



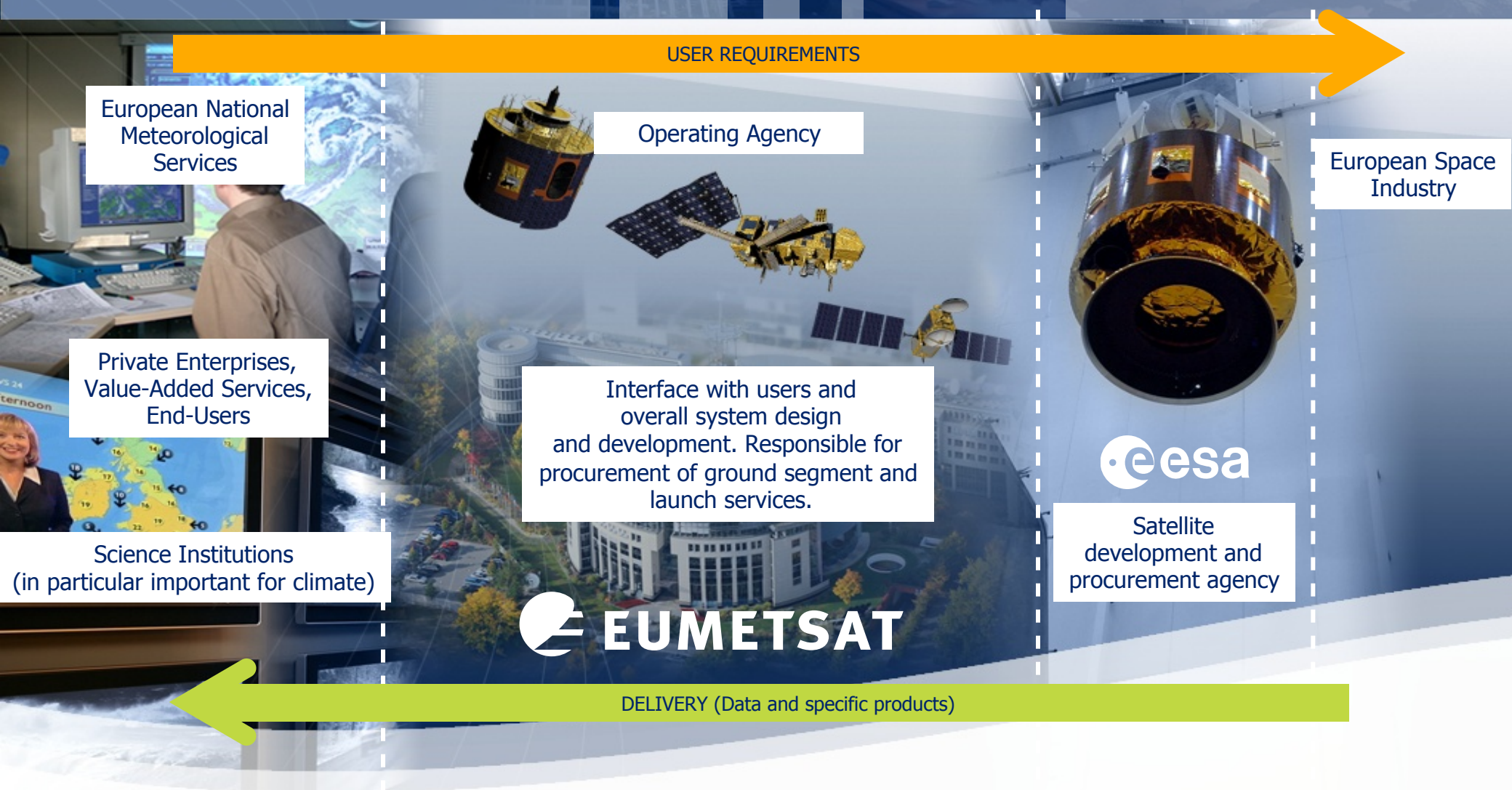
# EUMETSAT Activities Related to Climate



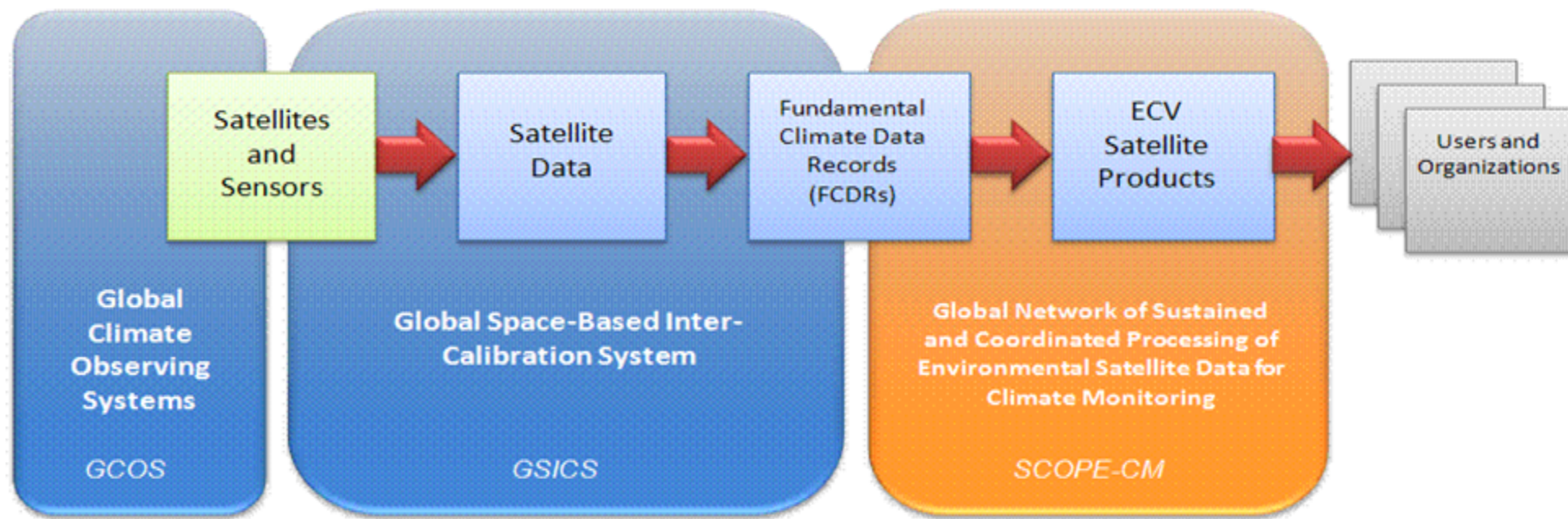
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[joerg.schulz@eumetsat.int](mailto:joerg.schulz@eumetsat.int)



