

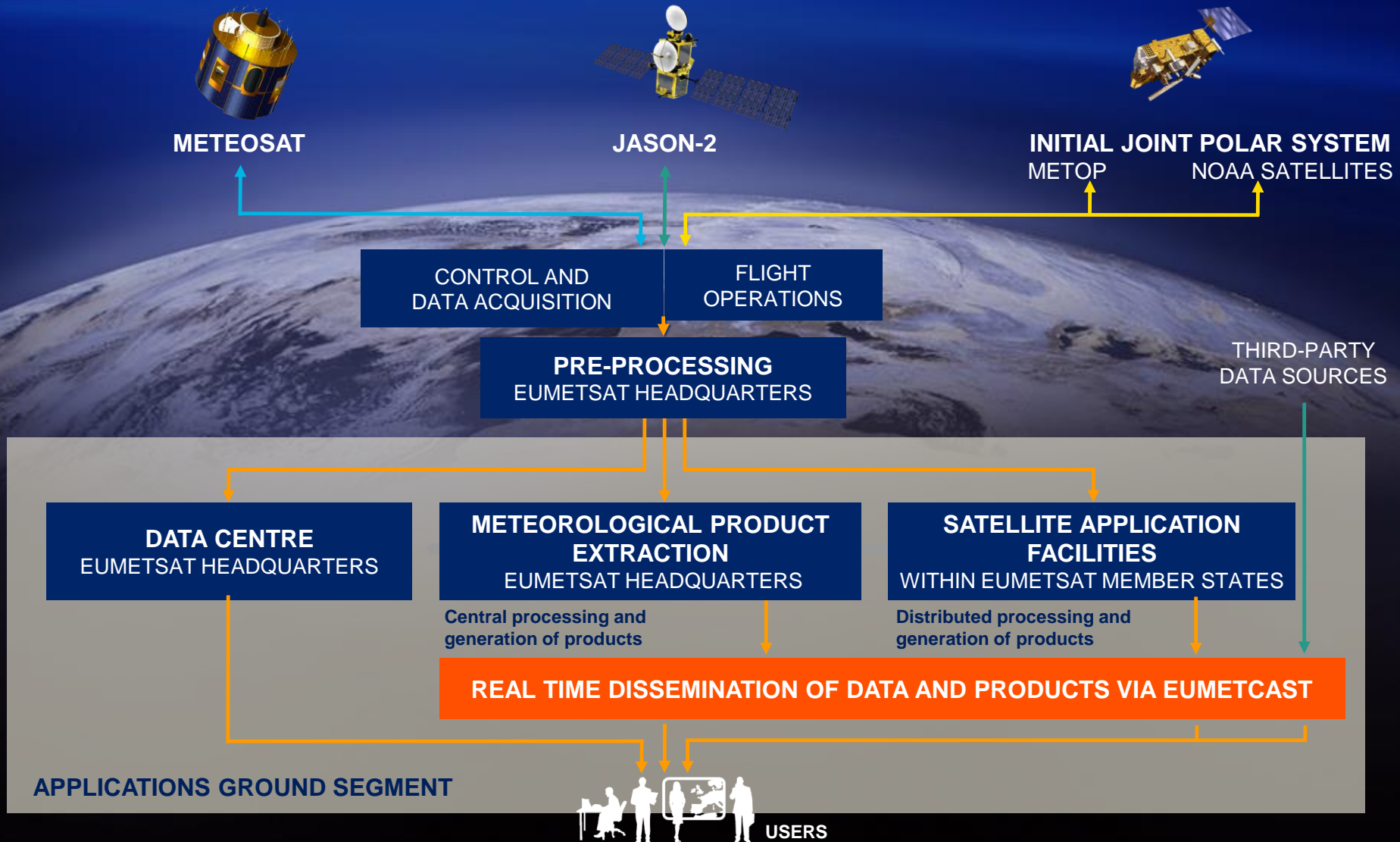
EUMETSAT SAF NETWORK



**Lothar Schüller, EUMETSAT
SAF Network Manager**



EUMETSAT ground segment overview



What is a SAF?



- SAF = **Satellite Application Facility**
- part of the EUMETSAT application ground segment
- complement production of standard meteorological products at EUMETSAT central facility
- providing products and services to users
- specialised on topics and themes
- located at Weather Services in EUMETSAT Member and Co-operating States
- developed and operated by consortium of partners

Nature of SAF products

The goal of SAFs is to provide “operational” products.
What do we mean with operational?

- Continuity of product provision
- Continuity of product improvements
- Continuous quality monitoring
- Committed user services
- Validation and review before official release/launch
- Complete Documentation of Products, Algorithms, Validation Results
- ...

