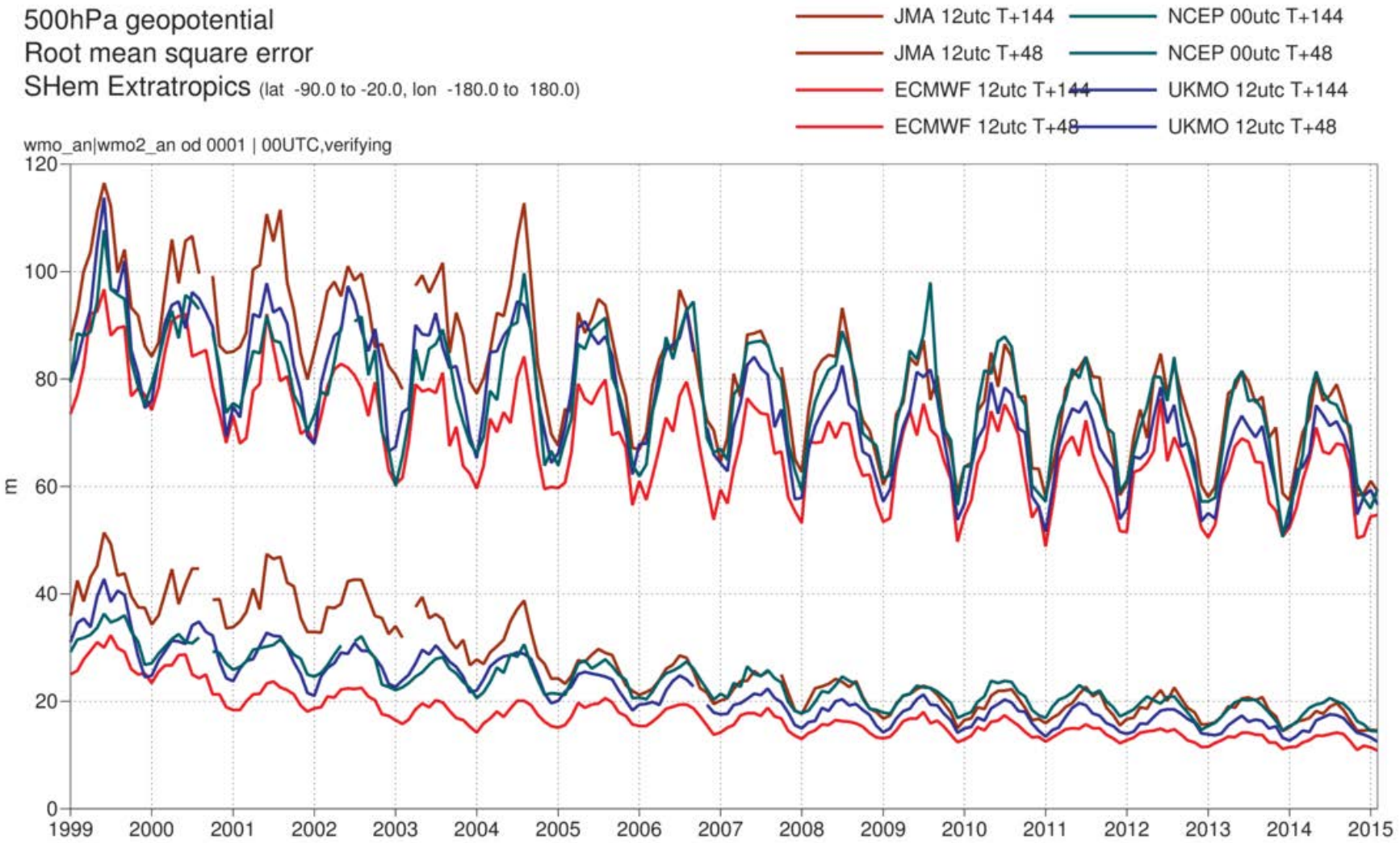
Z500, Time series of ACC=0.8 Europe Hres v ERA-I



