

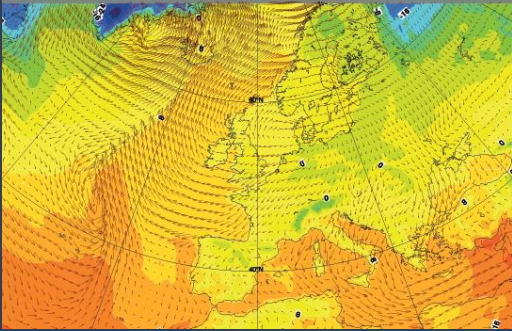
GLOBAL FORECASTS

NWP SCIENCE

ENVIRONMENTAL SERVICES

SERVING METEOROLOGY

SUPERCOMPUTING



GAIA-CLIM workshop at ECMWF

Introduction

Erland Källén



March 6, 2017

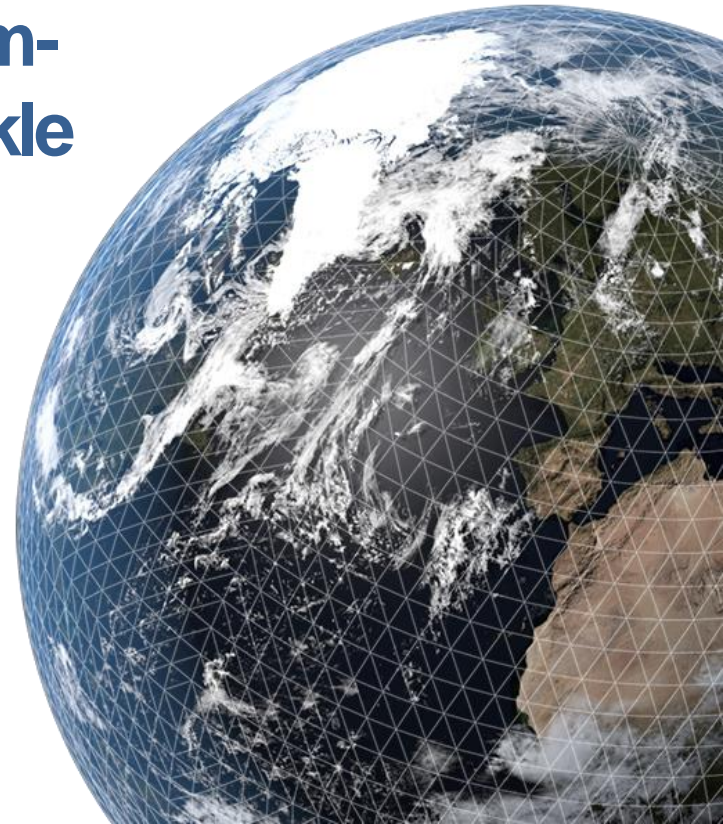
European co-operation at its best

Our mission

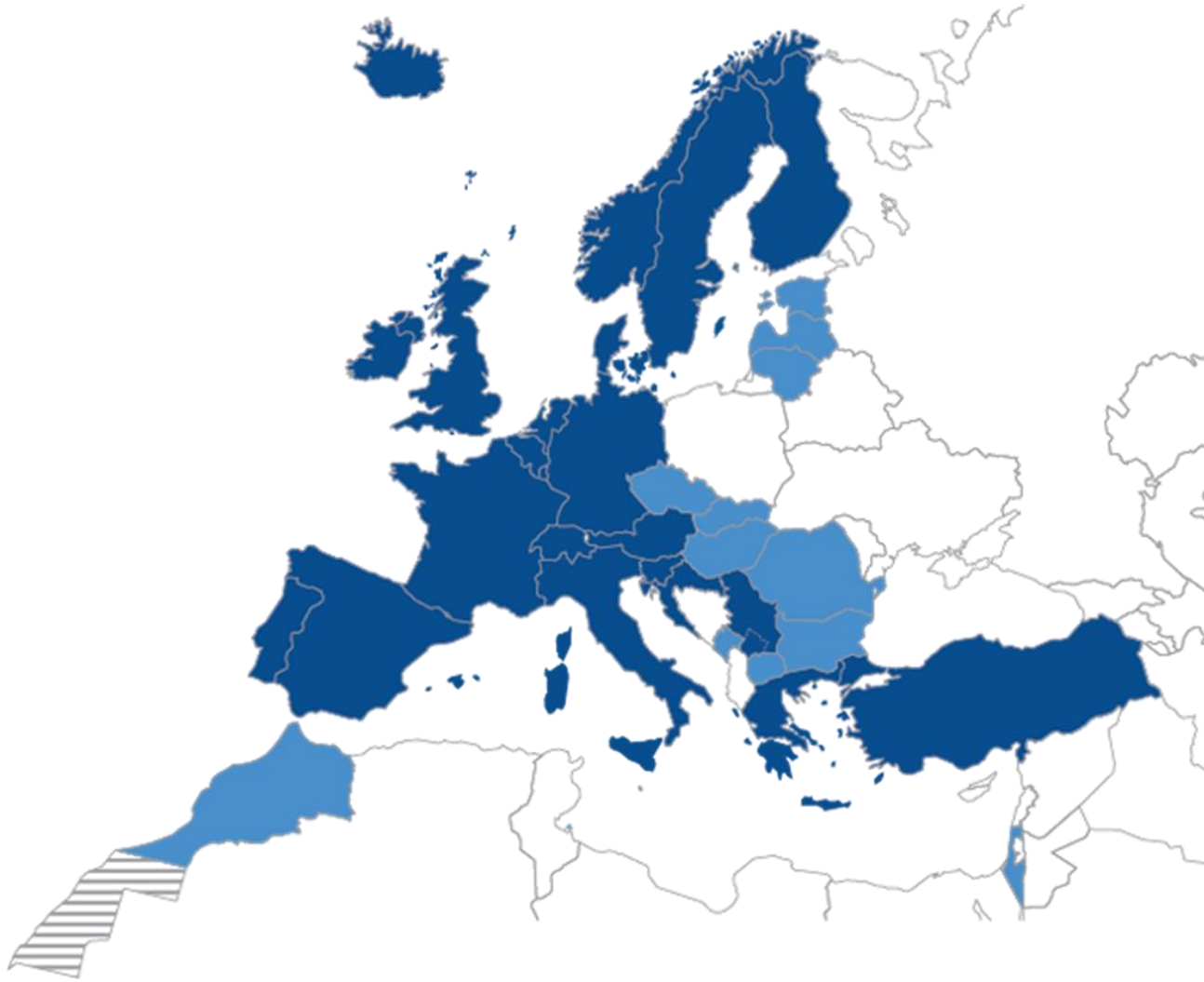
ECMWF's **role is to address the critical and most difficult research problems in medium-range NWP that no one country could tackle on its own**



EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS



European co-operation at its best



European co-operation at its best

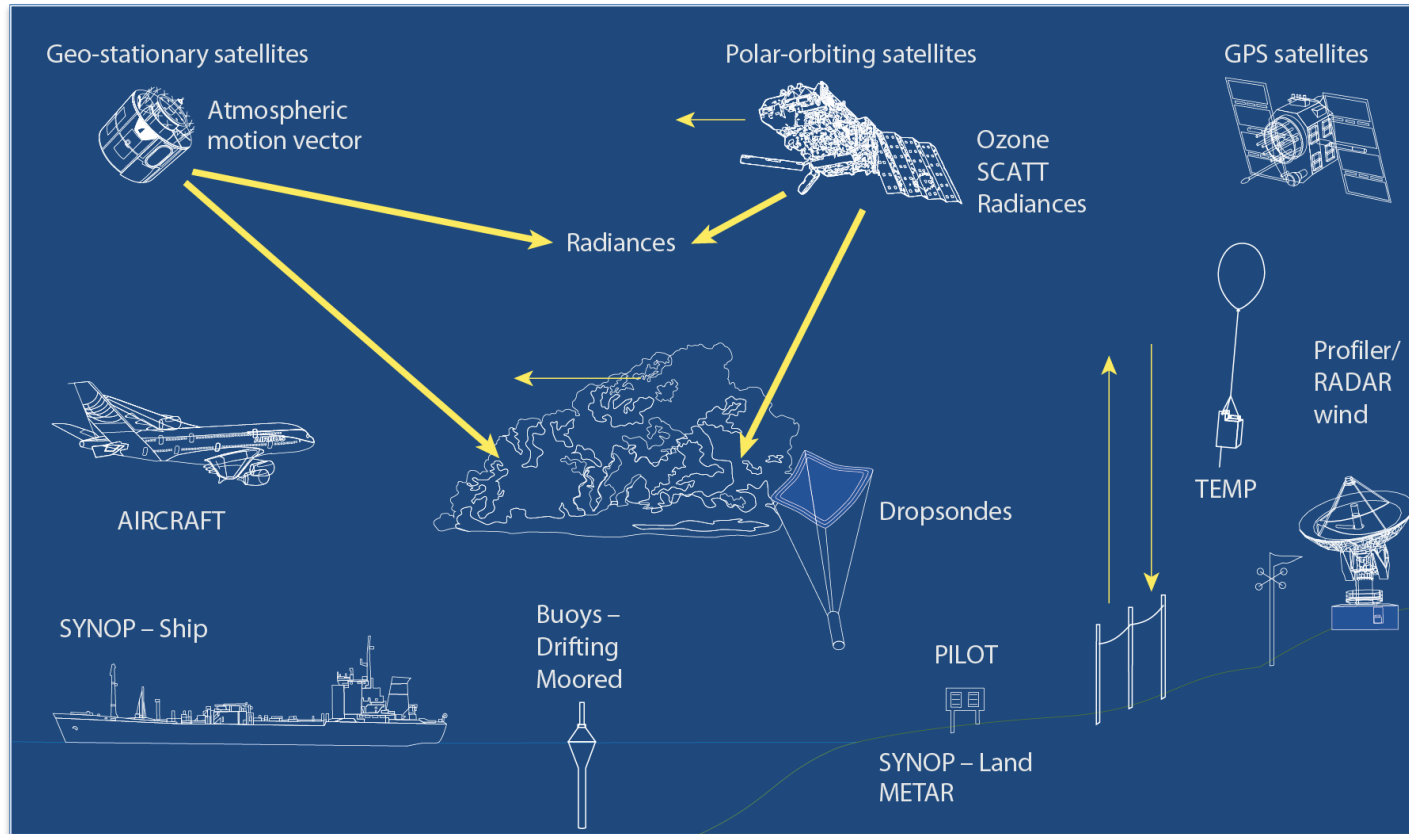
Deliverables

- Research in Earth System modelling
 - Global numerical weather forecasts
 - Supercomputing & data archiving
 - Education & training programme
-
- EU activities: Copernicus Climate and Atmosphere Services, EFAS contribution