EUMETSAT SAF network across Europe



Support to Operational Hydrology and Water Management
Led by Italian Meteorological Institute



Radio Occultation Meteorology
Led by Danish Meteorological Institute



Ozone and Atmospheric Chemistry Monitoring
Led by Finnish Meteorological Institute



Land Surface Analysis
Led by Portuguese Meteorological Institute



Support to Nowcasting and Very Short
Range Forecasting
Led by Agencia Estatal de Meteorología,
Spain



Ocean and Sea Ice
Led by Météo France



Climate Monitoring
Led by Deutscher Wetterdienst, Germany

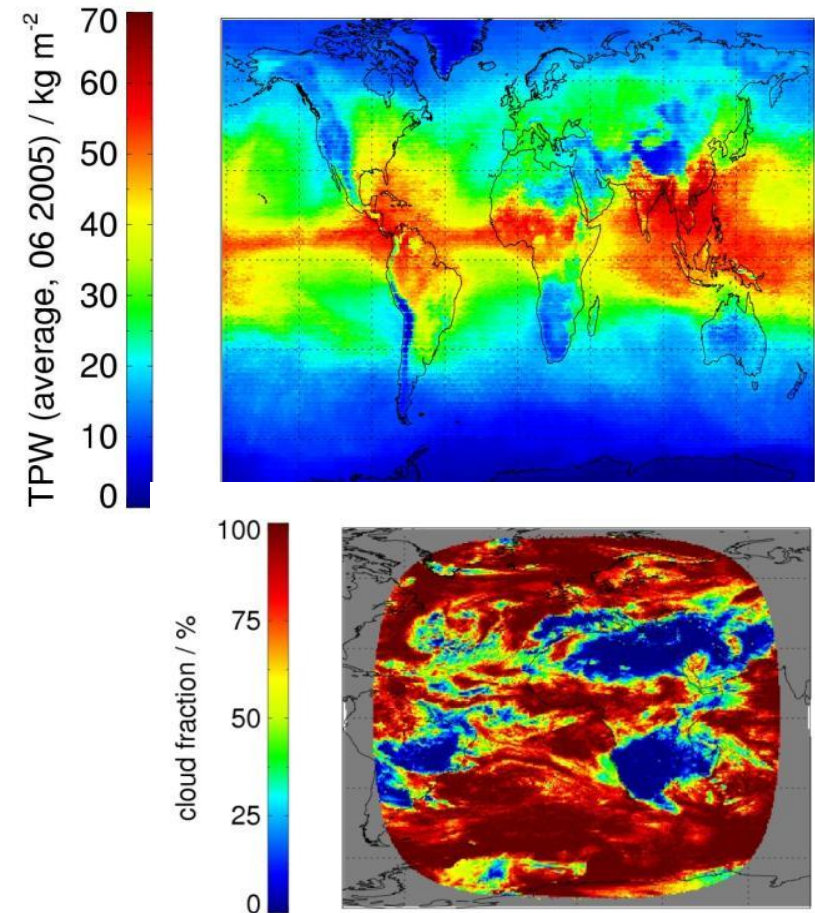


Numerical Weather Prediction
Led by Met Office (UK)



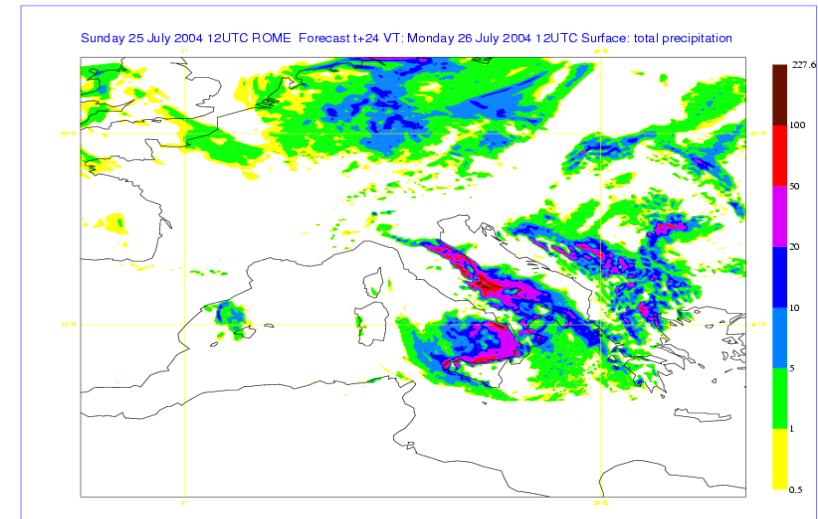


- SAF on Climate Monitoring
- generates and archives high-quality data-set for specific climate application areas
- Currently concentrates on:
 - cloud parameters
 - radiation budget parameters
 - atmospheric humidity
- Leading Entity is the German Weather Service DWD, Offenbach
- NOAA-AVHRR based data operationally produced since November 2004, MSG based data from October 2005, Metop data used since 2009.
- Climate Data Records: 20 years of SSM/I Water Vapour information released in 2009.
- NOAA-AVHRR based 20 years of homogeneous data record (clouds, surface radiation) released 2012
- Upcoming Climate Data Records based on SEVIRI, ATOVS, SSM/I