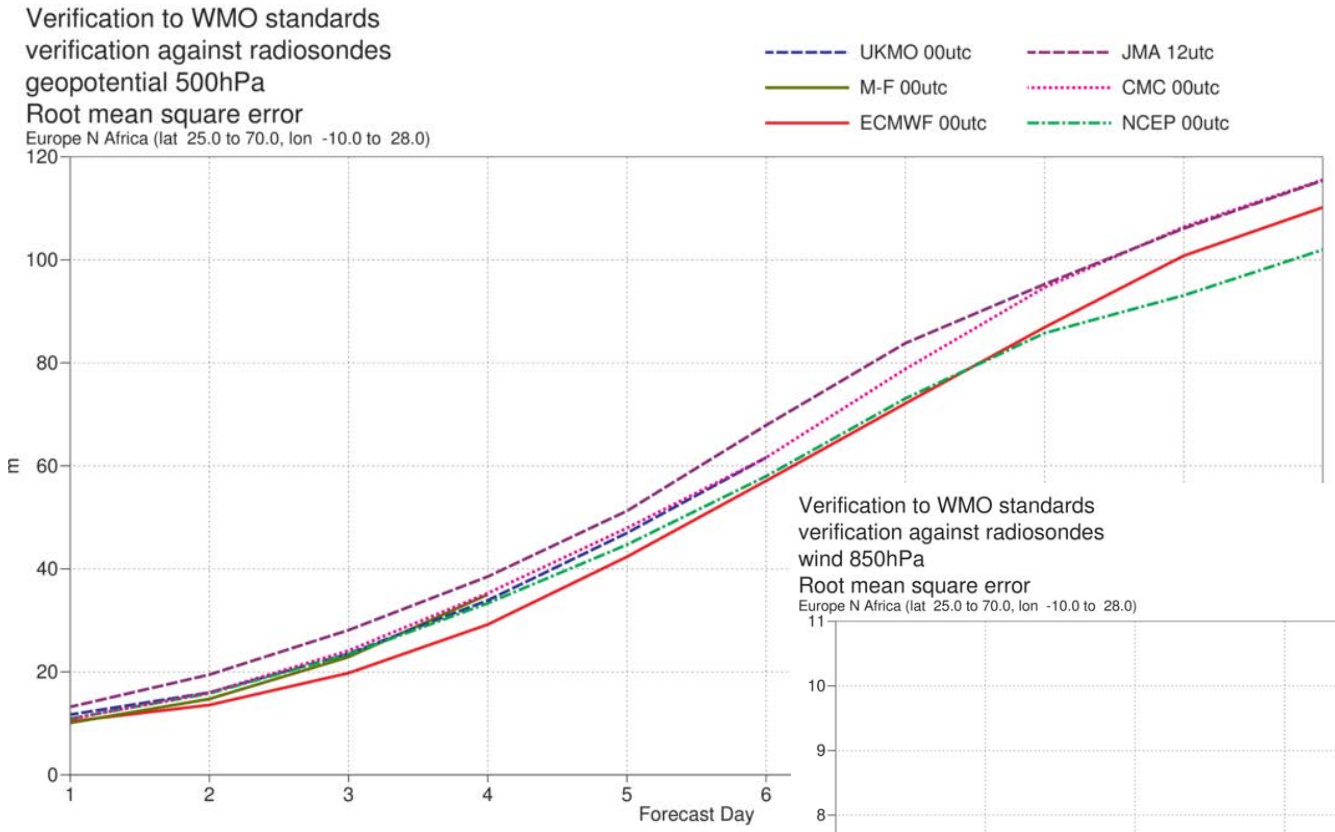
WMO scores Z500 N.Hem

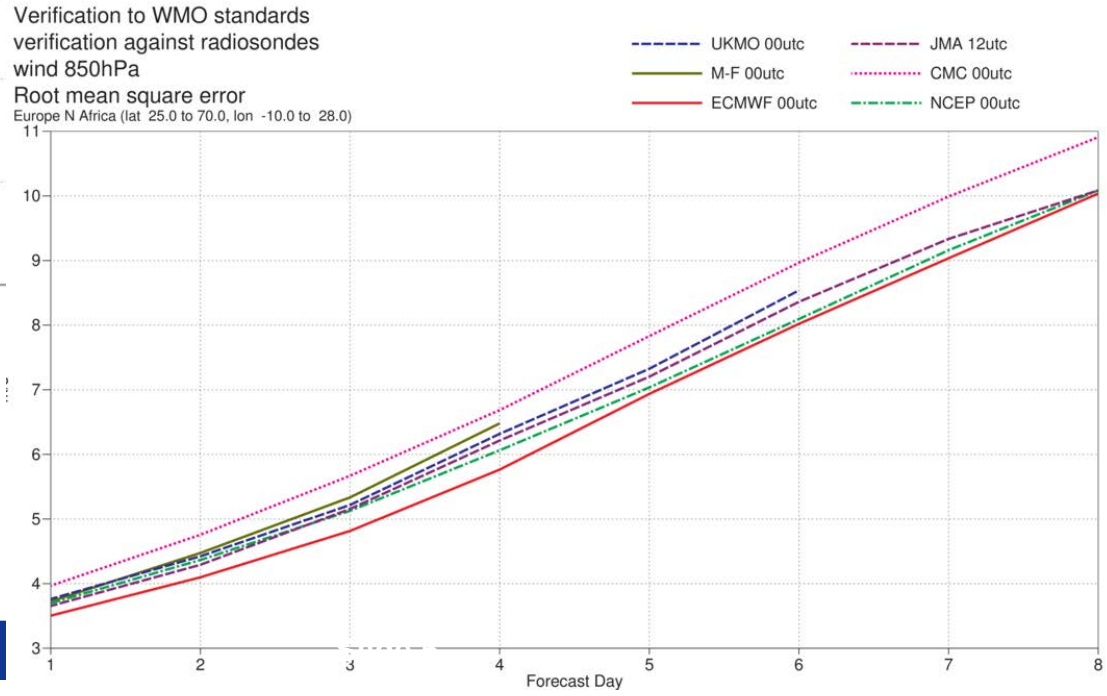


WMO scores Z500 S.Hem

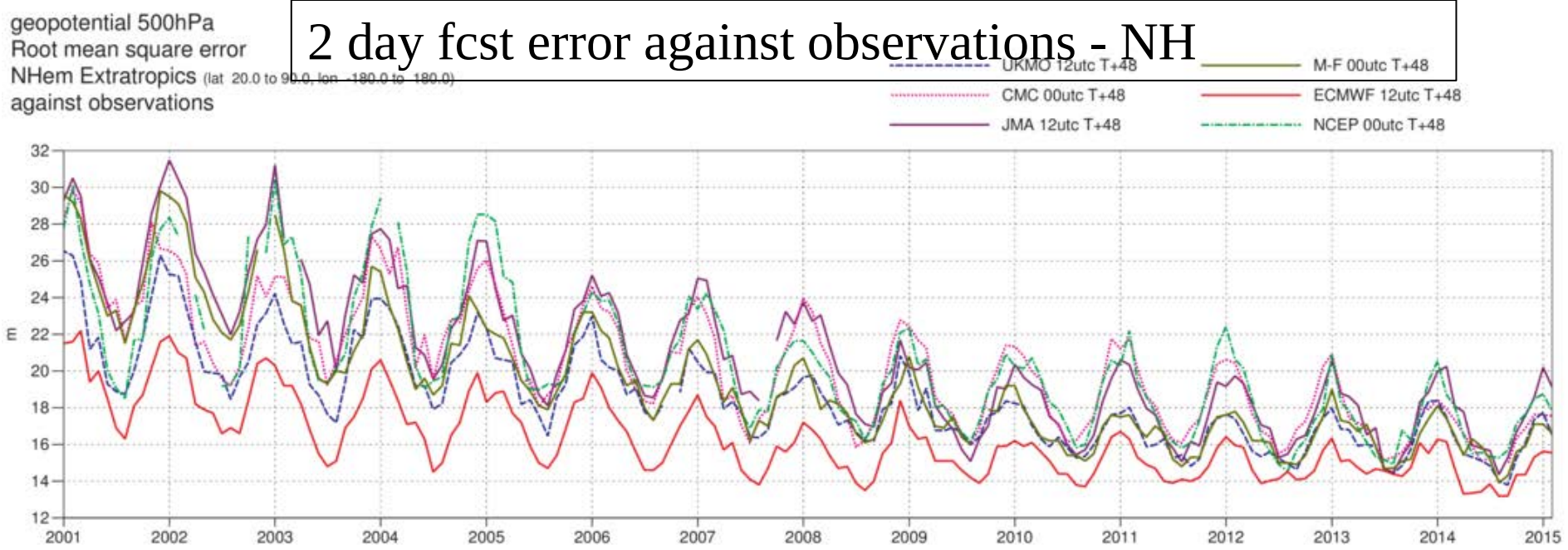


WMO scores using radiosondes
Z500 and wind850 over Europe, 2014

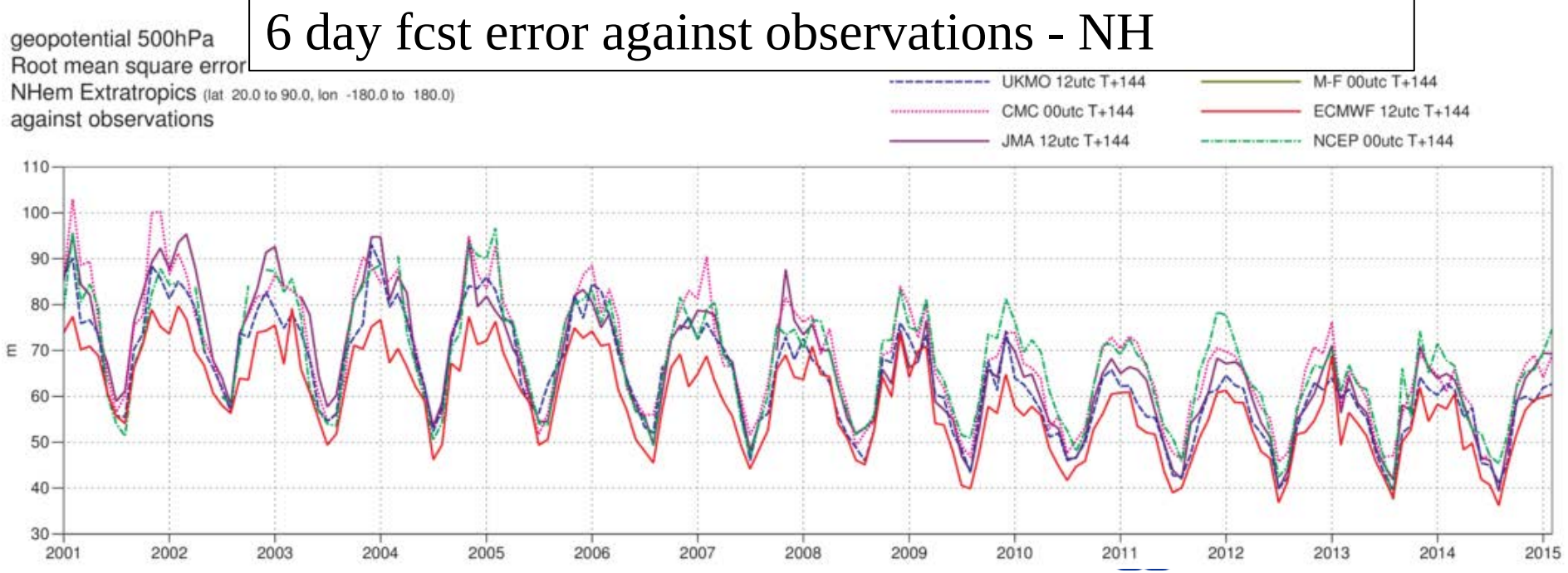




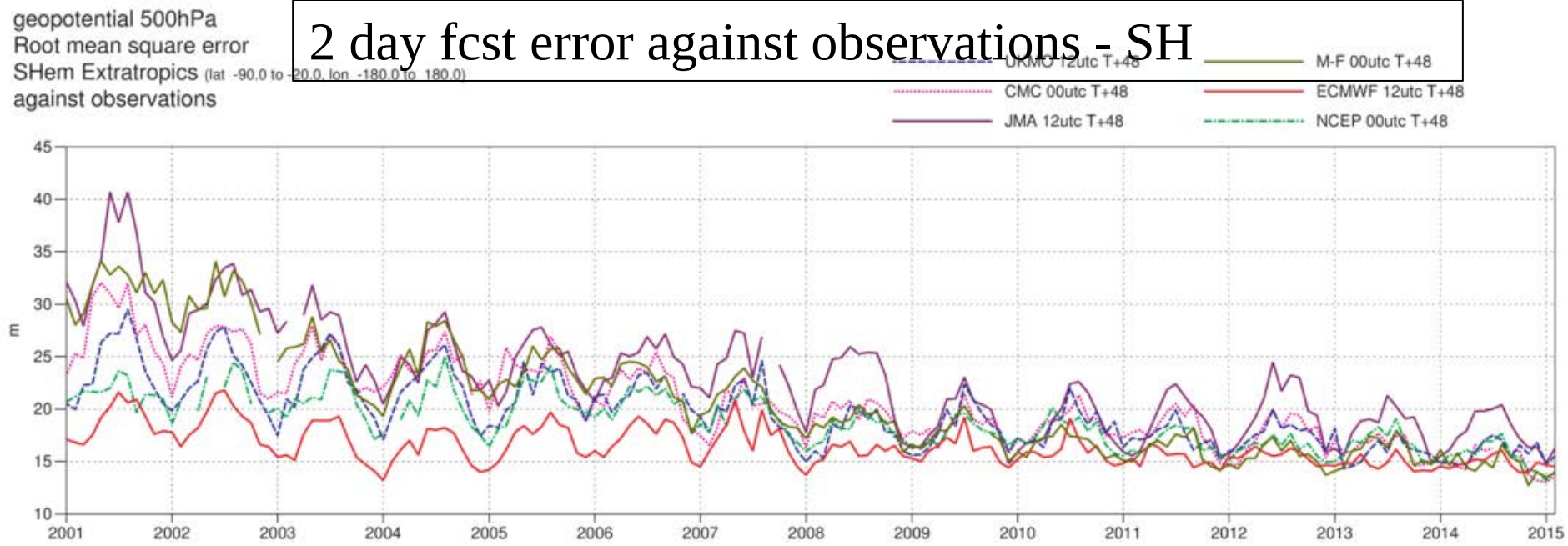
2 day fcst error against observations - NH



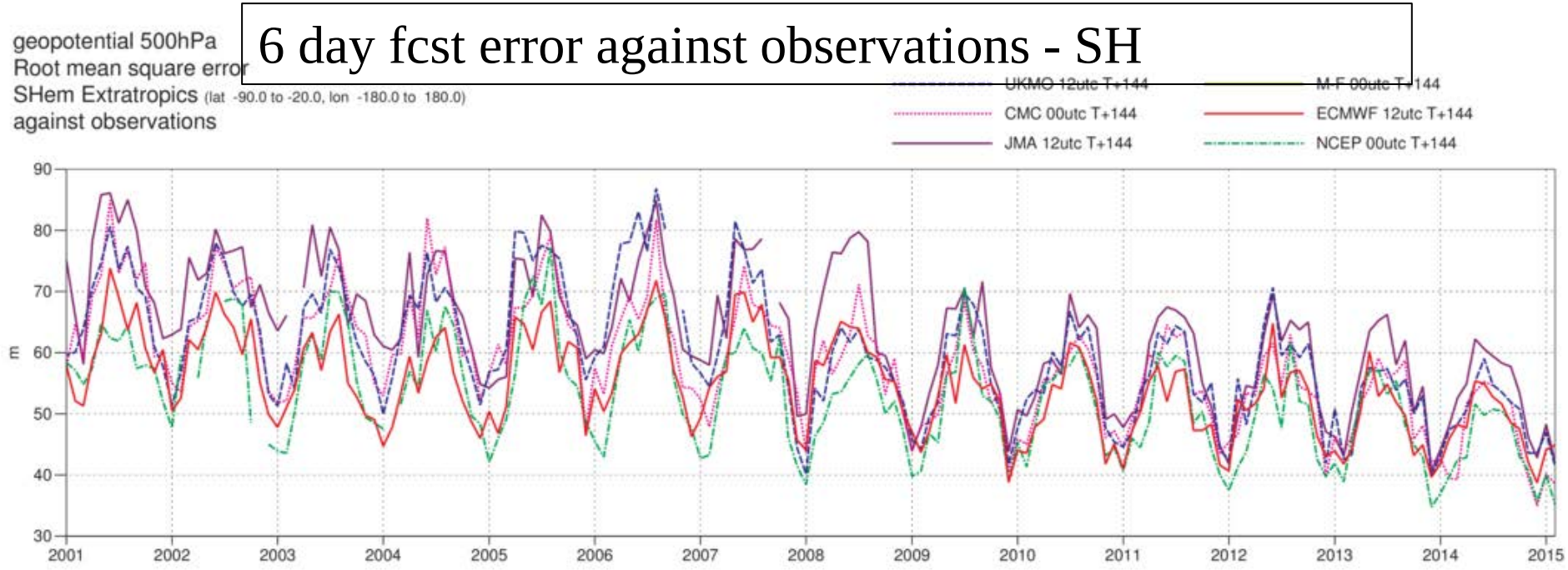
6 day fcst error against observations - NH



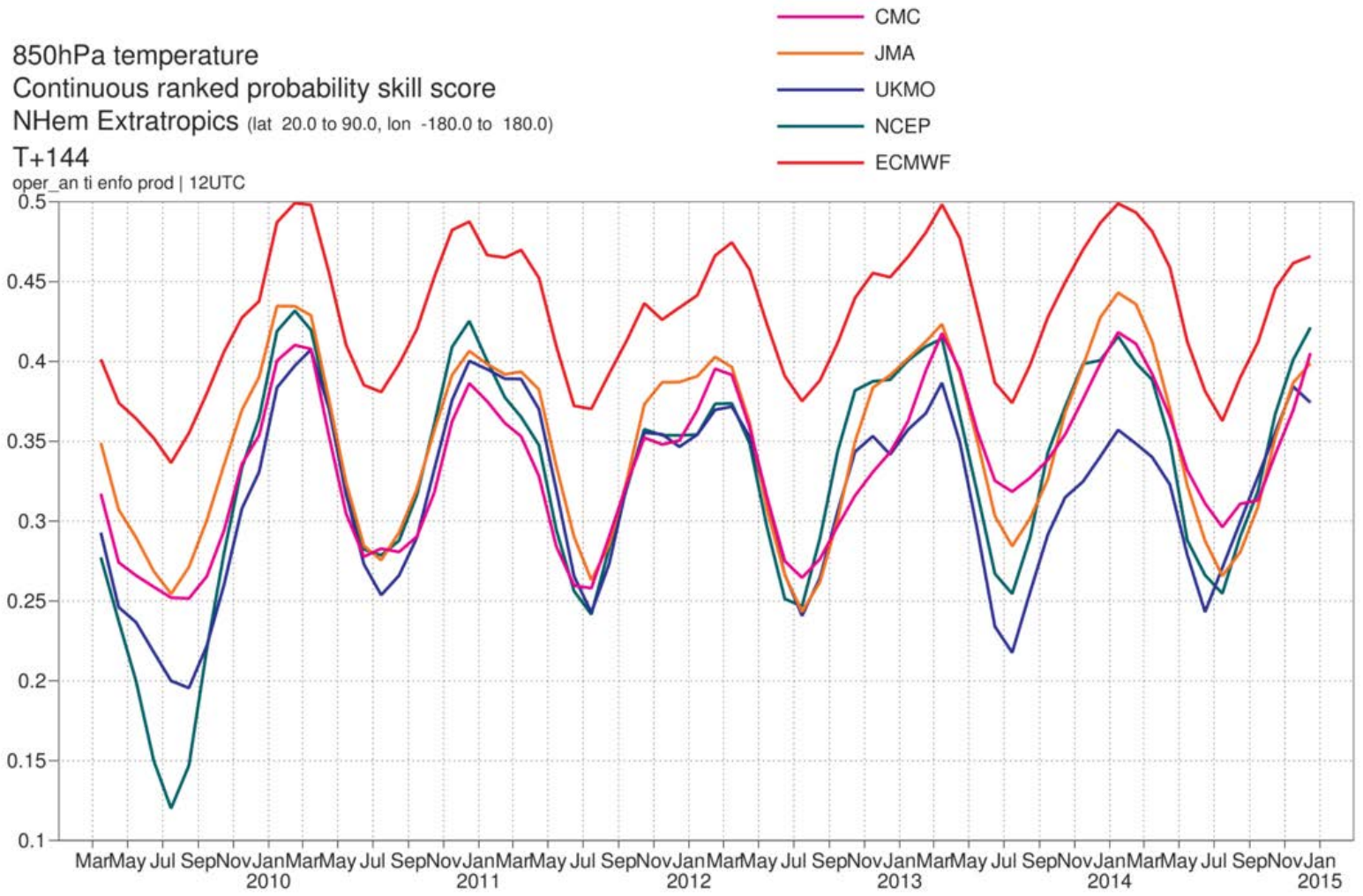
2 day fcst error against observations - SH