The importance of well-calibrated Observations

Mission-driven science: 40 million observations processed every day

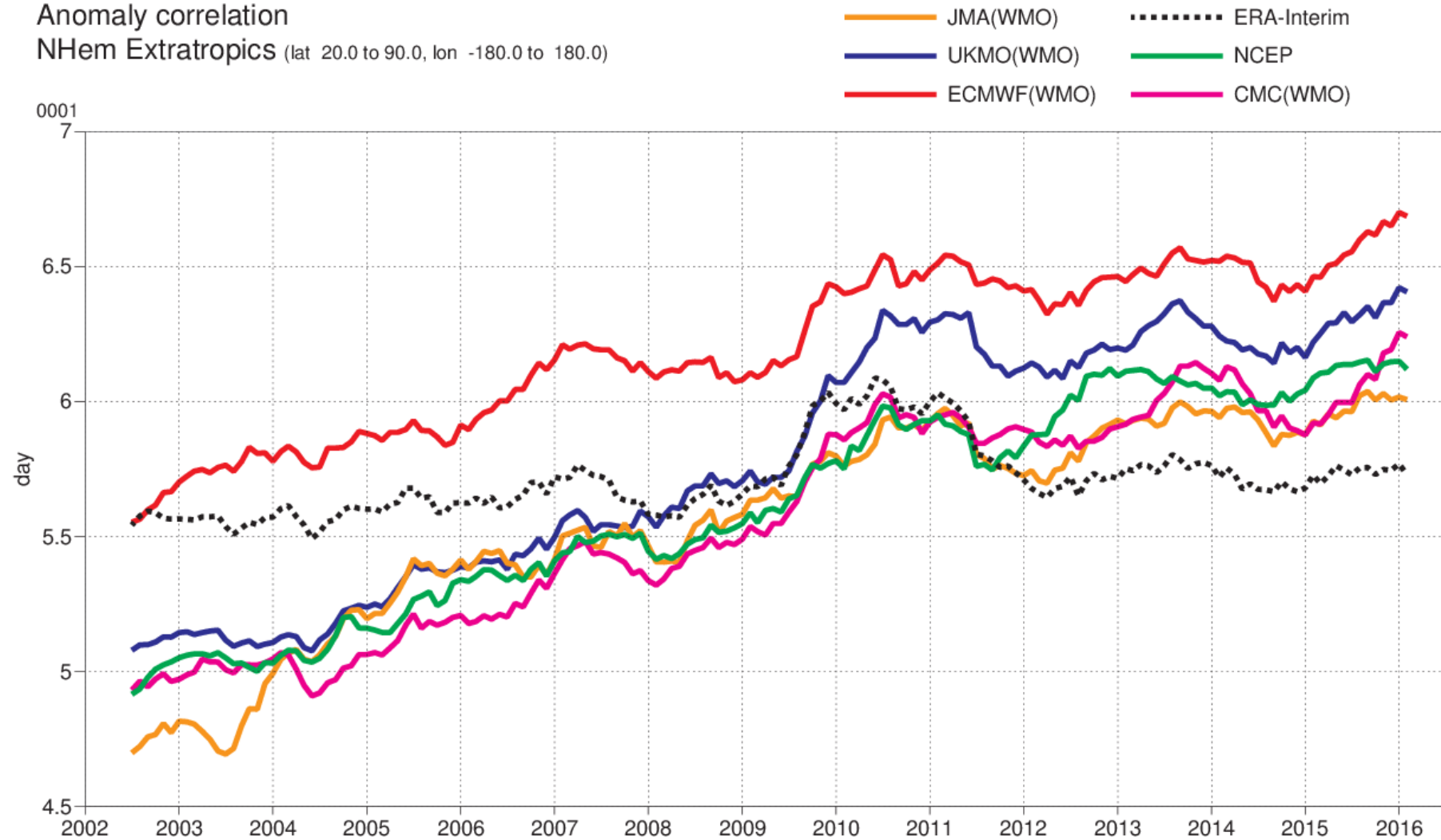


Comparison to other centres

500hPa geopotential

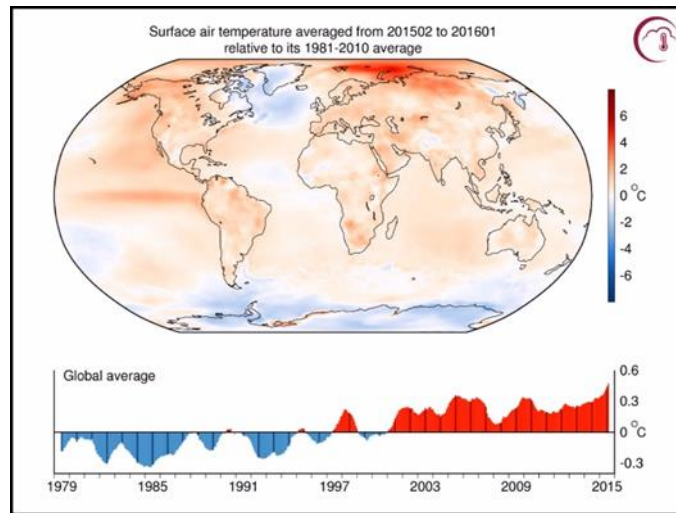
Anomaly correlation

NHem Extratropics (lat 20.0 to 90.0, lon -180.0 to 180.0)

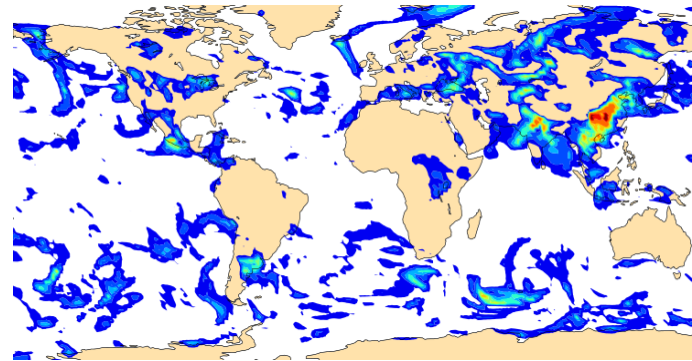


ECMWF Copernicus Services

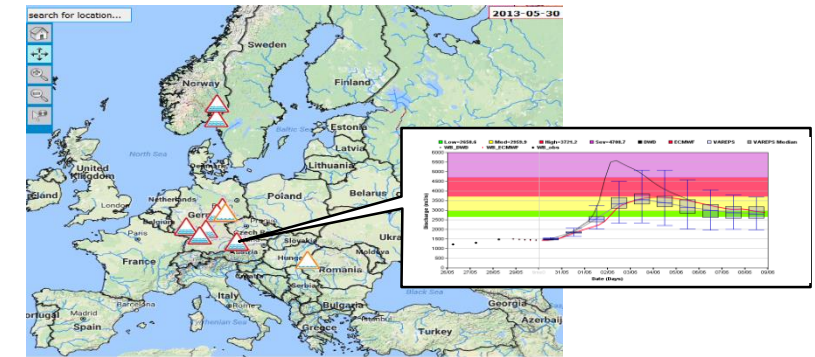
Climate Change (C3S), Atmospheric Monitoring (CAMS), Flooding Alerts EFAS



Surface air temperature anomaly for 2015 and evolution 1979-2015. Source: ERA-Interim.