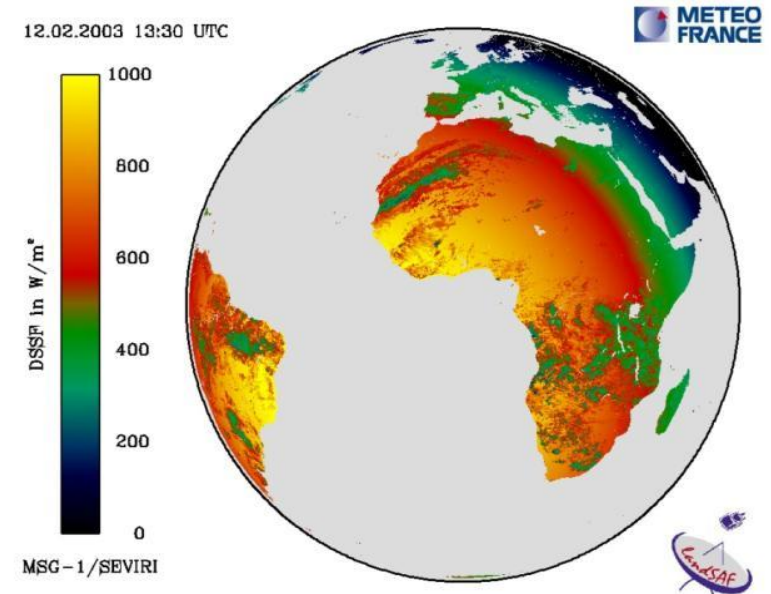


- SAF on Support to Operational Hydrology and Water Management
- Leading Entity: Italian Meteorological Service (USAM)
- SAF products focuses on
 - ▶ precipitation
 - ▶ soil moisture
 - ▶ snow parameters
 - ▶ utilisation of these parameters in hydrological models and NWP



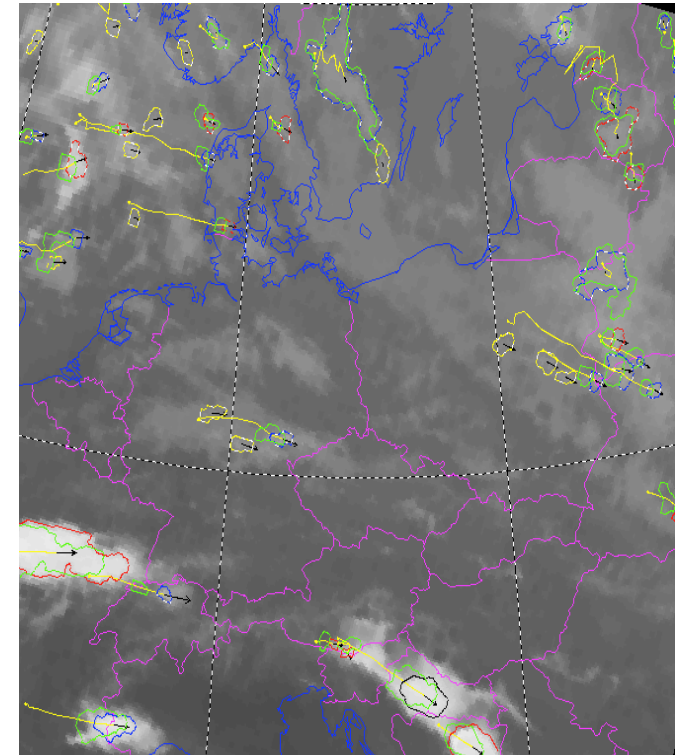


- SAF on Land Surface Analysis (LSA SAF)
- established to increase the benefit from MSG and EPS data related to land, land-atmosphere interaction and biospheric applications
- Generates operationally data services related to Surface Radiation, Vegetation and wild fire
- Leading entity is the Portuguese Sea and Atmosphere Institute, IPMA, Lisbon





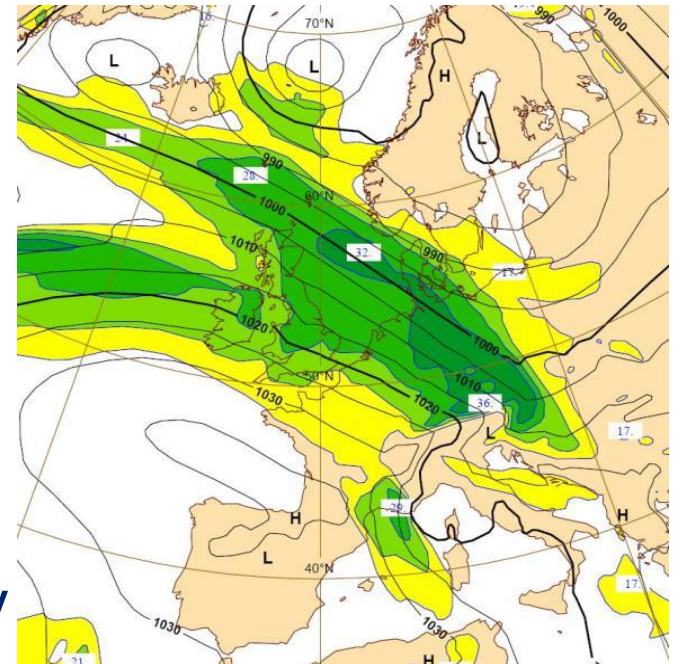
- “Support to Nowcasting and Very Short Range Forecasting” (NWC SAF)
- established to utilise the new data from Geostationary satellites (Meteosat and others) and the polar platforms (Metop, NOAA, Soumi NPP) for enhancing Nowcasting
- Development of Software packages for the operational extraction of products relevant to Nowcasting and for local installation
- Leading Entity is the Spanish Meteorological Agency AEMET in Madrid
- Regular updated software packages since October 2004