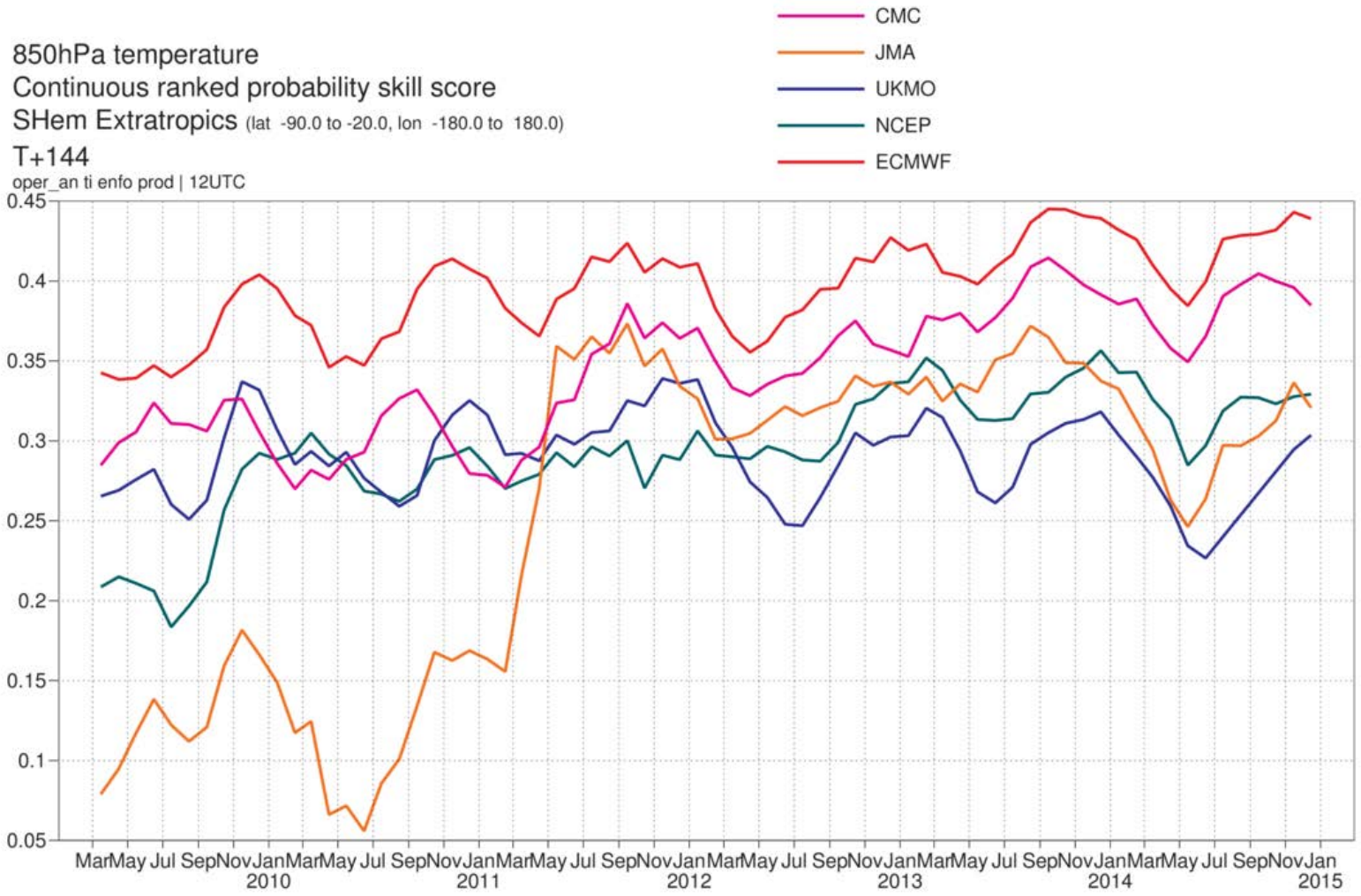
6 day fcst error against observations - SH