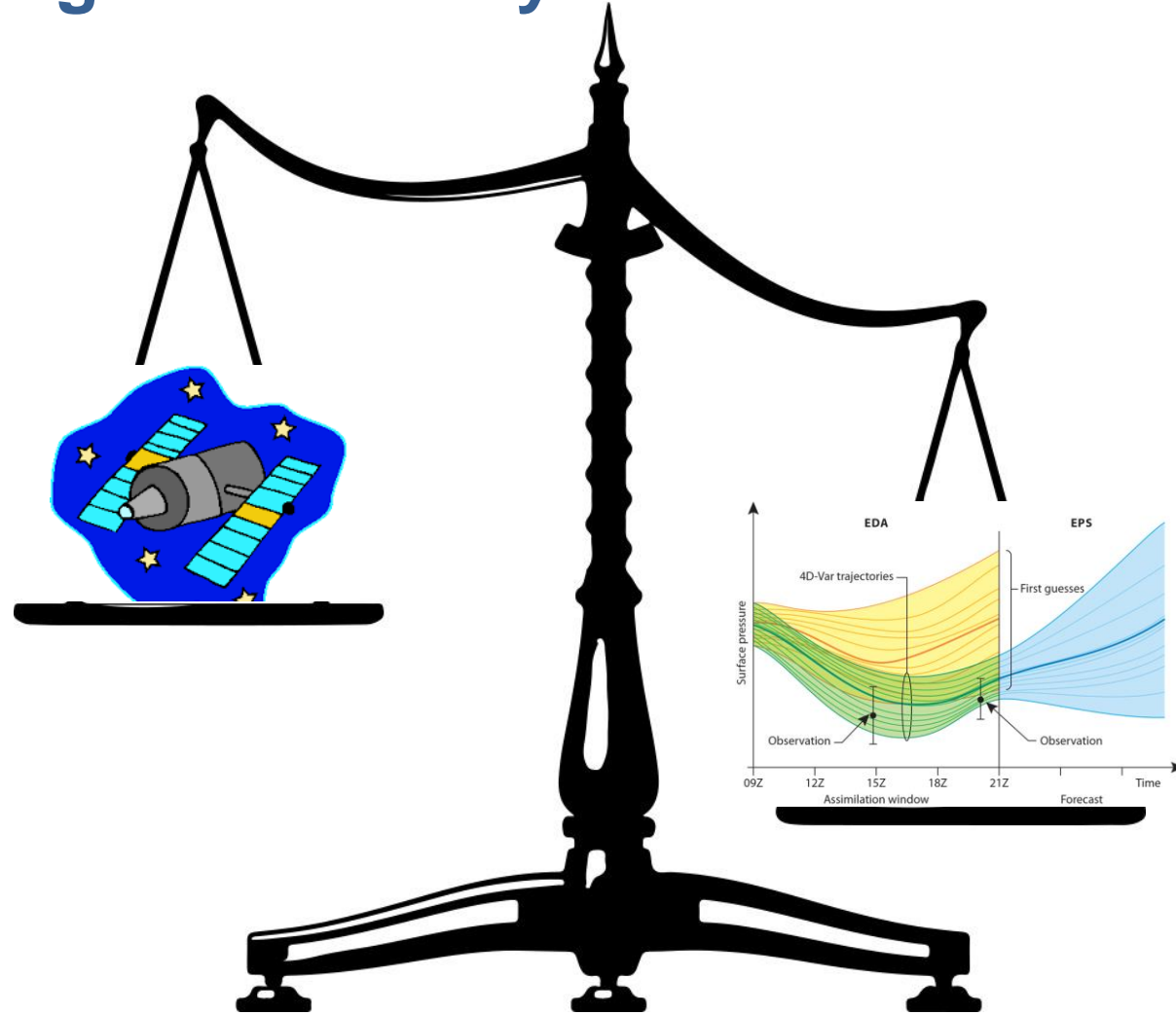
Twice-daily global forecasts up to 5 days of aerosol concentrations