# What we do



## Conceptual View of End-to-End Provision of ECV CDRs

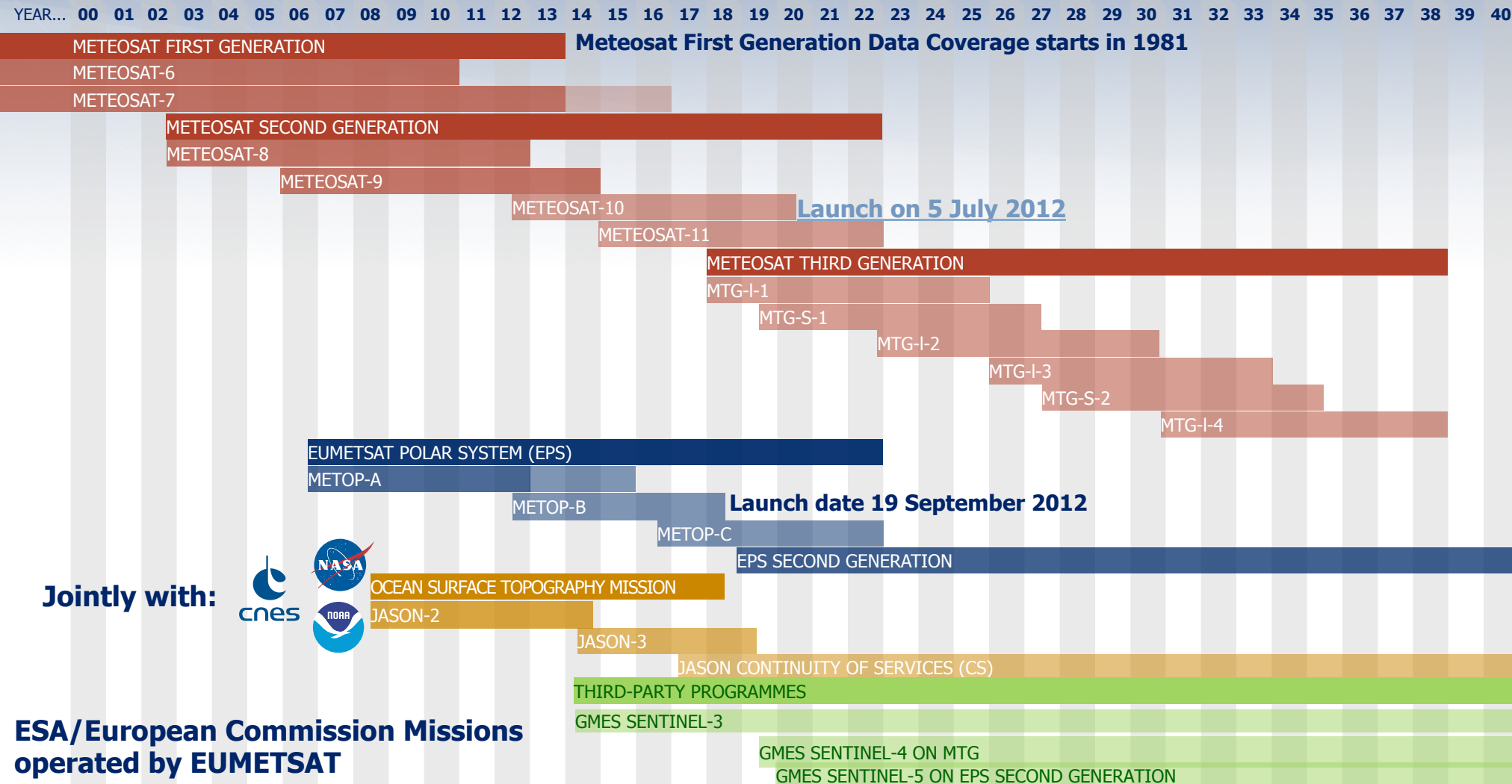


The architecture for space-based for climate monitoring contributing to the Global Framework for Climate Services in the context of WMO considers the whole chain from observations to decision making.