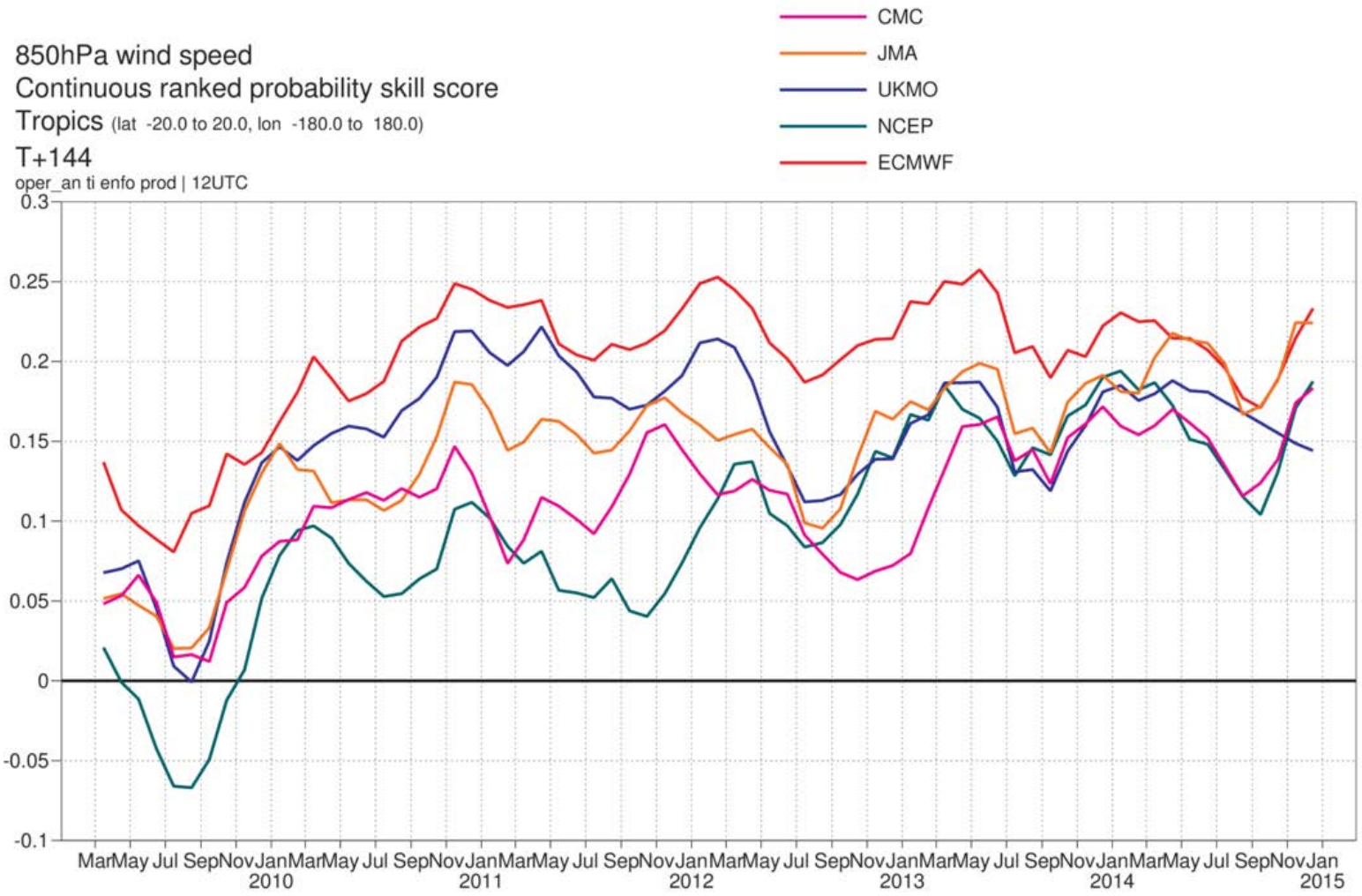
Ensemble scores, N extratropics

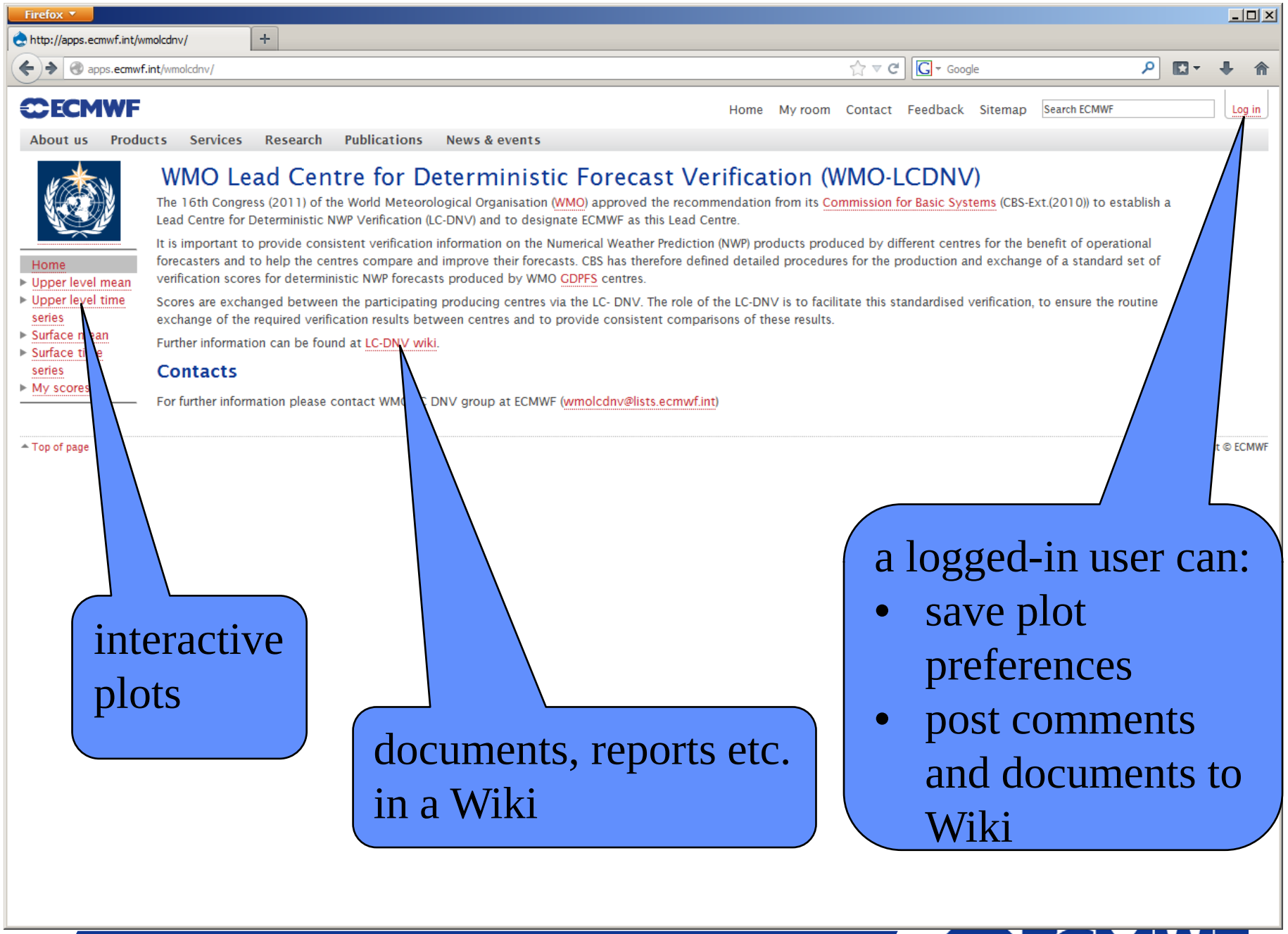


Ensemble scores, S extratropics



Ensemble scores, tropics




Firefox
http://apps.ecmwf.int/wmolcdnv/
apps.ecmwf.int/wmolcdnv/
Google
ECMWF
Home
My room
Contact
Feedback
Sitemap
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Publications
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WMO Lead Centre for Deterministic Forecast Verification (WMO-LCDNV)
The 16th Congress (2011) of the World Meteorological Organisation (WMO) approved the recommendation from its Commission for Basic Systems (CBS-Ext.(2010)) to establish a Lead Centre for Deterministic NWP Verification (LC-DNV) and to designate ECMWF as this Lead Centre.
It is important to provide consistent verification information on the Numerical Weather Prediction (NWP) products produced by different centres for the benefit of operational forecasters and to help the centres compare and improve their forecasts. CBS has therefore defined detailed procedures for the production and exchange of a standard set of verification scores for deterministic NWP forecasts produced by WMO GDPFS centres.
Scores are exchanged between the participating producing centres via the LC- DNV. The role of the LC-DNV is to facilitate this standardised verification, to ensure the routine exchange of the required verification results between centres and to provide consistent comparisons of these results.
Further information can be found at LC-DNV wiki.
Contacts
For further information please contact WM DNV group at ECMWF (wmolcdnv@lists.ecmwf.int)
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Surface mean
Surface time series
My scores
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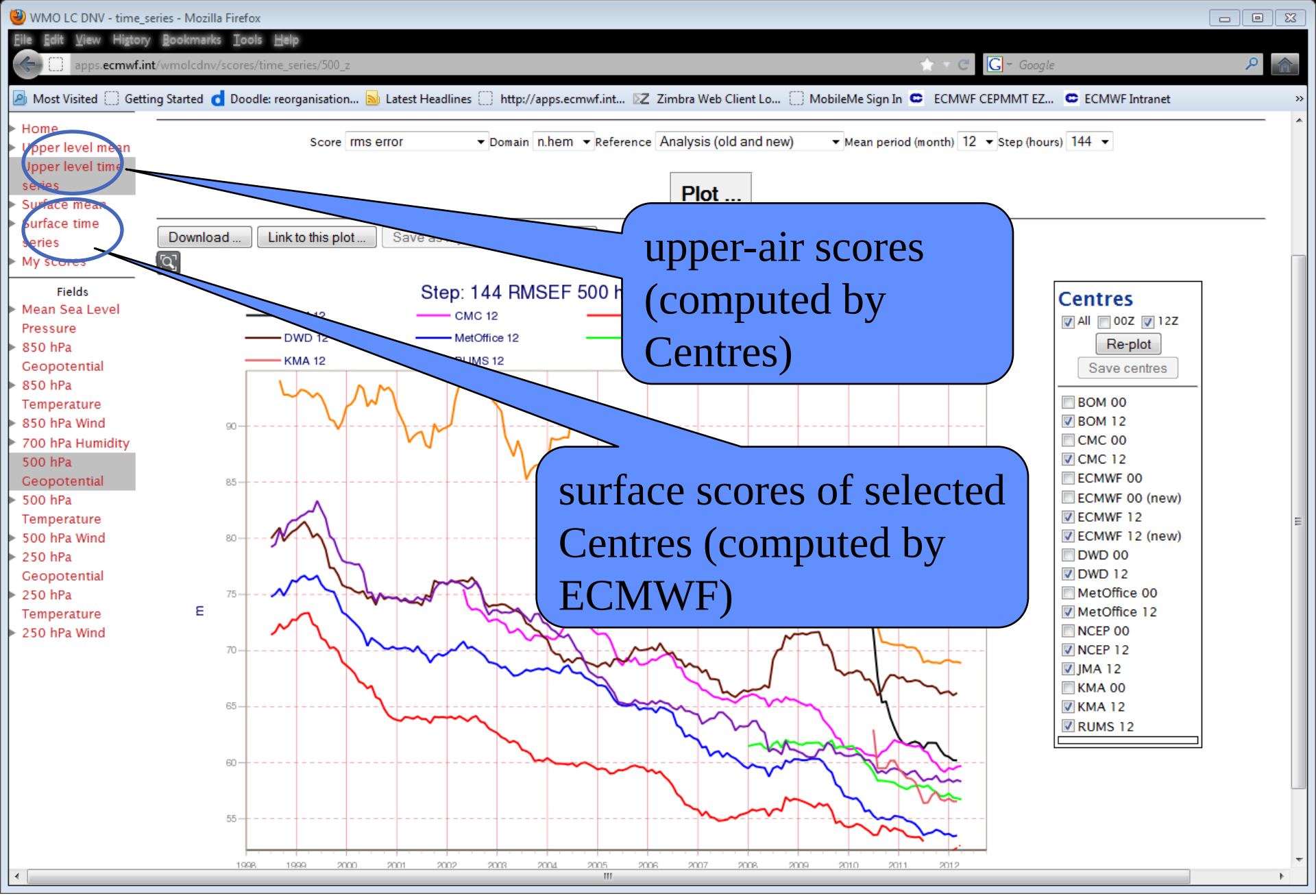
WMO LC DNV - time_series - Mozilla Firefox
apps.ecmwf.int/wmolcdnv/scores/time_series/500_z
Home
Upper level mean
Upper level time series
Surface mean
Surface time series
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Mean Sea Level Pressure
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850 hPa Temperature
850 hPa Wind
700 hPa Humidity
500 hPa Geopotential
500 hPa Temperature
500 hPa Wind
250 hPa Geopotential
250 hPa Temperature
250 hPa Wind
Score rms error
Domain n.hem
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Mean period (month) 12
Step (hours) 144
Plot ...
Download ...
Link to this plot ...
Step: 144 RMSEF 500 h
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DWD 12
MetOffice 12
KMA 12
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Save centres
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BOM 12
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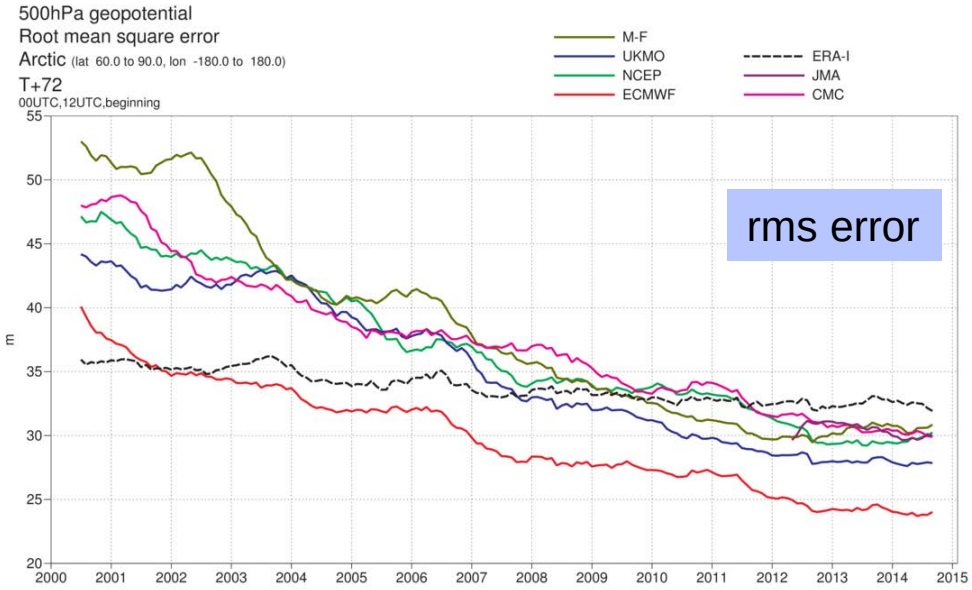
ECMWF 00
ECMWF 00 (new)
ECMWF 12
ECMWF 12 (new)
DWD 00
DWD 12
MetOffice 00
MetOffice 12
NCEP 00
NCEP 12
JMA 12
KMA 00
KMA 12
RUMS 12
upper-air scores (computed by Centres)
surface scores of selected Centres (computed by ECMWF)

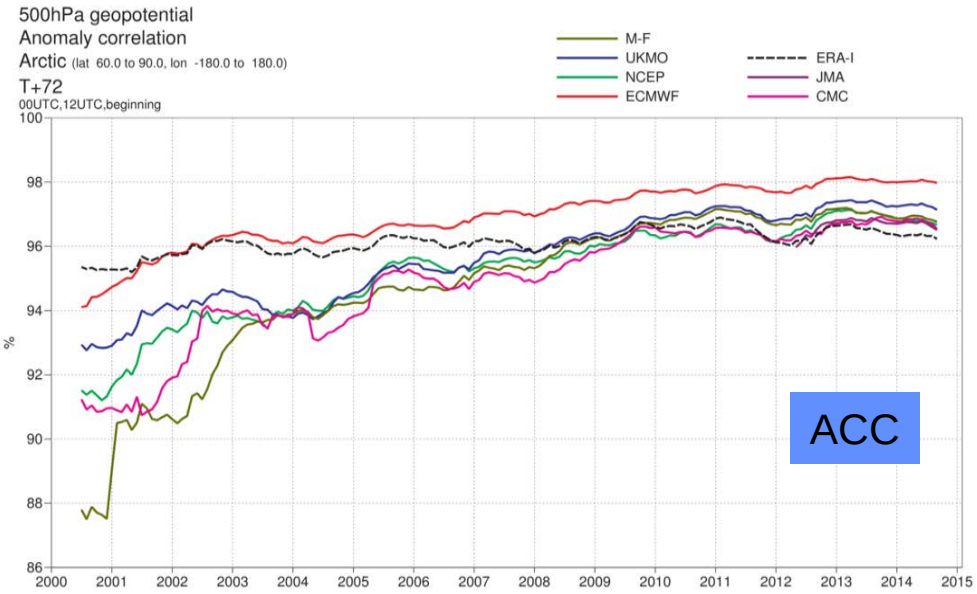
Verification for polar regions

- **Scores computed for polewards of 60°**
- **Verification at ECMWF using available fields from other centres**
- **Done for Z500 and T850**
- **All verification against analysis (each centre against own analysis) or radiosonde observations**
- **ERA-Interim scores shown as reference (ERA is fixed model and assimilation system)**

Comparison with other centres (2000-2015) Arctic

- **Day 3 forecasts (T+72)**
- **Z500, 12-month moving average**
- **Each centre verified against own analysis**
- **ERA-I shown for reference**
- **JMA score only since 2012 (due to limited availability of fields at ECMWF)**