**Twice-daily multi-model probabilistic flood forecasts up to 15 days
>50 European forecasting centres as partners**

Relevance of GAIA-CLIM for ECMWF

Improved handling of uncertainty



Relevance of GAIA-CLIM for ECMWF

The Importance of correcting biases in the observations

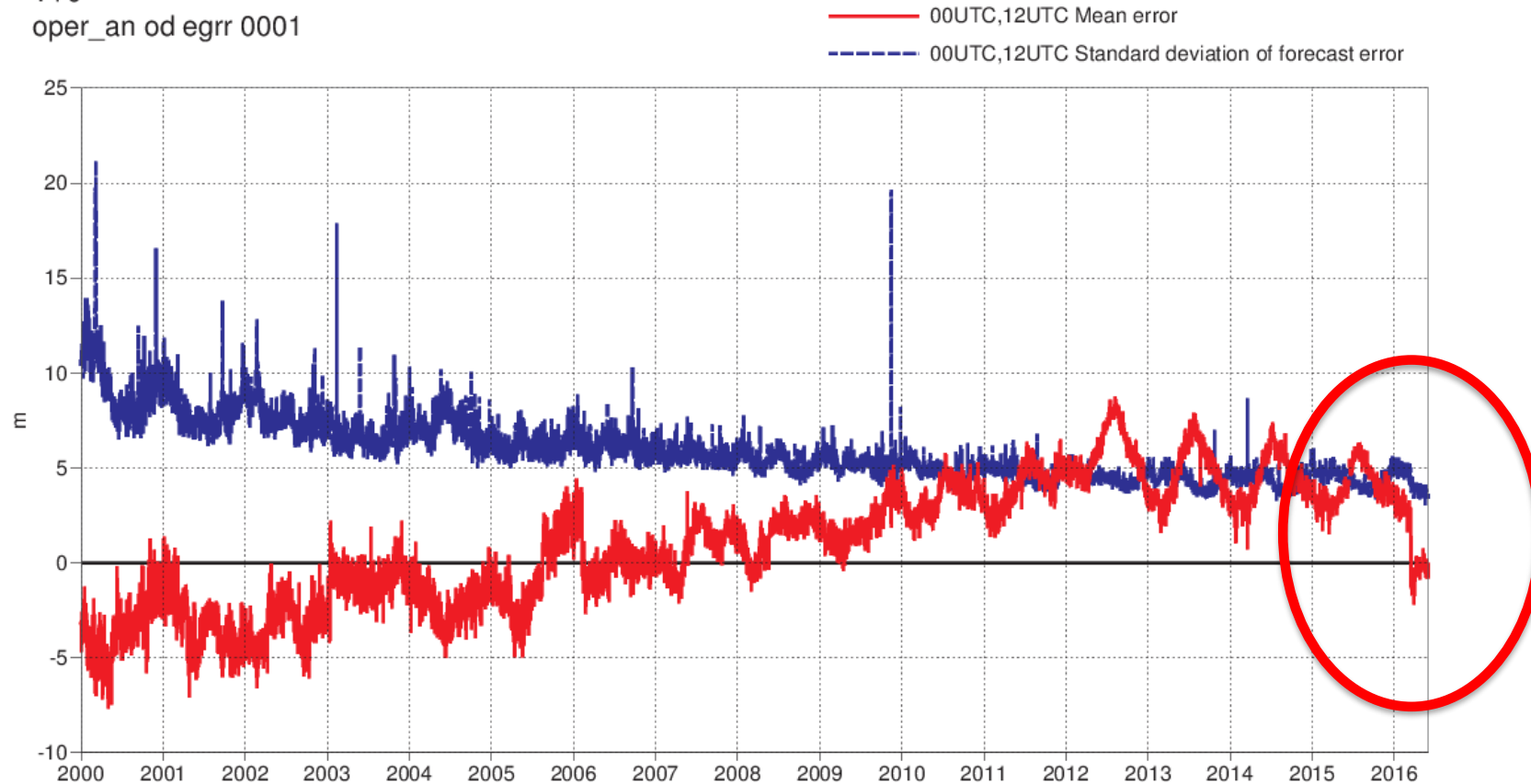
UKMO analysis against ECMWF analysis

500hPa geopotential

NHem Extratropics (lat 20.0 to 90.0, lon -180.0 to 180.0)

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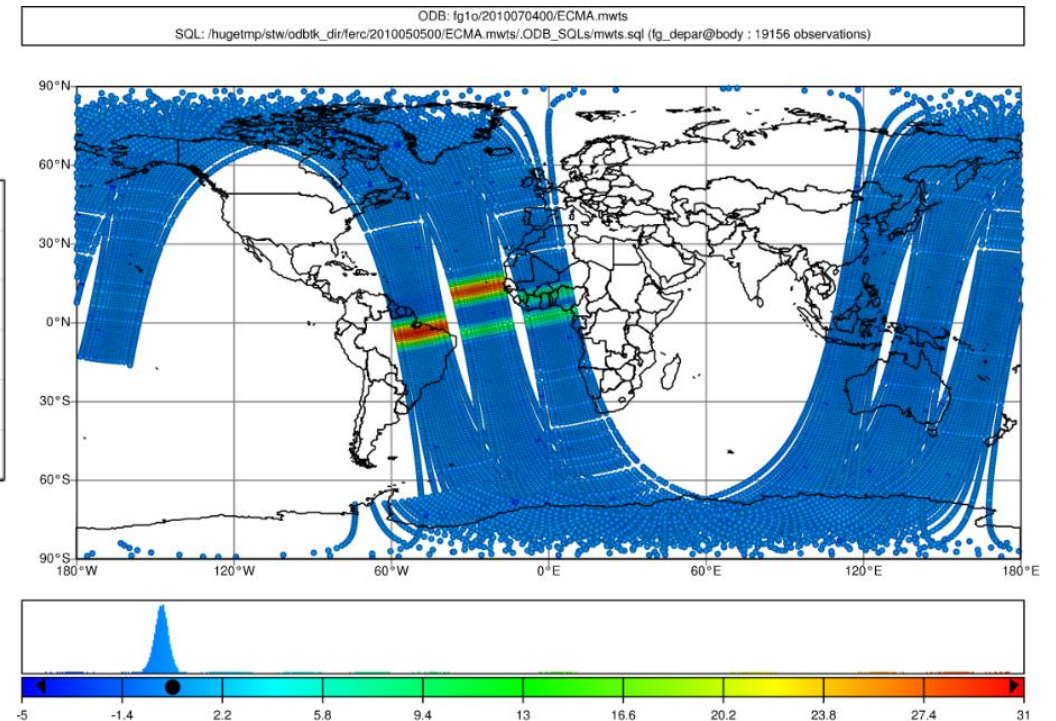
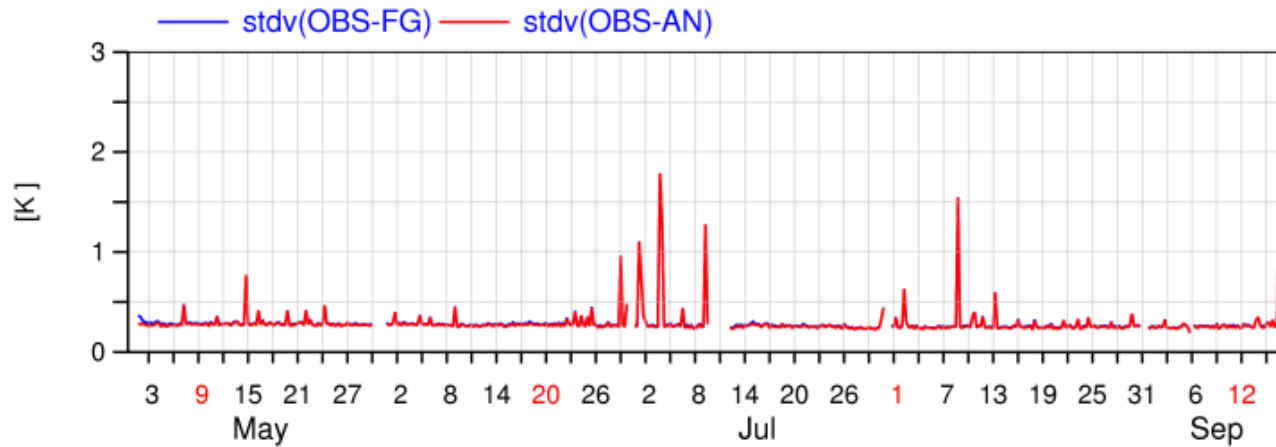