# EUMETSAT Space Segment







# MSG-3 Launch





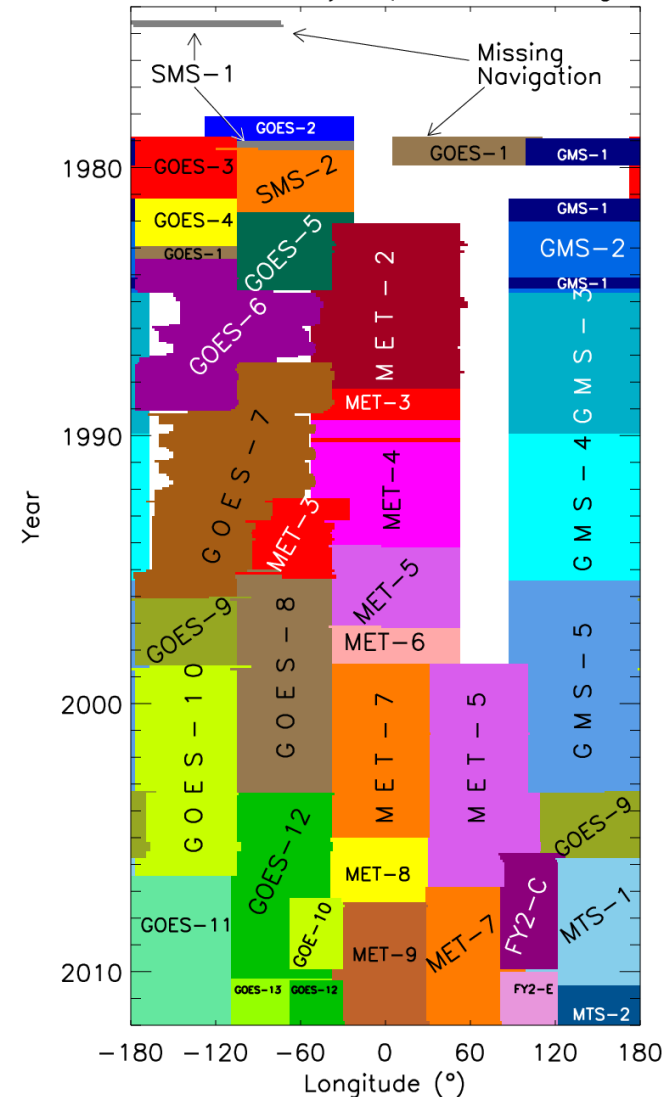
# Recent Activities

- EUMETSAT has set up operational infrastructure for fast reprocessing of data that ensures reproducibility and update of data sets;
- EUMETSAT has set up a data set generation plan for its Central Application and distributed Satellite Application Facility (CAF and SAF) network covering 2012-2017;
- The CAF is concentrating on improvements of Fundamental radiance records used for both DA in reanalysis and retrieval schemes;
- The SAF network has significantly increased its commitments towards production of Climate Data Records including data for atmosphere, ocean, land and ice surfaces as well as atmospheric composition;
- Many of these activities are performed in the frameworks of GSICS and SCOPE-CM.



# FCDR Creation - Scale of the Challenge

## ISCCP Geostationary Equator Coverage



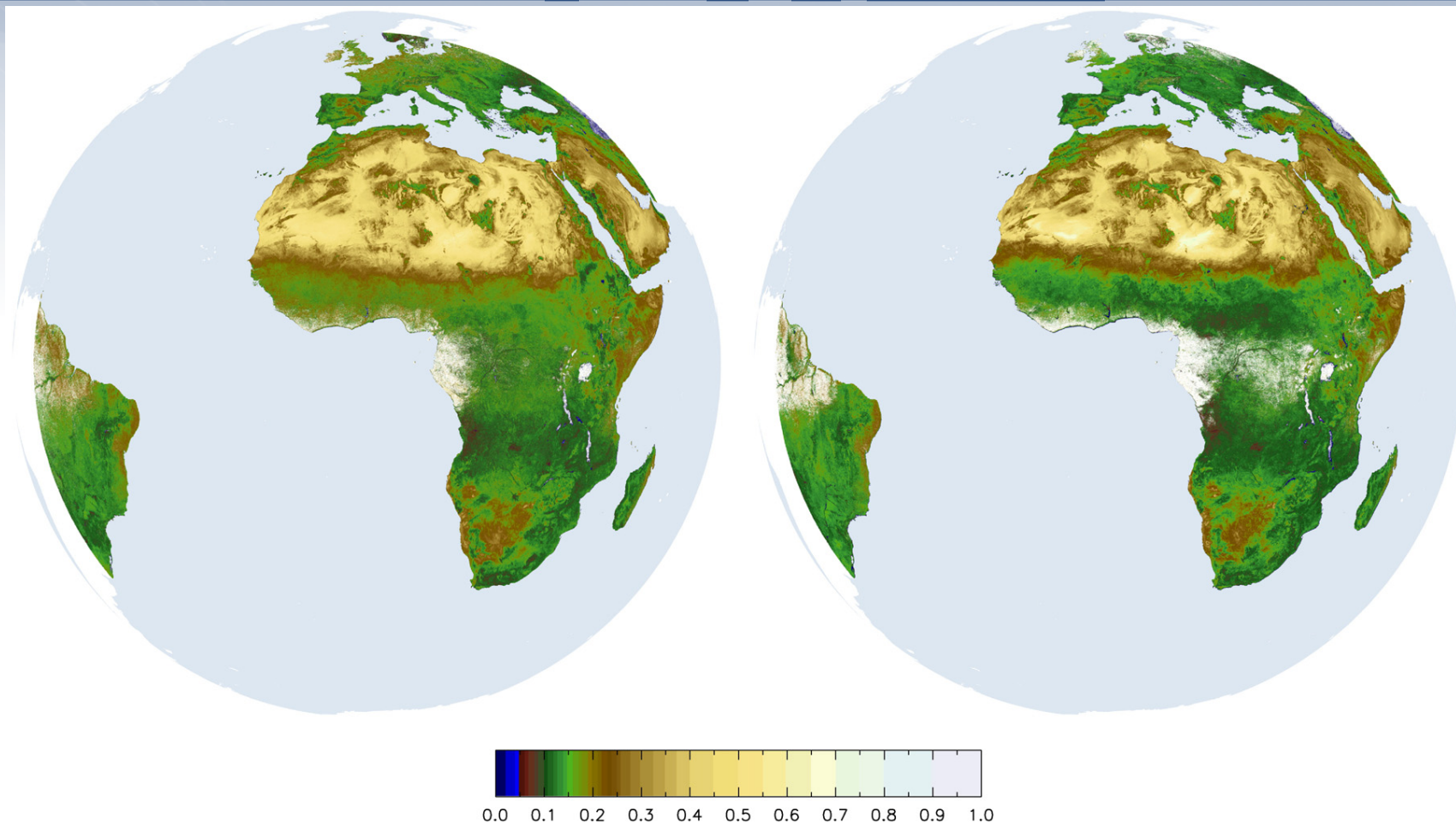
- International community has embarked on the creation of FCDRs for archived data (EUMETSAT, NOAA-CDR program and similar programs);
- It is essential for fulfilling GCOS ECV requirements;
- Inter-calibration of the sensors to allow seamless products is a weakness in existing data records, e.g., GEWEX data projects;
- The creation of FCDRs has a large science component calling for collaborations of space agencies and scientists **← WCRP involvement;**
- **GSICS and SCOPE-CM are the right frameworks to make progress and achieve GCOS goals.**