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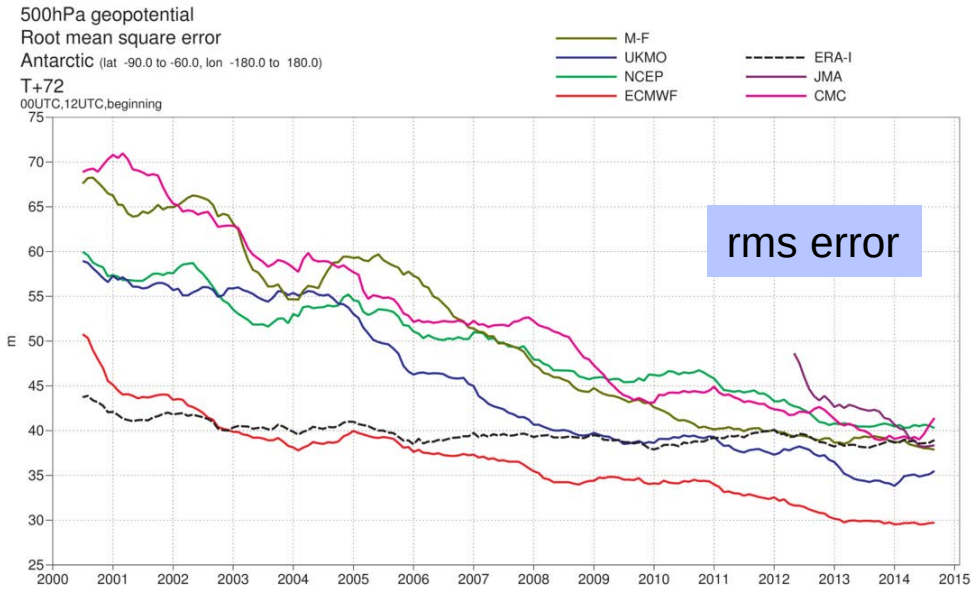
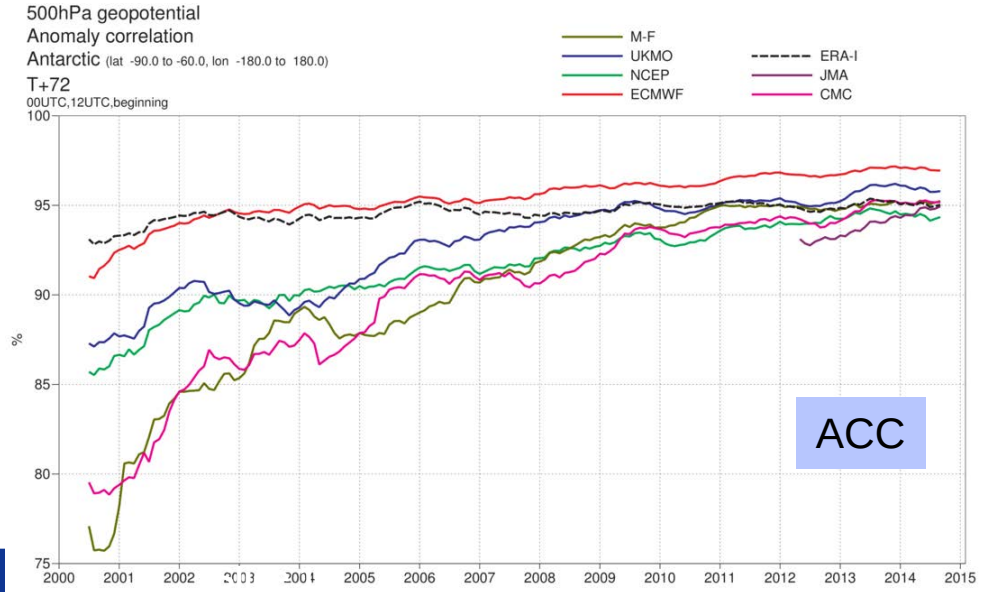
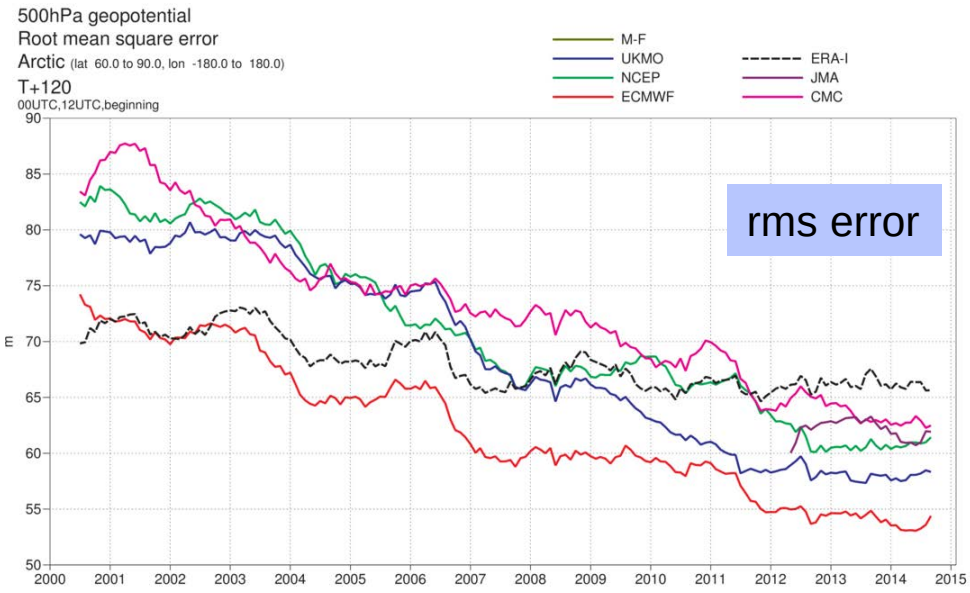
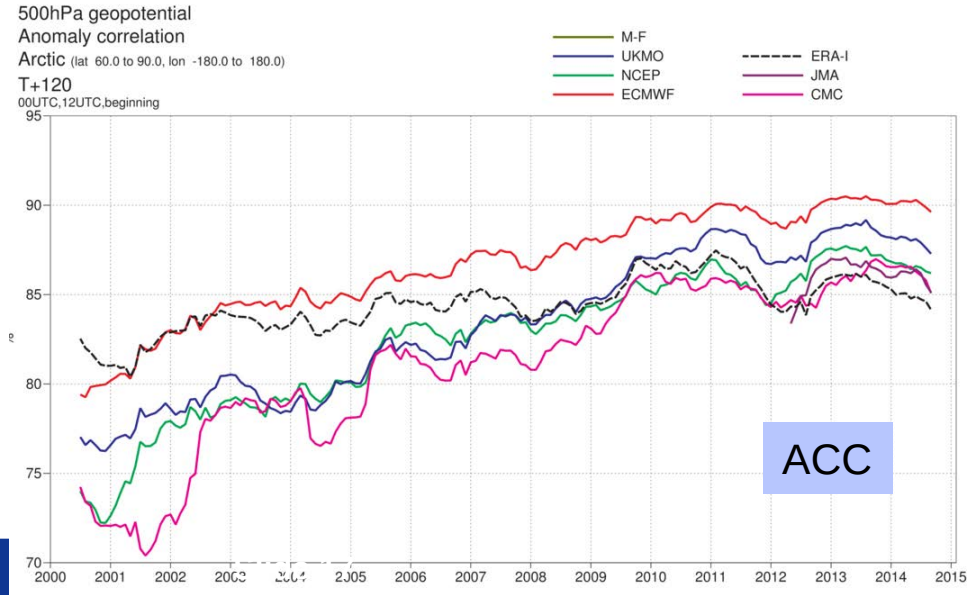




Comparison with other centres (2000-2015) Arctic

- **Day 5 forecasts (T+120)**
- **Z500, 12-month moving average**
- **Each centre verified against own analysis**
- **ERA-I shown for reference**





Comparison with other centres (2000-2015) Antarctic

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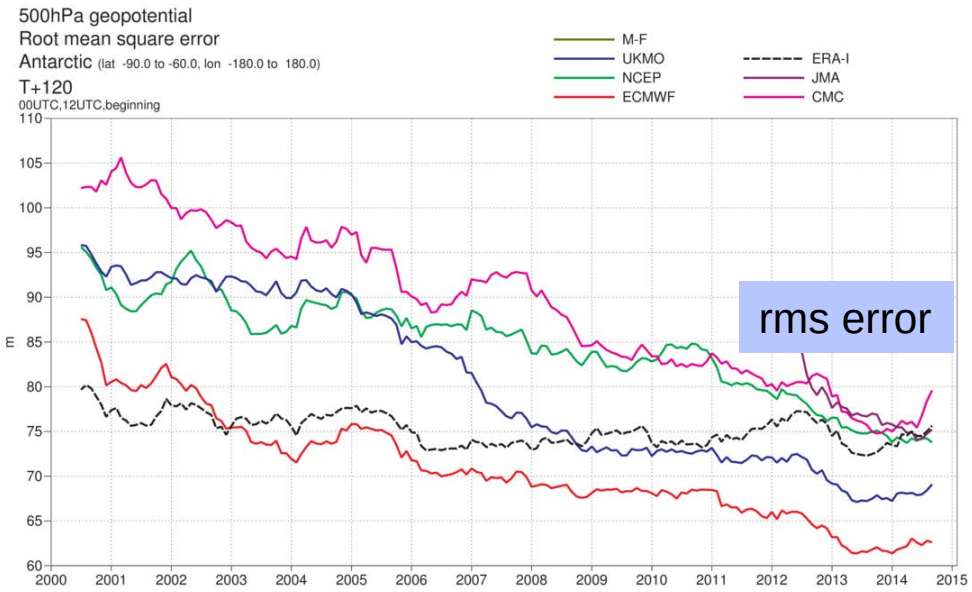
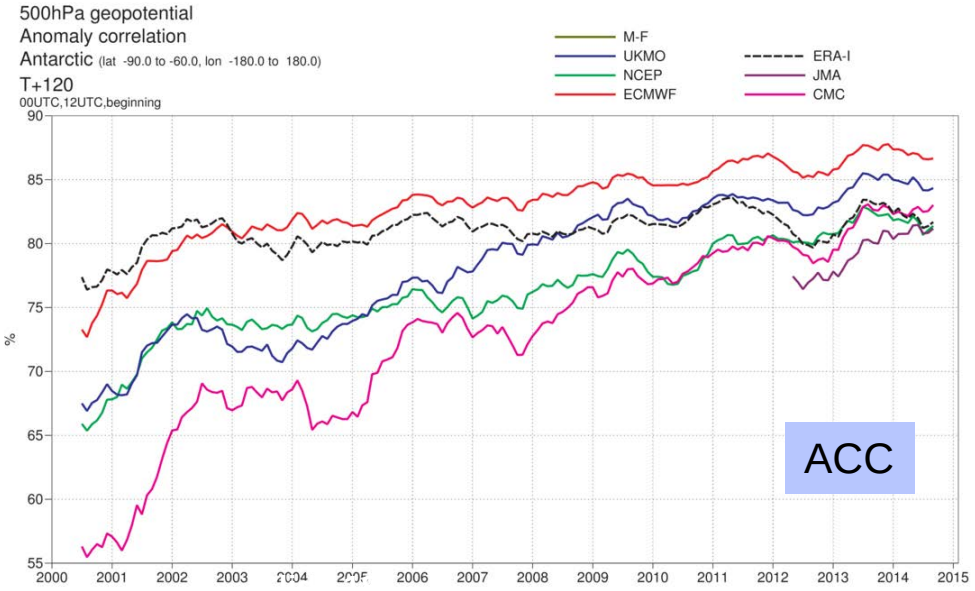
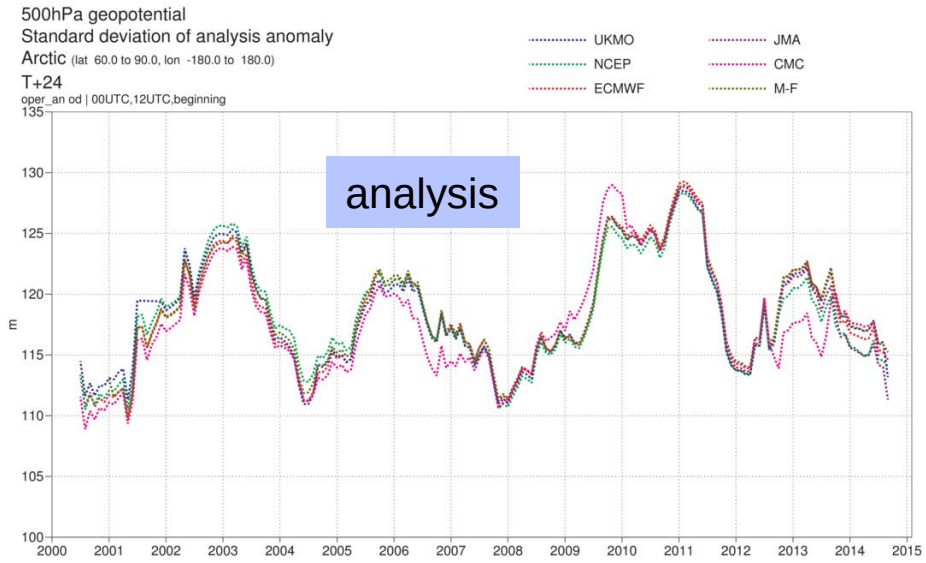