Relevance of GAIA-CLIM for ECMWF

Assessing new satellite observations

NWP forecasts are a powerful tool for assessing new satellite data:

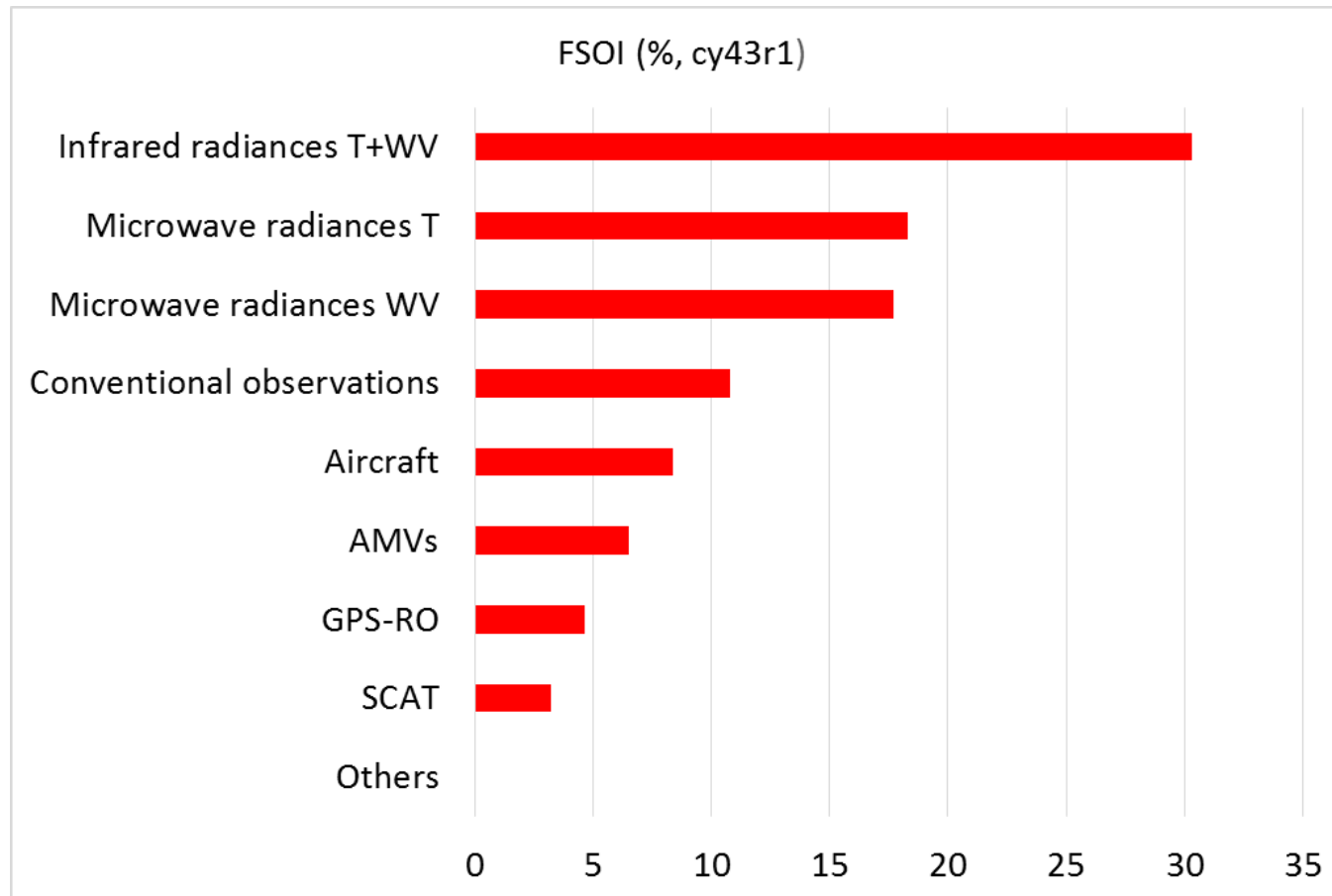
MWTS-3 FG DEPARTURES



Relevance of GAIA-CLIM for ECMWF

The importance of well-characterised observations

Total FSOI [%] by type of observation



Aeolus Doppler wind Lidar (launch Dec 2017) (ESA Earth Explorer Mission)



Conclusions

- Observations essential input to NWP
- Error characterisation:
 - Biases
 - Correlations
- Main needs:
 - Anchoring observations
 - Wind information



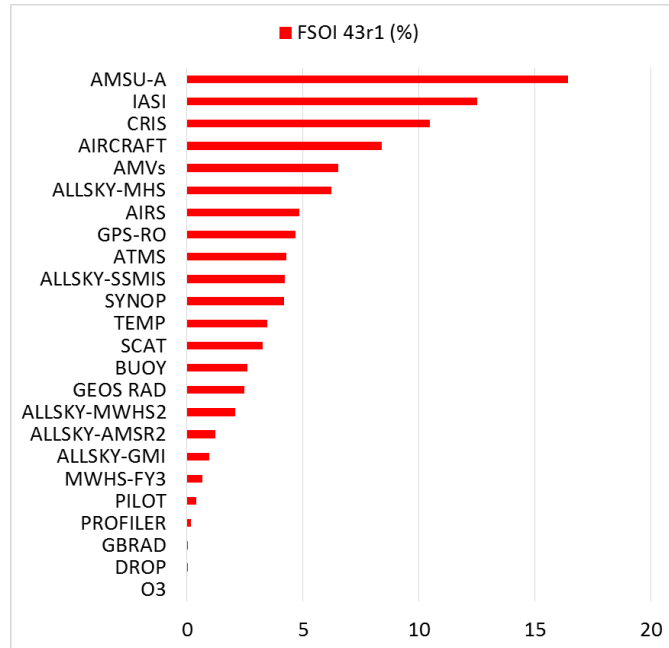
The strength of a common goal

Extra slides...