Rapidly developing Thunderstorm Product



- SAF on Numerical Weather Prediction (NWP SAF)
- aims at increasing the benefits to Met.-Services from Numerical Weather Prediction (NWP)
- develops advanced techniques for the effective use of satellite data
- development and maintenance of RTTOV radiative transfer model, ATOVS and AVHRR Pre-processing Package (AAPP)
- Leading Entity is the UK MetOffice, Exeter



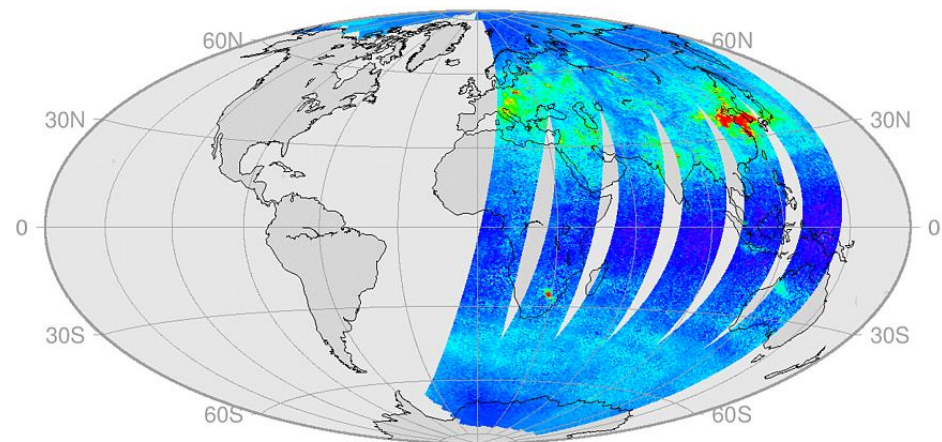


- SAF on Ozone and Atmospheric Chemistry Monitoring (O3M SAF)
- developed for the processing of data on ozone, other trace gases, aerosols and ultraviolet radiation
- Emphasis on the Global Ozone Monitoring Experiment (GOME-2) and IASI on EPS (Metop)
- Leading Entity is the Finnish Meteorological Institute FMI, Helsinki
- First release of products in Summer 2007