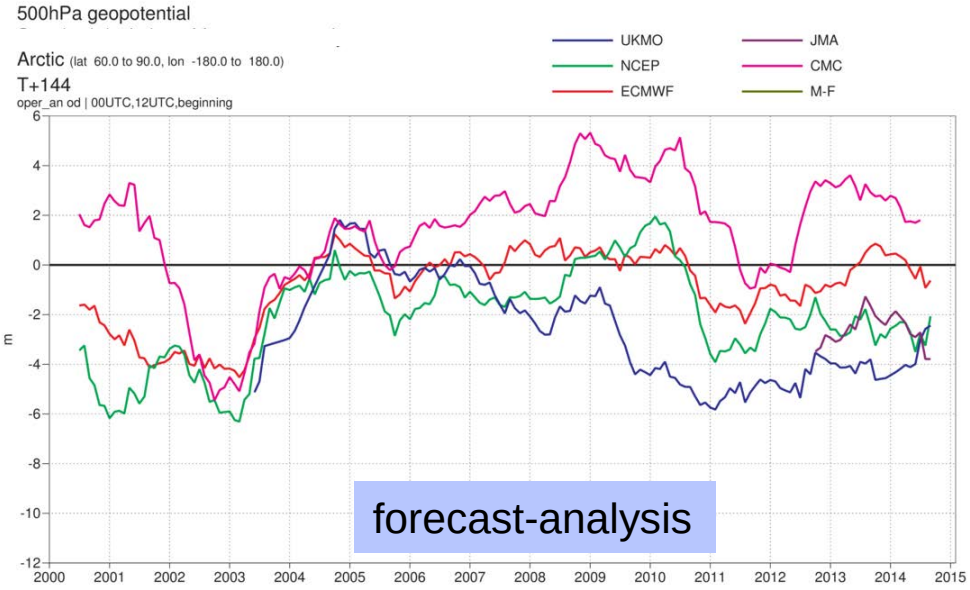
- **NB some dates missing for CMC in 2009 – affects these scores for 2009 (other years OK)**



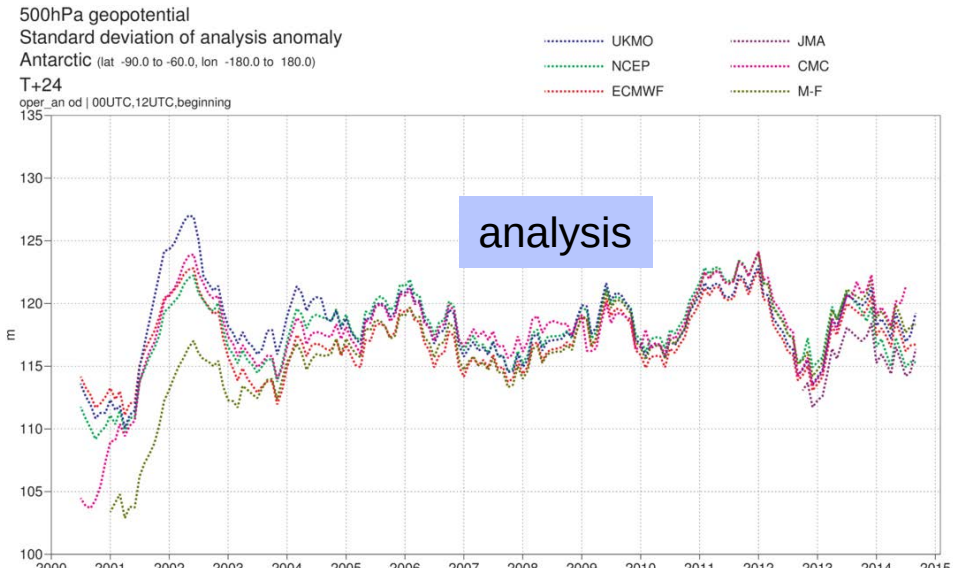
Comparison with other centres (2000-2015)
Arctic

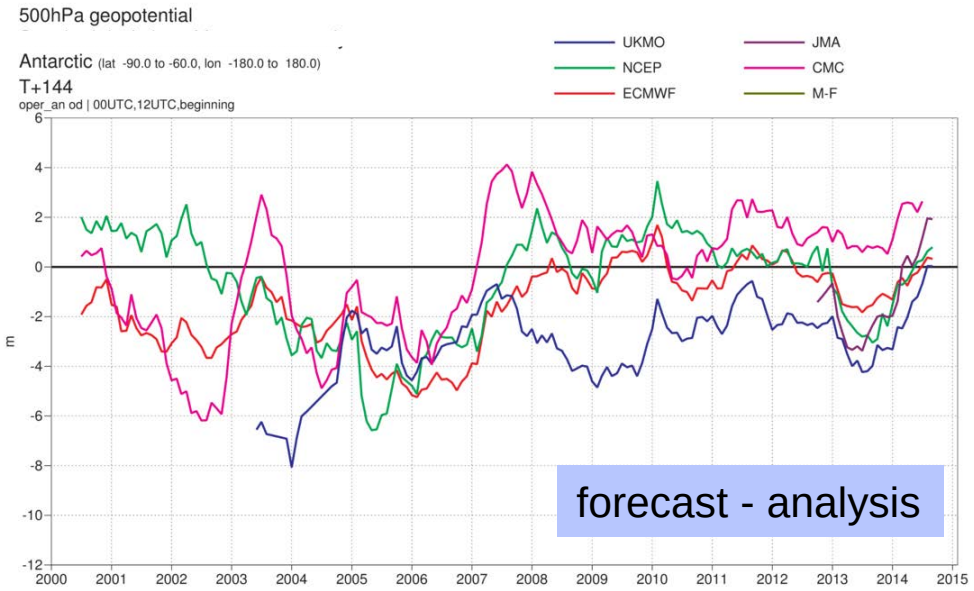
- **Variability (activity) of forecast and analysis fields: standard deviation of anomalies**
- **Z500, 12-month moving average**
- **Activity of analyses comparable**
- **During the forecast, CMC and Meteo-France are gaining activity; others underactive?**
- **Note recent change in MetOffice model, increasing activity**
- **NB some dates missing for CMC in 2009 – affects these scores for 2009 (other years OK)**





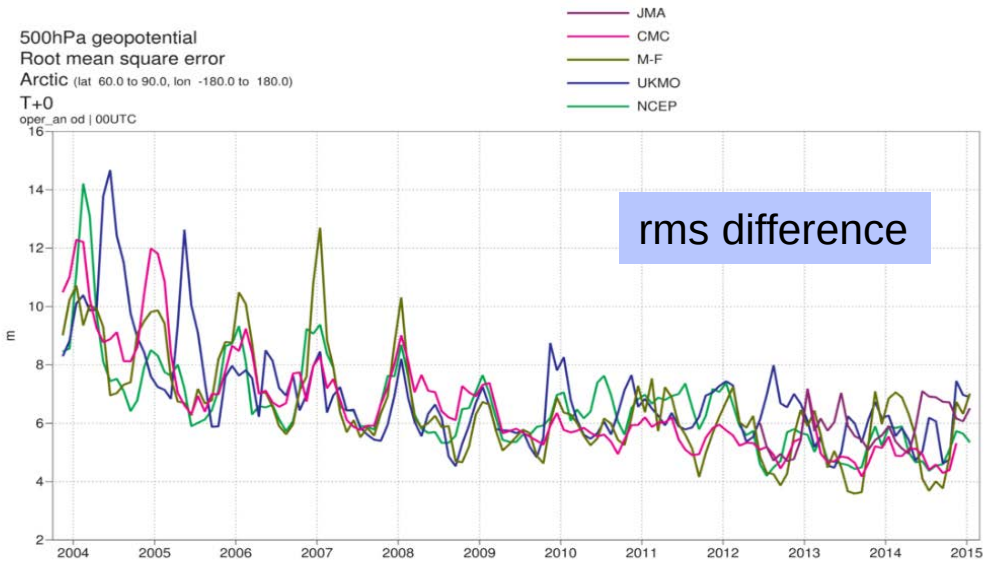
Comparison with other centres (2000-2015) Antarctic

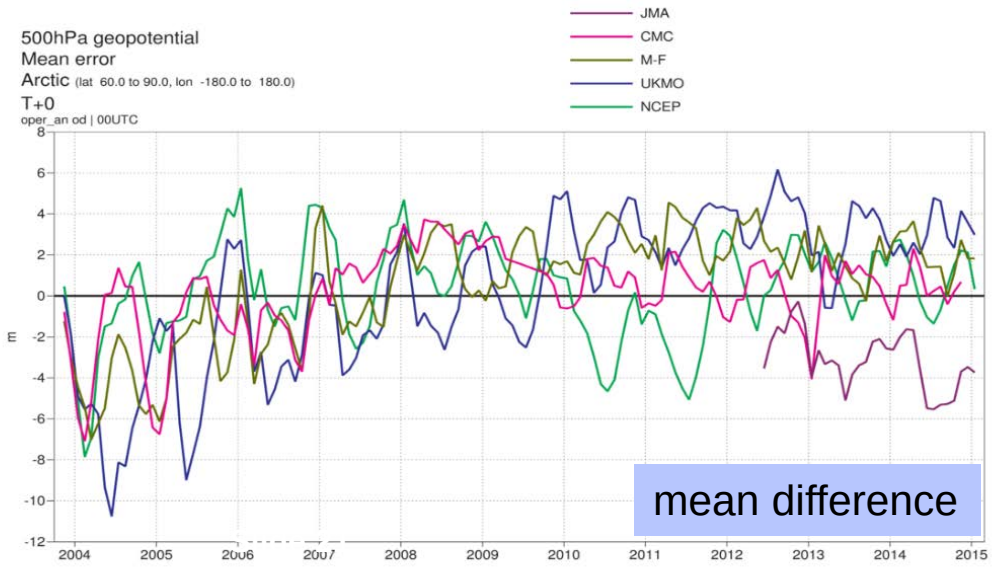




Comparison between analyses (Arctic)