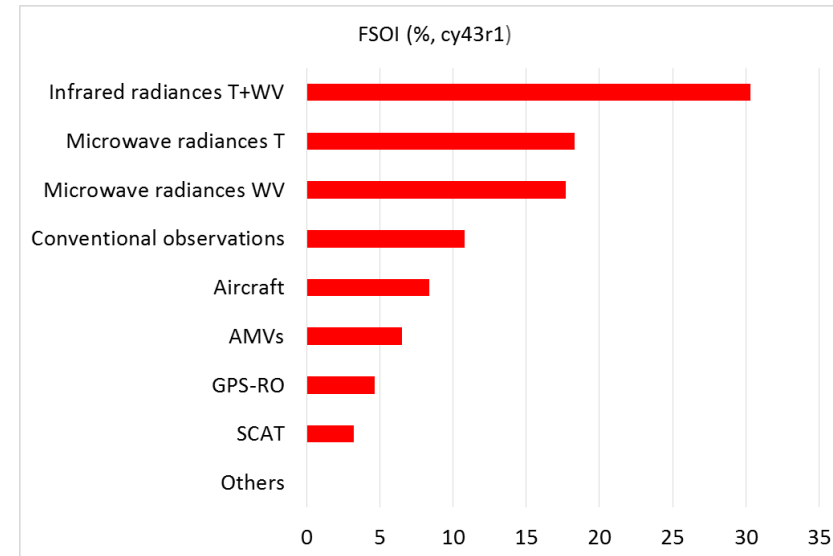
Relevance of GAIA-CLIM for ECMWF

The importance of well-characterised observations

Total FSOI [%] by instrument



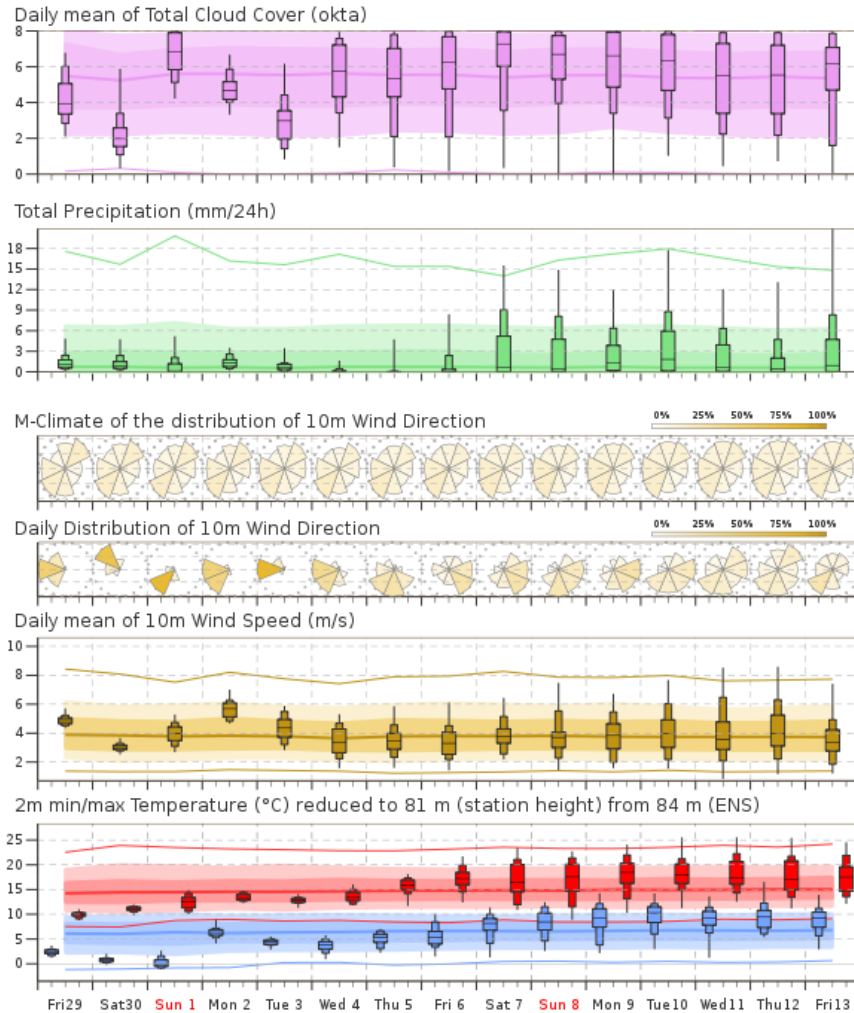
Total FSOI [%] by type of observation



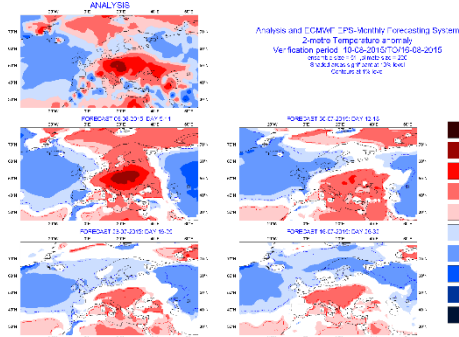
23 million observations are actively assimilated each cycle

Deliverables: a few examples

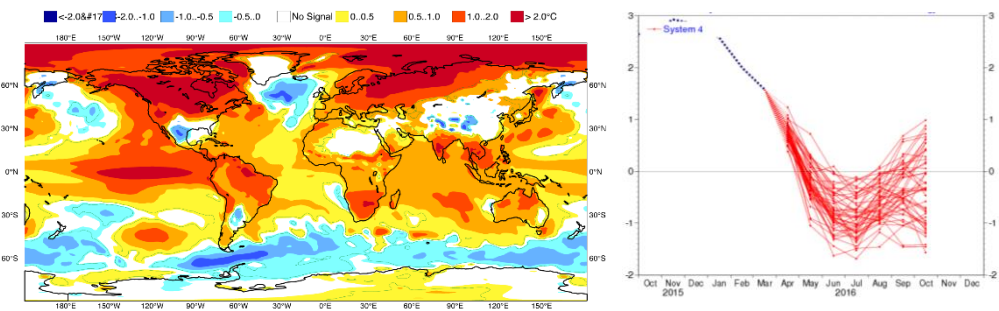
Medium-range



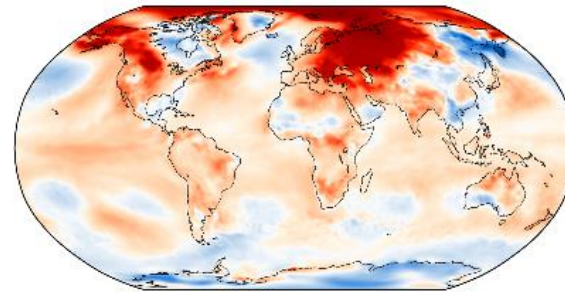
ENS-Monthly Forecasting System 2mt anomaly