Figure: Courtesy of Ken Knapp, NOAA-NCDC



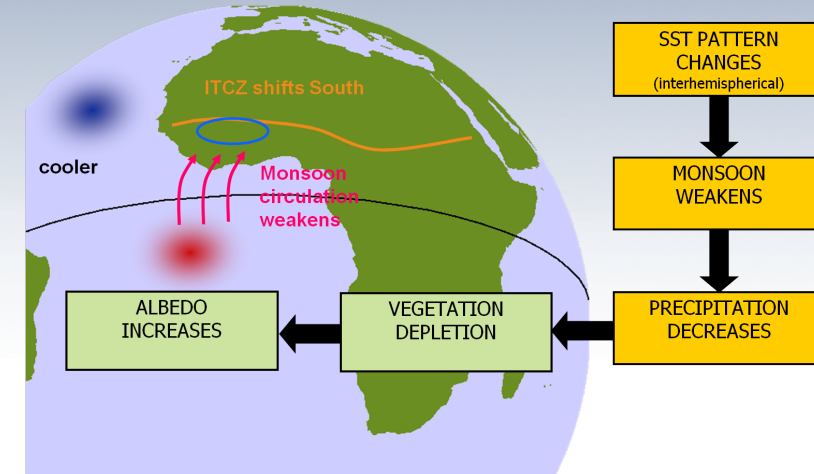
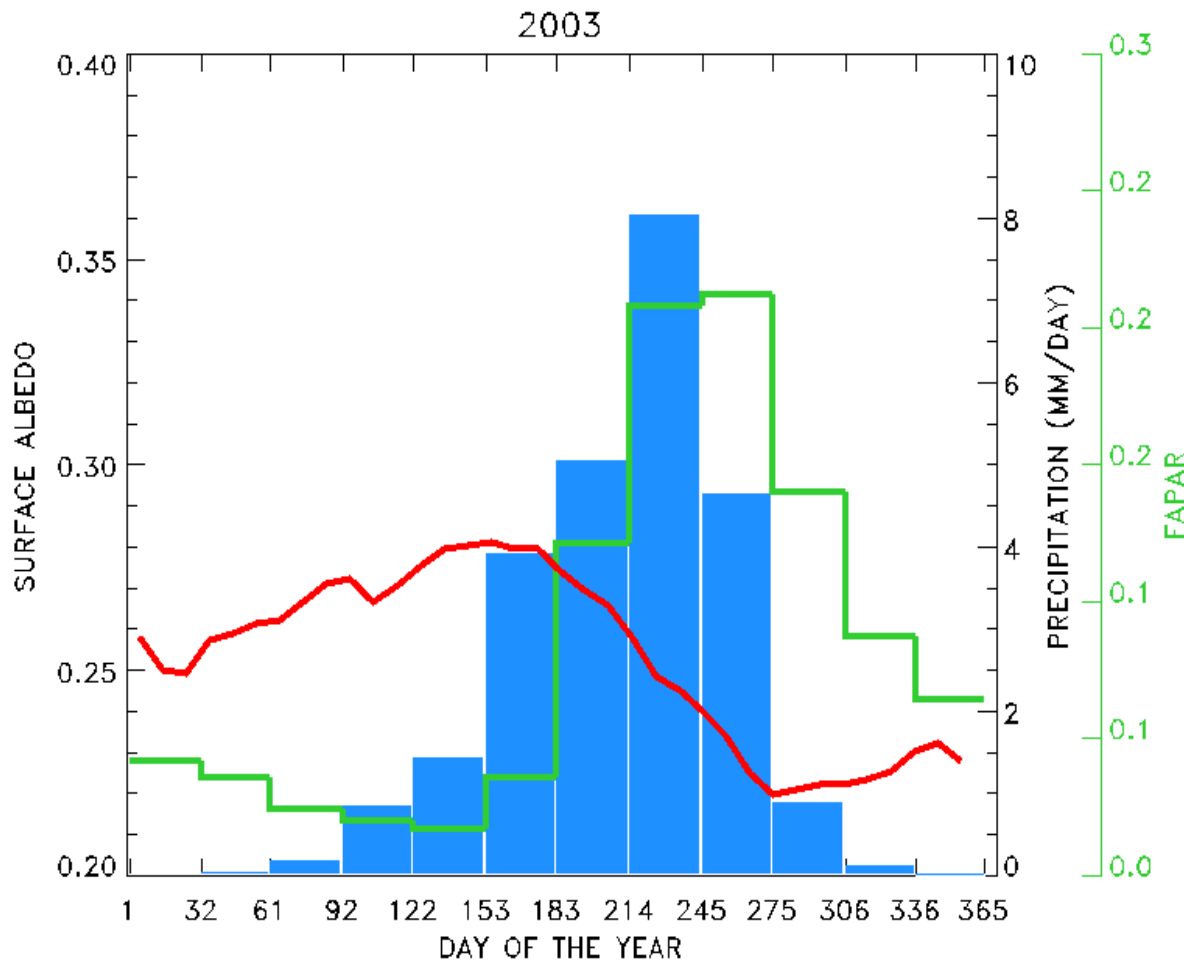