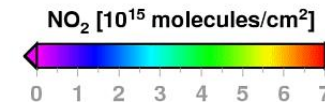
GOME-2 / MetOp

Mar 26, 2009

NO₂ Vertical Column Density

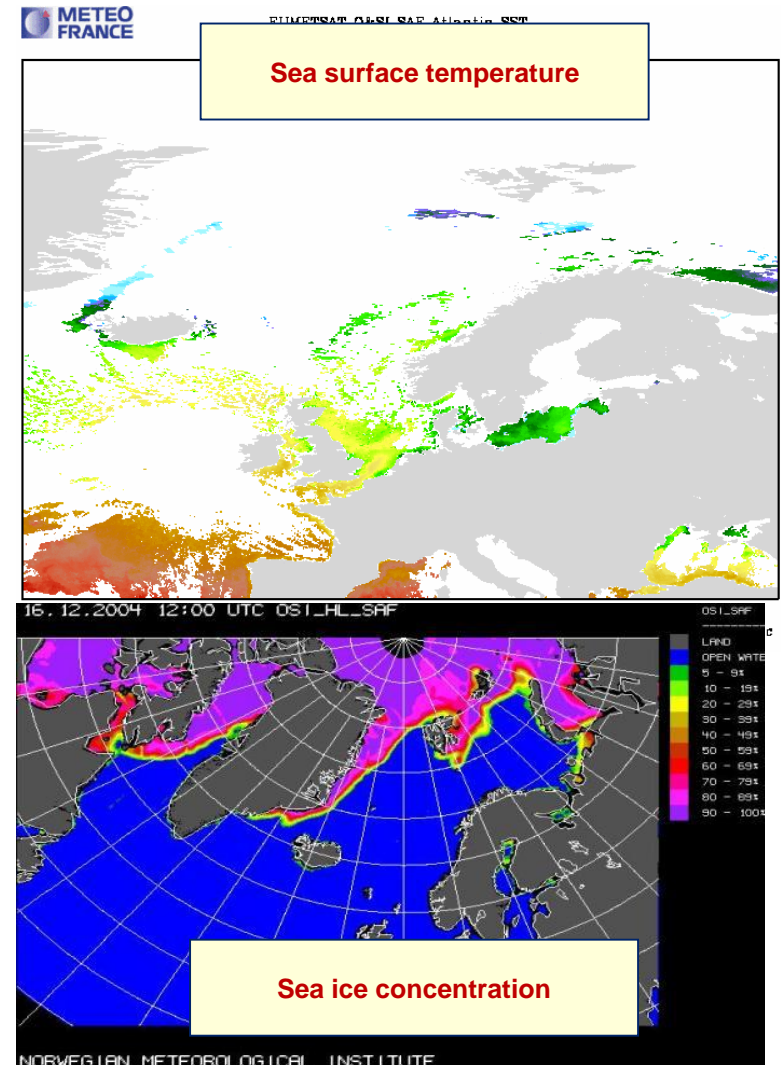


One-day Composite
Lv2 Version: GDP-4.3
<http://wdc.dlr.de>



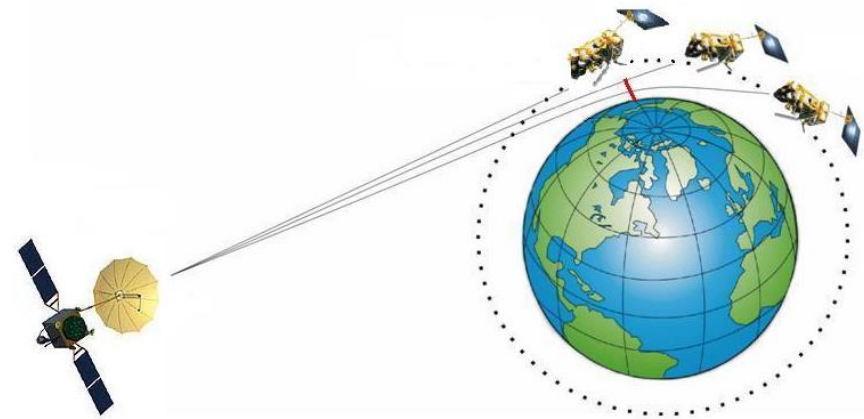


- Ocean and Sea Ice (OSI) SAF routinely produces and disseminates products characterising the ocean surface and the energy fluxes across the sea surface
- Operationally produces information on the sea ice characteristics (extent, concentration, ...)
- Leading Entity is Météo-France in Lannion
- OSI SAF distributes near real-time products based on NOAA, MSG, Metop, DMSP and GOES data