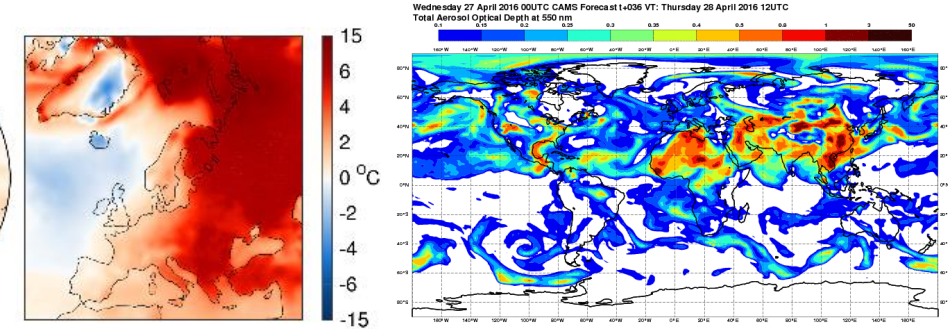
Seasonal Forecast



Global average temperatures

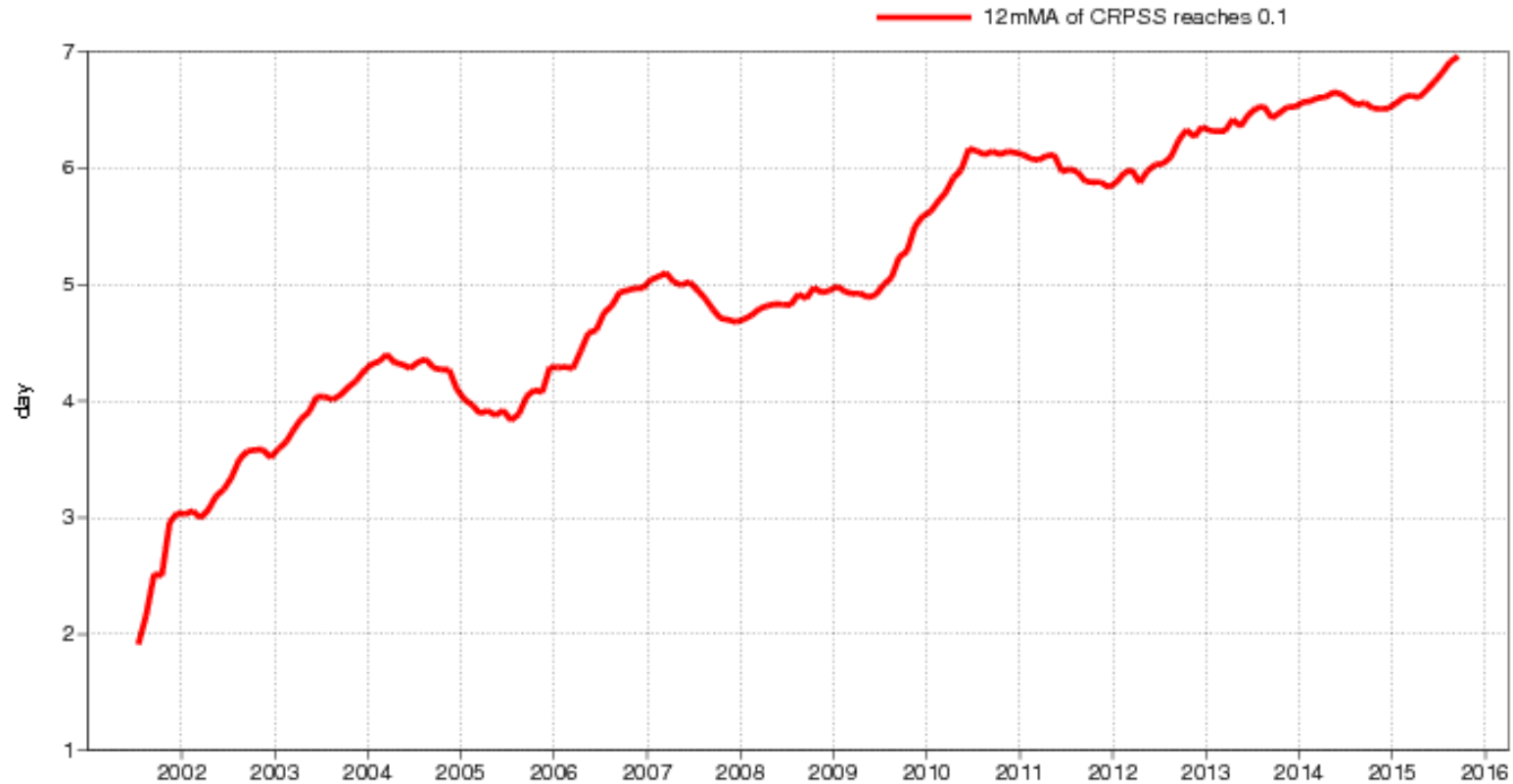


Forecast of Aerosols Optical Depth



European co-operation at its best: Continuously aiming to improve

total precipitation
Continuous ranked probability skill score
Extratropics (lat -90 to -30.0 and 30.0 to 90, lon -180.0 to 180.0)



The importance of well-calibrated Observations

23 million observations assimilated each cycle