# Monitoring Change of Surface Albedo with Meteosat



**Fig. 4. Mean broadband surface albedo derived from Meteosat observations for the August–October (ASO) period for year 1984 (left) and 2003 (right). Unprocessed data are shown in white to the exception of oceans which are shown in light blue. Products available from [www.eumetsat.int](http://www.eumetsat.int).**

# An Application of Meteosat Surface Albedo: Albedo Response to Precipitation Change



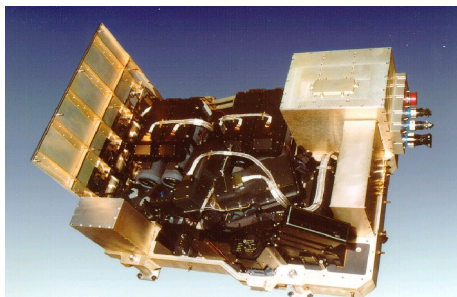
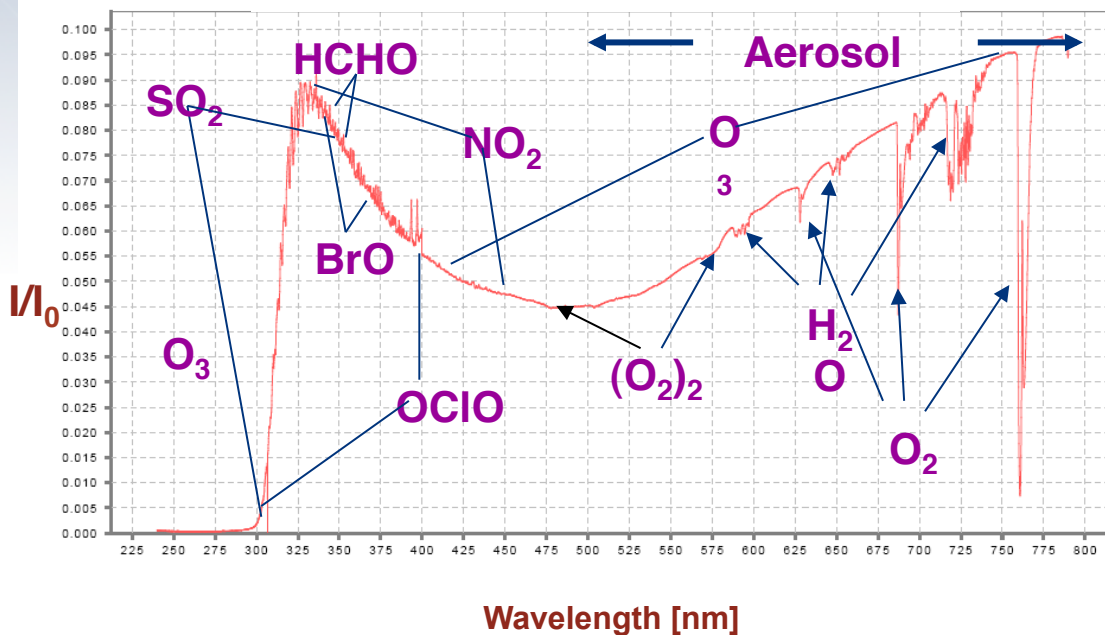
- Seasonal cycle (2003, spatial average over 8.5°W–8.5°E and 12.5°–15.5°N) of monthly mean precipitation in mm/d (blue) from the Global Precipitation Climatology Project, Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) (green) derived from SeaWiFS and surface albedo (red) derived from Meteosat 7 data.
- The delay between the onset of precipitation and growing vegetation is ~ 1 month.
- The inverse proportional effect between vegetation growth and corresponding albedo change is indicating high consistency of observations.