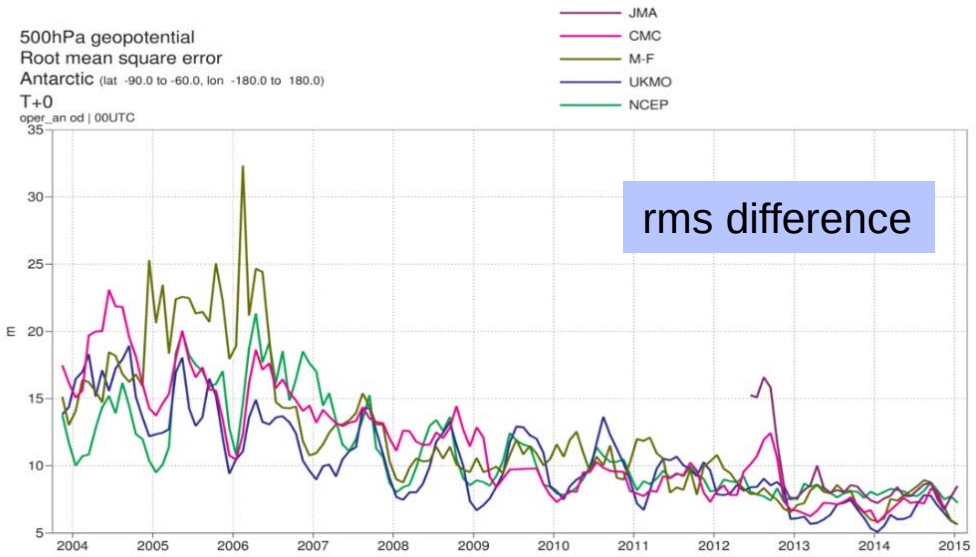
- **Differences between the analyses of different centres and the ECMWF analysis**
- **Z500 30 day moving average**
- **Decrease over last decade in the difference between the analyses of different centres**

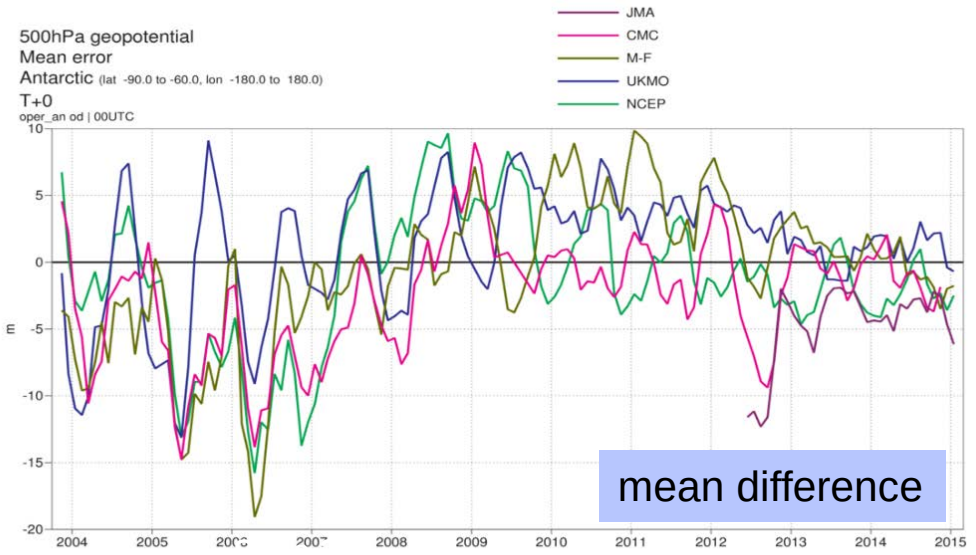




Comparison between analyses (Antarctic)

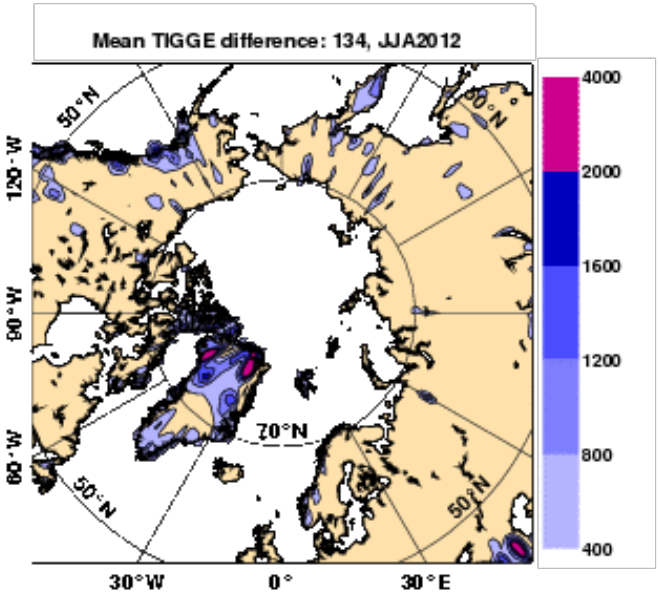
- **Differences between the analyses of different centres and the ECMWF analysis**
- **Z500 30 day moving average**
- **Decrease over last decade in the difference between the analyses of different centres (in RMS sense, mean states remain quite different)**





Spread between TIGGE models: Analysis, surface

p_s: [Pa]



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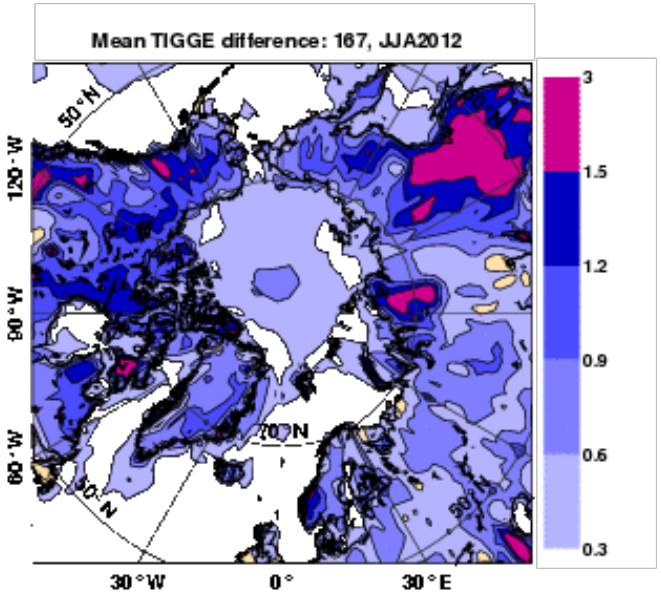

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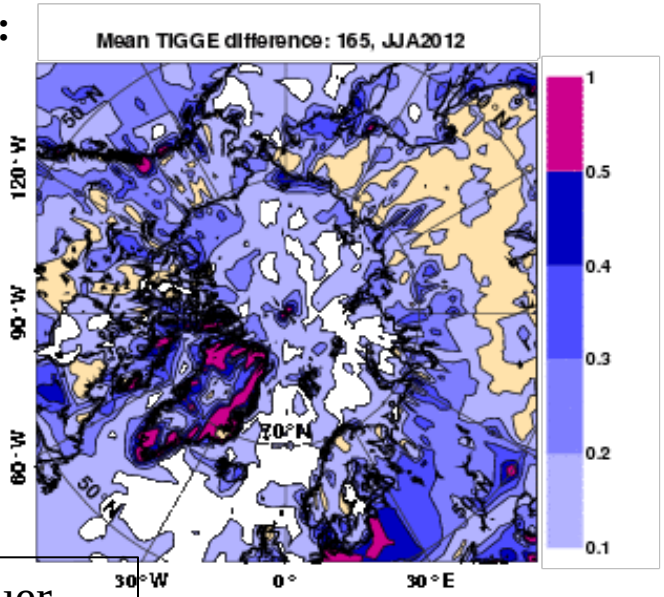
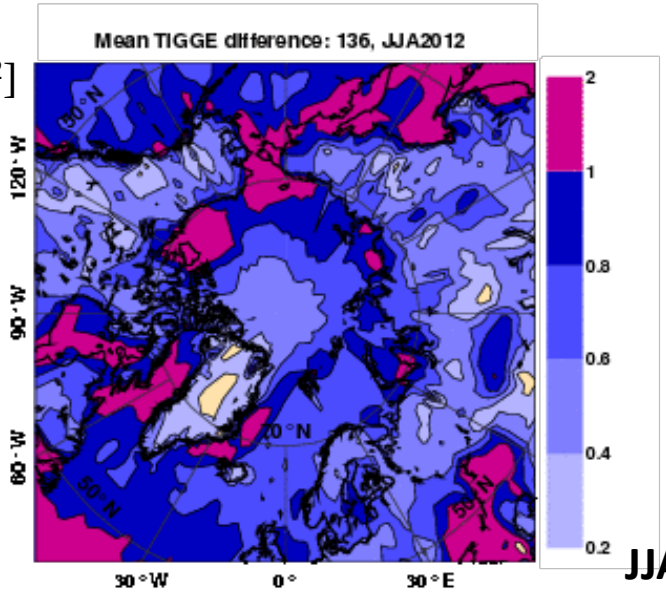


TCW: [kg/m^2]



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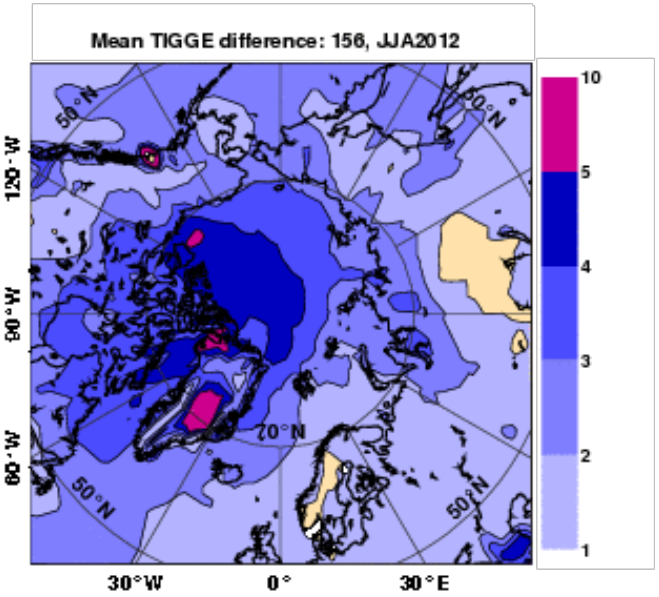
Spread between TIGGE models: Analysis, 850 hPa

gh:
[m]



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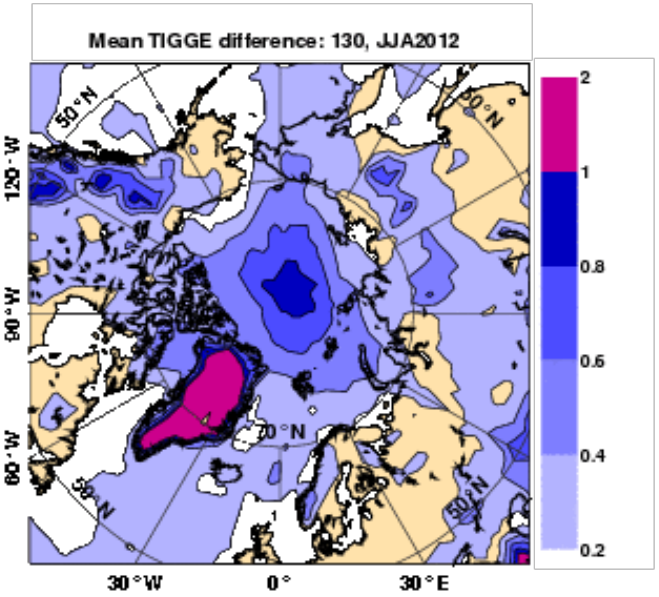