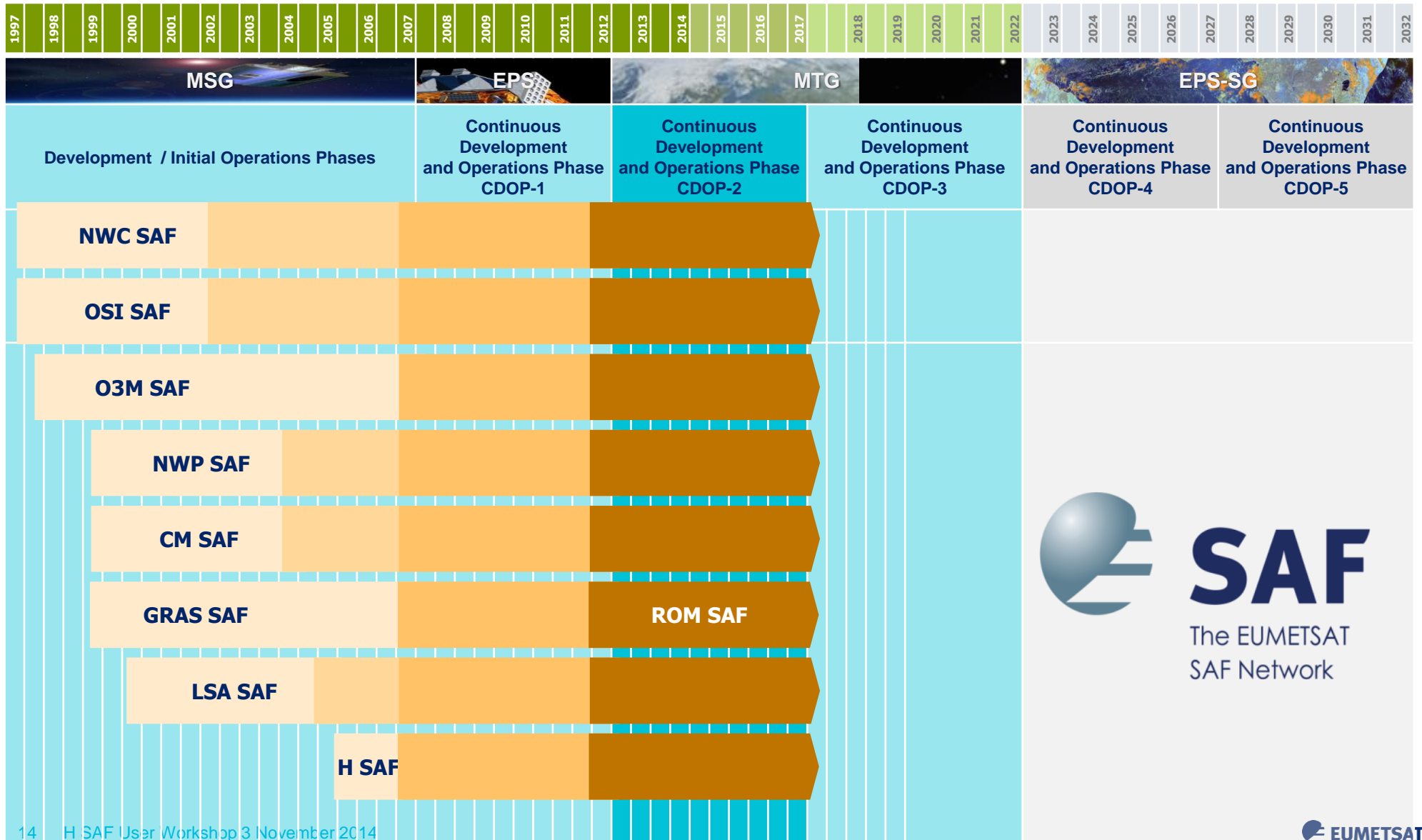




- SAF on Radio Occultation Meteorology
- GRAS: Global Positioning System (GPS) Receiver for Atmospheric Sounding flown on EPS/Metop satellites
- near real-time and offline:
 - ▶ sounding data (temperature, pressure, humidity)
 - ▶ corresponding validation products, and
 - ▶ assimilation software
- The Leading Entity is the Danish Meteorological Institute DMI, Copenhagen
- Software packages released since 2007, first NRT product dissemination in October 2008



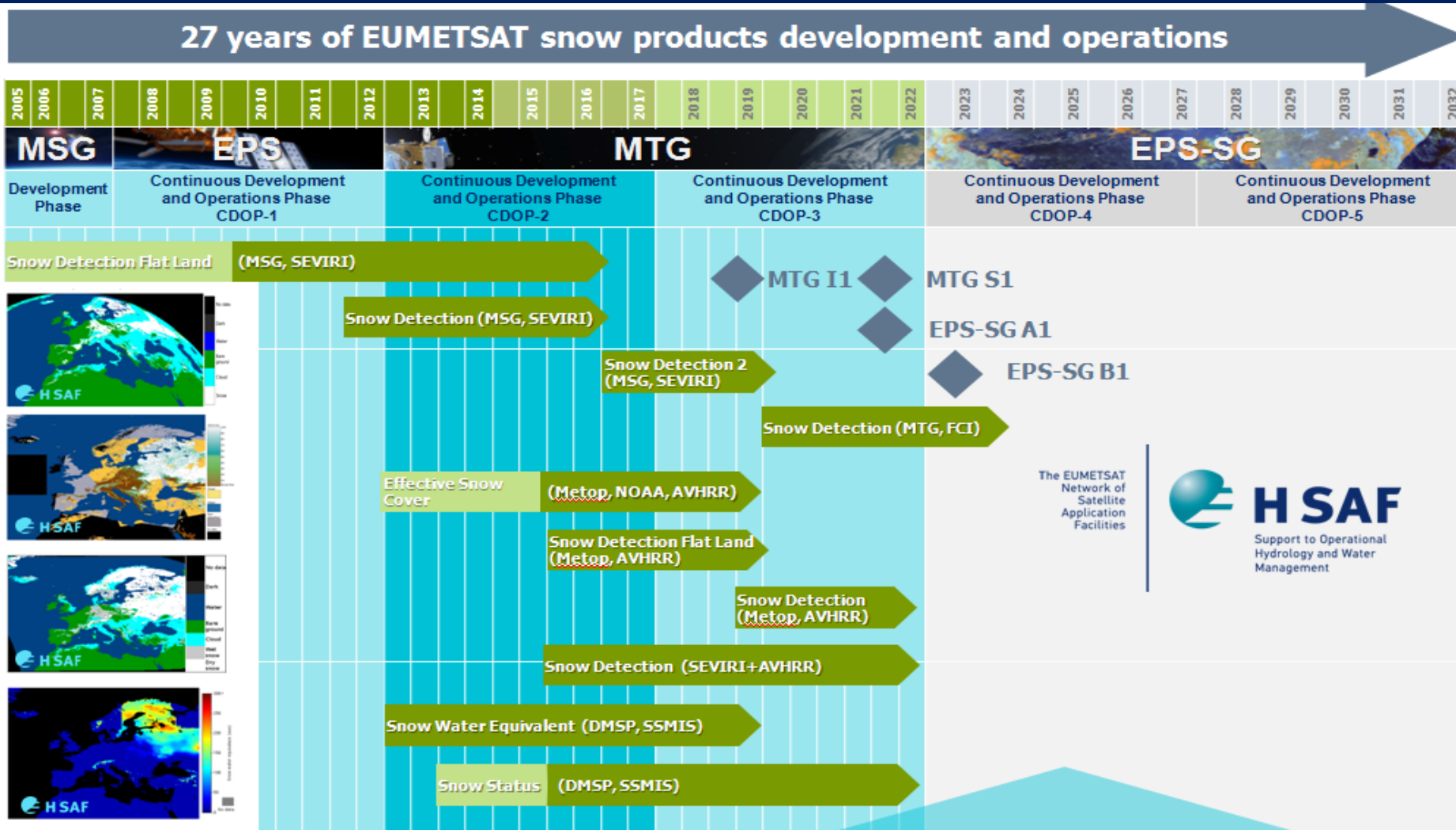
35 years of SAF Development and Operations