# The GOME-2 instrument on Metop

Measuring atmospheric composition

## GOME-2 main channel transmittance



## Orbit file sizes

GOME-2 L1B ~ 1GB  
IASI L1C ~ 2GB

## GOME-2:

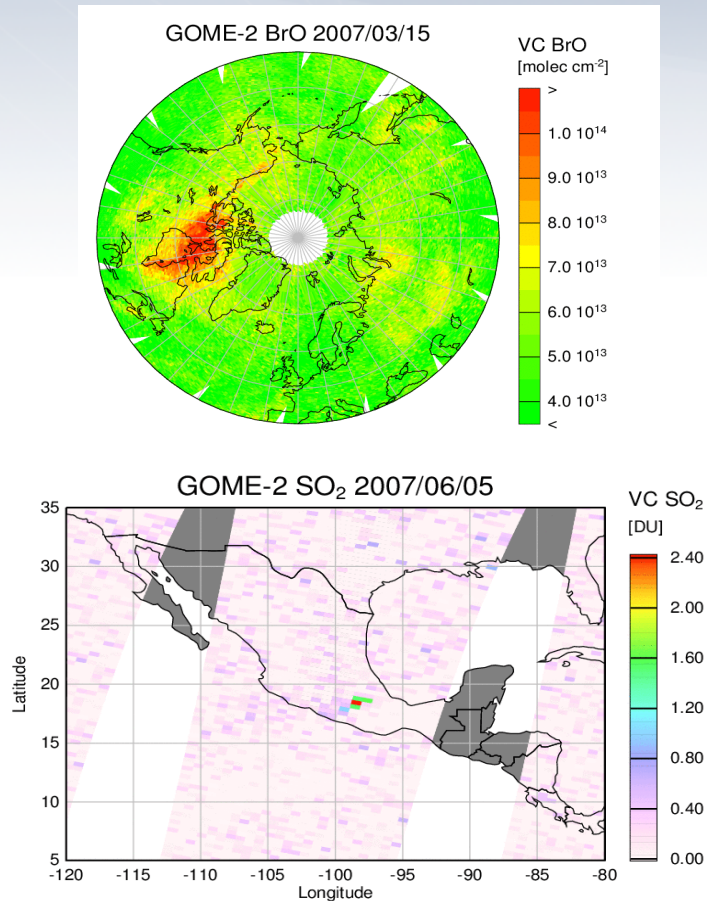
- series of 3 instruments on Metop (Metop A launched in 10/2006)
- sun-synchronous orbit, 09:30
- 412 orbits (29 days) repeat cycle
- Global coverage 1.5 days
- 240 nm to 800 nm
- 0.25 to 0.5 nm spectral resolution (FWHM)
- 4 channels with 4098 energy measurements of polarisation corrected radiances (40 x 80 km<sup>2</sup>)
- 2 channels with 512 energy measurements of linear polarised light in perpendicular direction (S/P) (40 x 10 km<sup>2</sup>)