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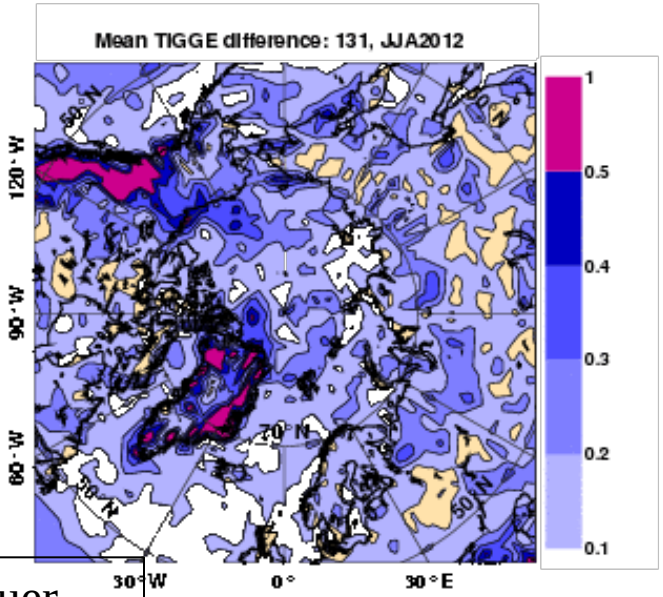
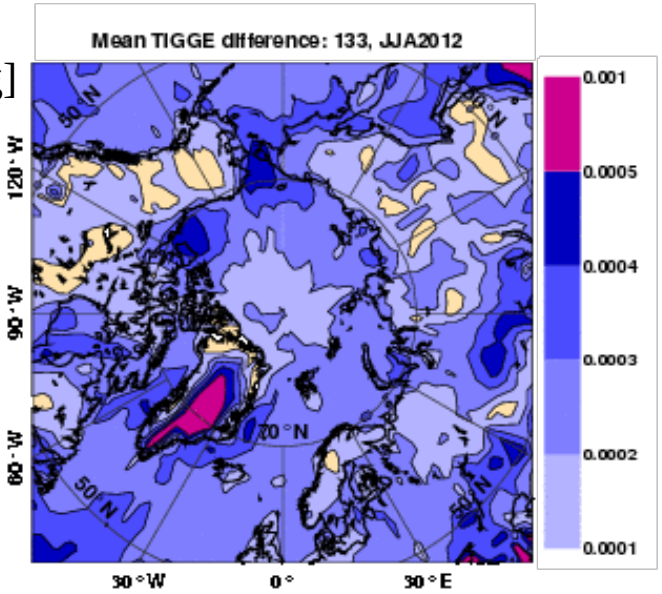
[m/s]



q:
[kg/kg]



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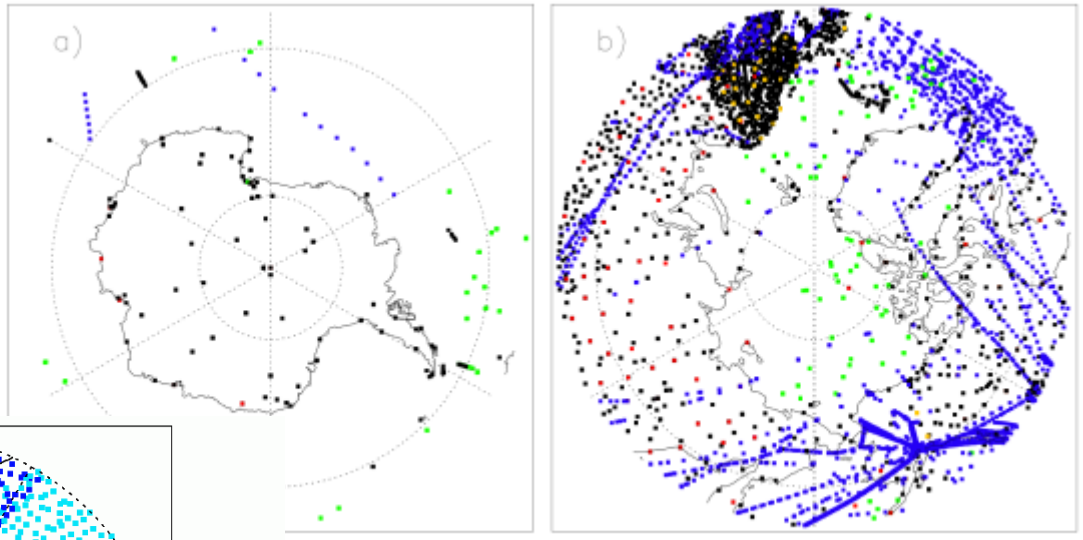
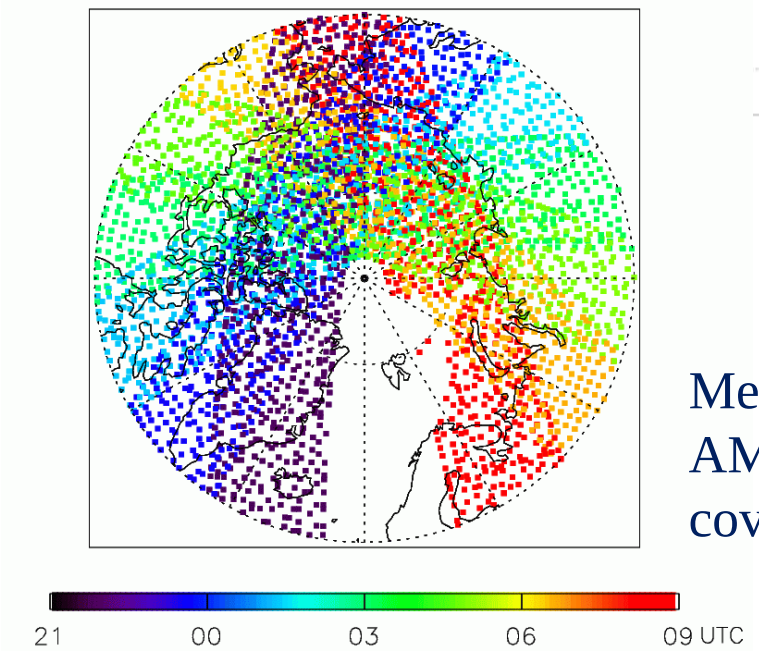
Polar data assimilation issues

Conventional
data coverage
09-12 UTC





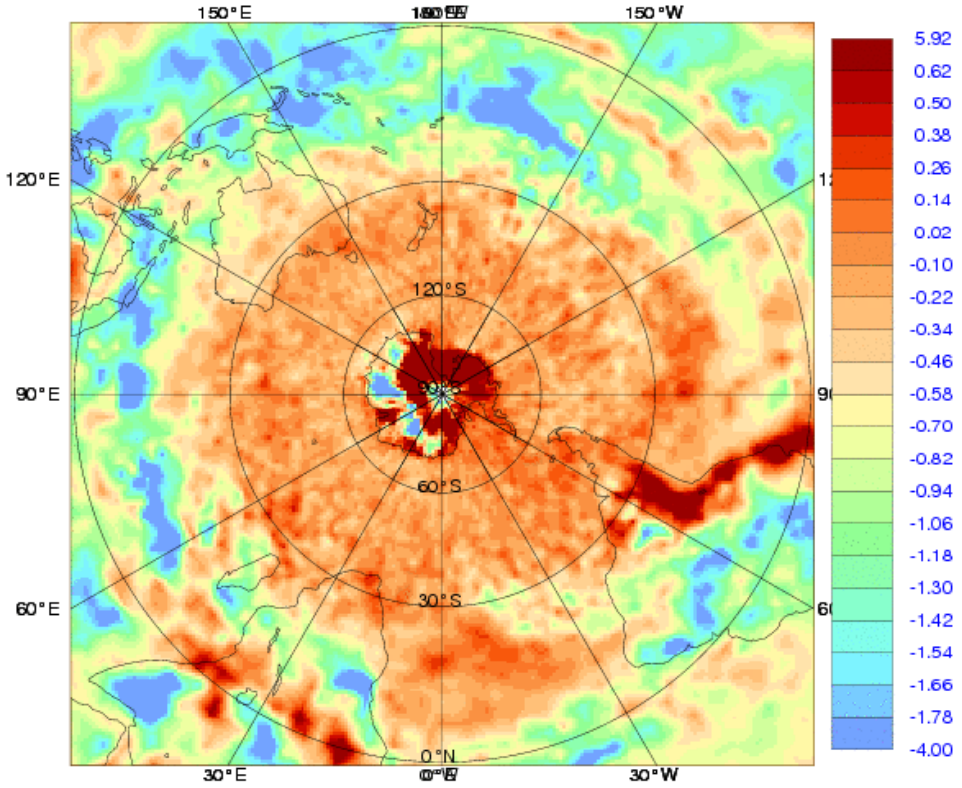
Metop
AMSU-A data
coverage 09-12 UTC

[Peter Bauer, Mohamed Dahoui]

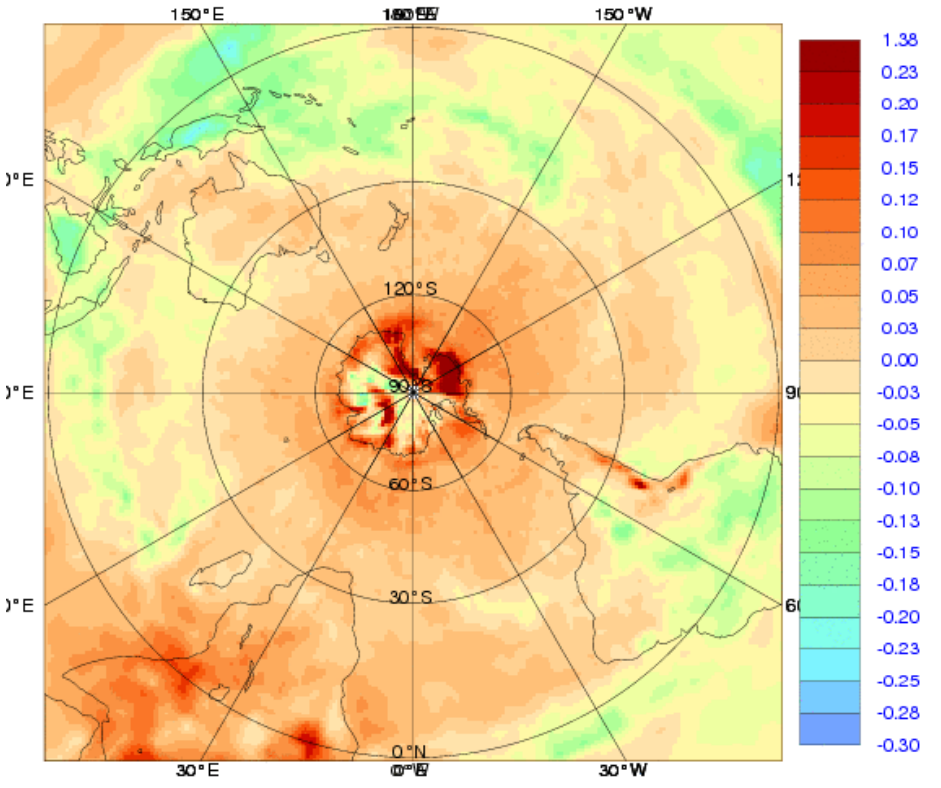
Polar data assimilation issues

Mean April 2013 observation-model radiances

MHS channel 3
upper tropospheric moisture



AMSU-A channel 6
low-mid tropospheric temperature



[Peter Bauer, Mohamed Dahoui]

Conclusions

- **General scores:**
  - **Versus own analyses**
    - **Differences across global centres have got smaller and stabilised.**
  - **Versus observations**
    - **Differences have got smaller and smaller**
    - **NCEP (T+144) and MF (T+48): improvements noticeable**
  - **Large discrepancy between Ensemble systems**
- **Please have a look at http://apps.ecmwf.int/wmolcdnv/**
- **Polar verification**
  - **Verification against observations**
  - **Levels of activity across centres significantly different**
  - **RMSEs continue to be reduced**
  - **Need to continue looking at analyses behaviours**
  - **Still some way to go – we need more participants!**