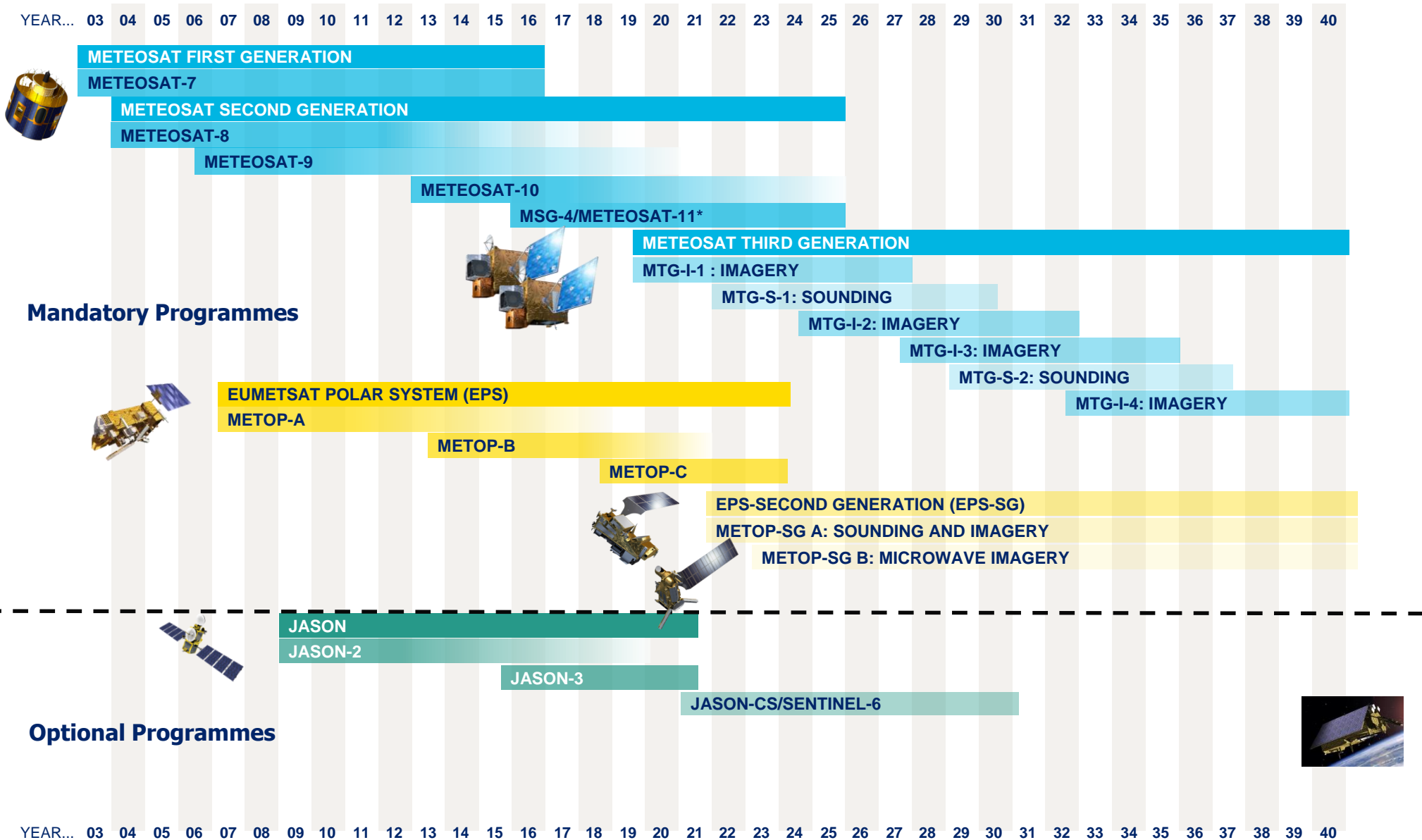
Synergy: Research to Operations

- SAFs embedded programmatically in the EUMETSAT mandatory programmes, currently secured until 2022 (2032).
- The purpose and commitment of SAFs is to:
 - deliver operational products addressing requirements of the EUMETSAT member states
 - develop new products implementing mature retrievals validated by Research (transition from Research to Operations)
- Upstream research not in the mandate of EUMETSAT, and hence expected to be funded from other sources (ESA, EC, national research...)
- Next SAF development and operations phase (CDOP-3 for 2017-2022): proposals expected end of 2015.