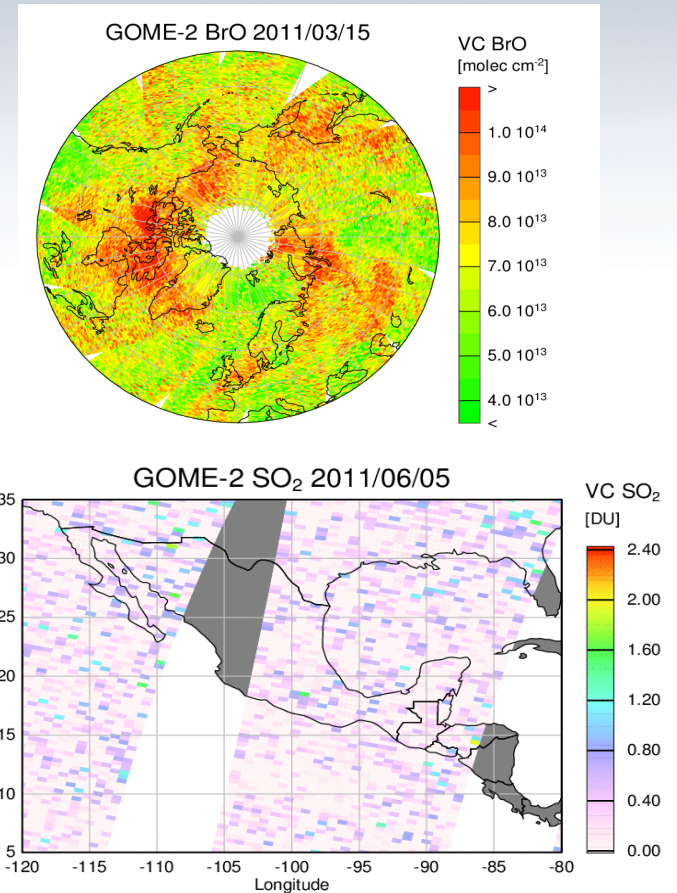


# Motivation of GOME-2 Reprocessing

**At beginning of mission**



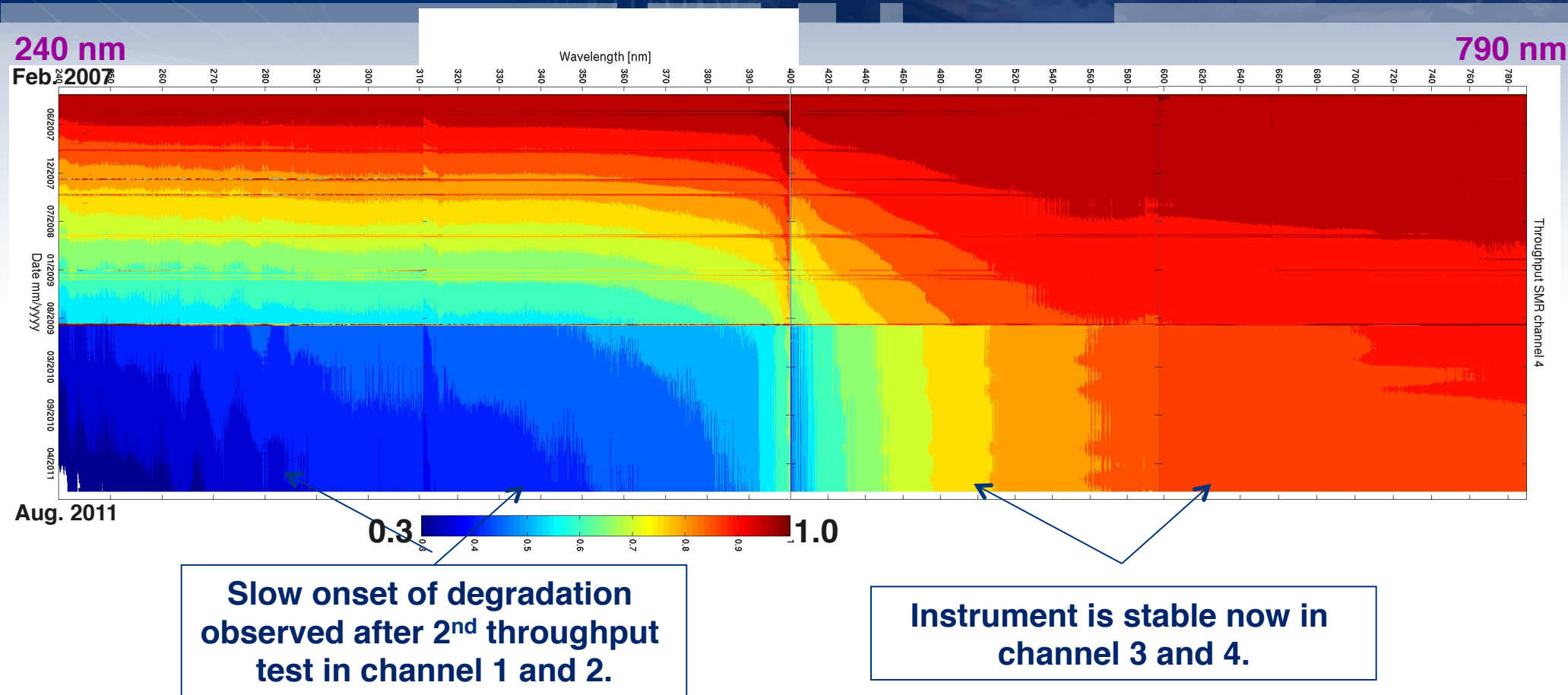
**After 4 years of operation**



Figures courtesy of A. Richter, University of Bremen

# GOME-2 Long-term throughput changes

## Solar Mean Reference (SMR) spectrum

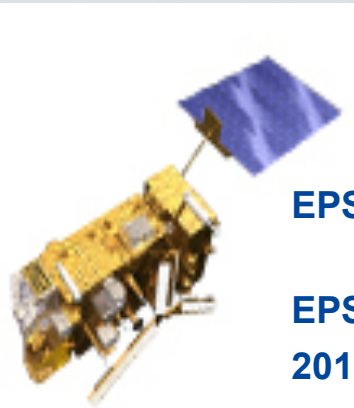


Reprocessed signals R2 PPF 5.2 until August 2011  
relative to February 2007



# EUMETSAT Current and Future Programme for Operational Oceanography

## Mandatory Programs



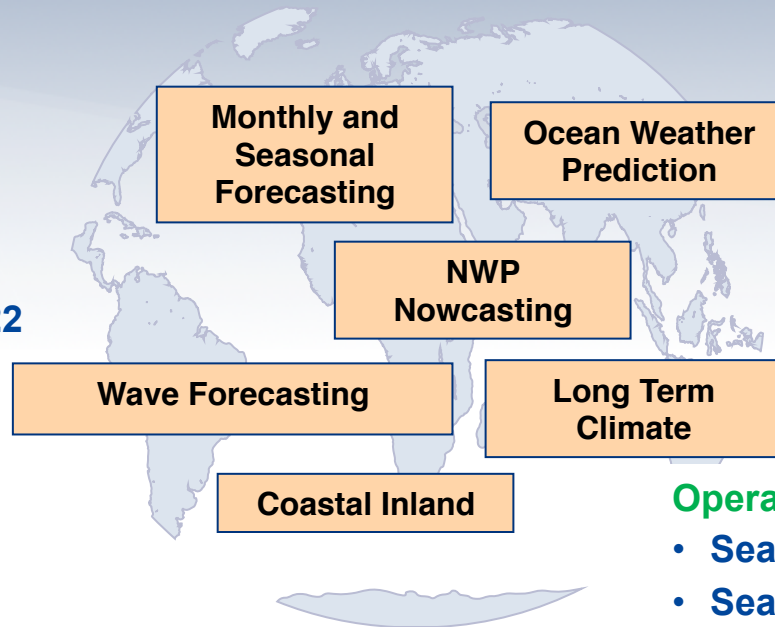
**EPS – until 2022**

**EPS-SG  
2018 -2035**

**Meteosat First  
Generation  
(until 2016)**

**MSG (until 2020)**

**MTG (2018-2038)**



The EUMETSAT  
Network of  
Satellite Application  
Facilities



The EUMETSAT  
Network of  
Satellite Application  
Facilities



## Optional Programs



**Jason-2**  
**Jason-3**  
**Jason -CS**  
**GMES Sentinel 3**

**Plus access to and use of third party mission data.**

### Operational Products :

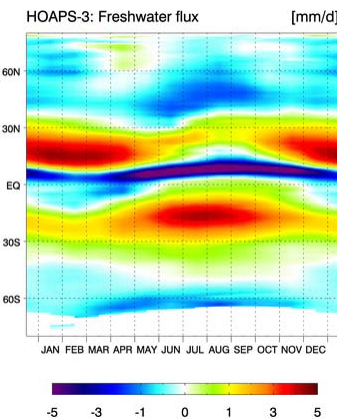
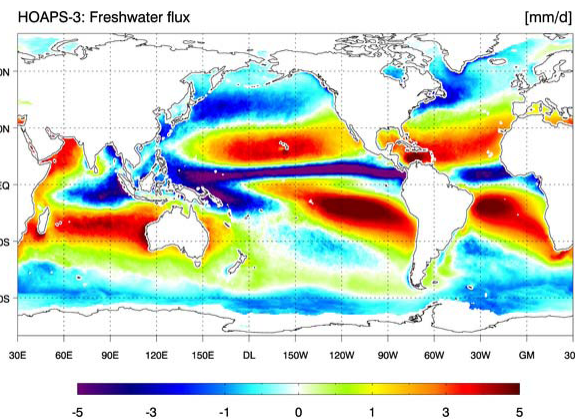
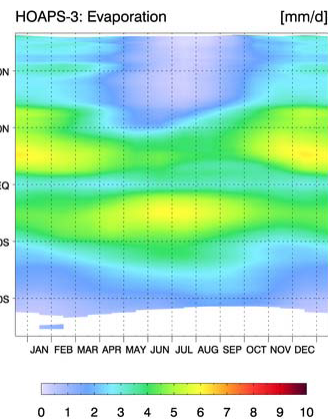
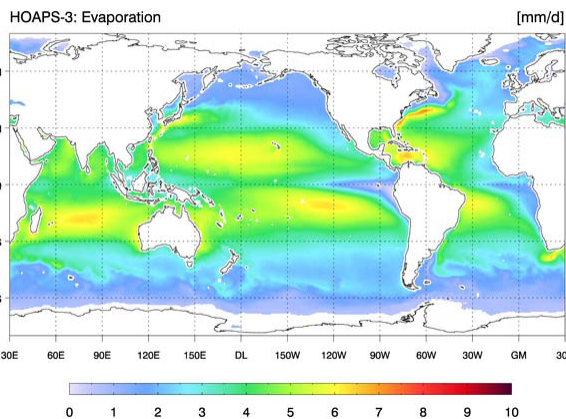
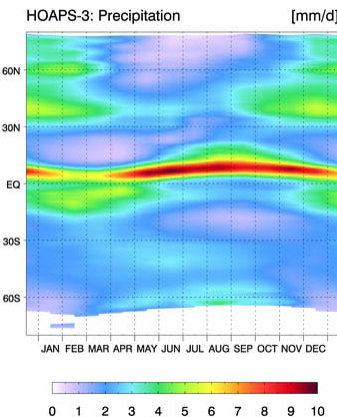
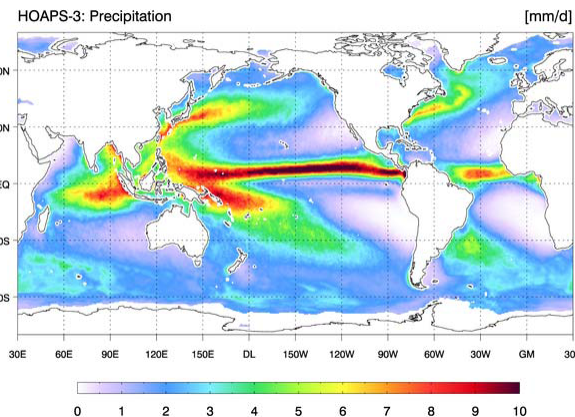
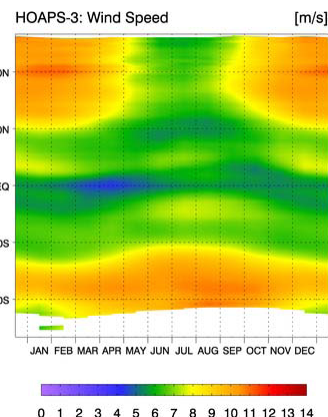
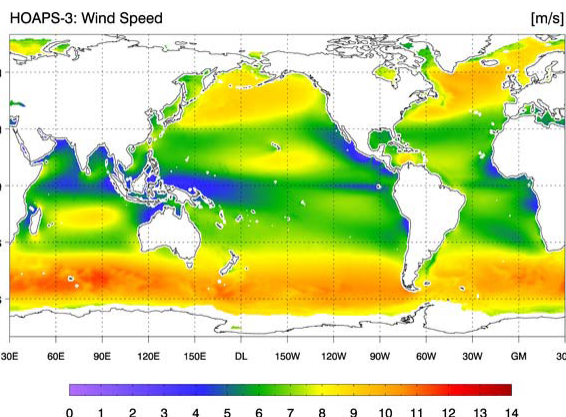
- Sea Surface Temperature (SST)
- Sea Surface Heights (SSH)
- Ocean Surface Vector Winds (OVW)
- Sea Ice Concentration
- Ocean Surface Fluxes (Radiation)
- Ocean Colour (OC)

### Climate Data Records:

- SSM/I FCDR (CM-SAF)
- Sea Ice Concentration (OSI-SAF)
- Ocean Surface Wind Speed (CM-SAF)
- Ocean Surface Fluxes (Latent Heat, Precipitation and Radiation) (CM-SAF)



# The HOAPS Freshwater Flux Climatology



**SSM/I derived climatology covering 1987-2008 employing inter-calibrated SSM/I radiances. Continuation with SSMIS data is subject of CDOP-2.**