Snow information from satellites: EUMETSAT's commitments for the next 20 years



New programmes for 2020-2040



EPS Second Generation

- Primary mission: further improve Numerical Weather Prediction
- Significant contributions to other real time applications
 - Nowcasting: regional mission
 - Marine meteorology and operational oceanography
 - **Operational hydrology**
 - Air quality monitoring
- Climate monitoring: expand by 20+ years the climate data records initiated in 2006 with EPS

EPS Second Generation

- Continuation and enhancement of service from mid morning polar orbit in 2021 – 2040
- Twin satellite in-orbit configuration:
 - **Metop-SG A**: optical imagery and sounding mission
 - Flies the Copernicus Sentinel-5 instrument
 - **Metop-SG B**: microwave imaging mission
- Two series of 3 successive satellites for 21 years of operations
- European contribution to the Joint Polar System (JPS) shared with the US/NOAA

EPS-SG mission capabilities

- User requirements established after user consultation process
- Metop-SG Instrument payload agreed by Council in 2012
 - Improvements to all EPS observation missions
 - Infrared and microwave sounding
 - Optical imagery
 - Scatterometer
 - New, innovative passive microwave imagery missions
 - Microwave imager (MWI)
 - Ice Cloud Imager (ICI) is a world premiere

Micro-Wave Imager (MWI) & Ice-Cloud Imager (ICI) on Metop-SG B

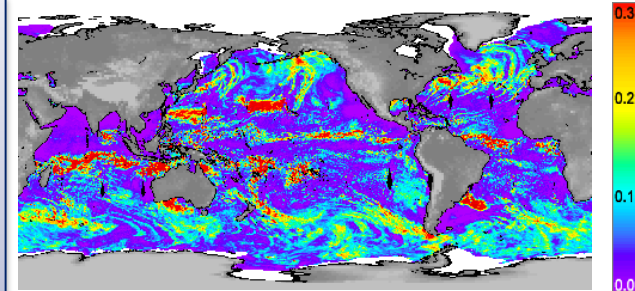
Two innovative microwave imagery missions

MWI objectives

- Precipitation and clouds
- Imagery and H₂O profiles
- Sea ice, surface snow

19 channel (18.7 - 183 GHz)

- Continuity wrt SSMI/S
- Addition of sounding channels
 - Improve estimation of precipitation
 - Water vapour and clouds



Cloud Liquid Column mm

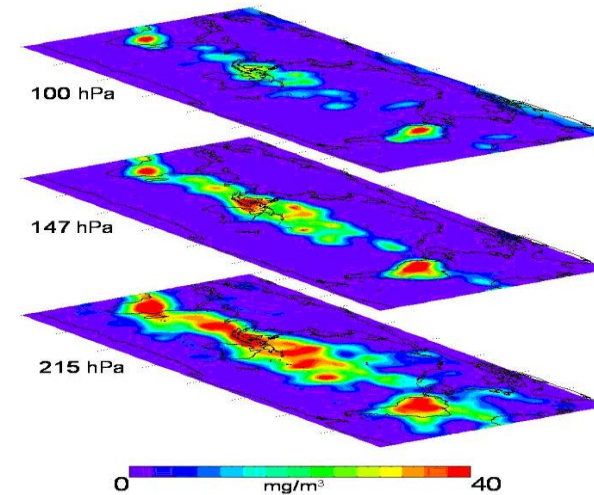
ICI objectives

- Clouds (ice phase)
- Detection of snow

11 channels (183 – 664 GHz)

- First operational ice cloud imagery mission
- Meteorology and climate (Cirrus)

Mean Cloud Ice, December, 2004



NASA: Aura/MLS

H SAF relevant EPS-SG End User Requirements

H SAF Developments and Products essential part for the overall EPS-SG mission objectives

The EUMETSAT
Network of
Satellite
Application
Facilities



H SAF

Support to Operational
Hydrology and Water
Management

SAF in Support of Operational Hydrology and Water Management

<i>Parameter</i>	<i>Mission</i>	<i>Continuity</i>
Precipitation detection	MWI, ICI	YES
Precipitation detection	MWS	YES
Precipitation partial column (liquid)	MWI	NO
Precipitation partial column (solid)	MWI, ICI	NO
Precipitation rate (liquid)	MWI	YES
Precipitation rate (solid)	MWI, ICI	YES
Precipitation rate	MWS	YES
Snow detection and effective cover	VII	YES
Snow detection and coverage	MWI	YES
Snow status	MWI	YES
Snow water equivalent	MWI	YES
Soil moisture	SCA	YES
Root zone soil moisture	SCA	YES
High-resolution root zone soil moisture	SCA	YES
Extreme soil hydrology index	SCA	NO
Soil hydrology uncertainty	SCA	NO

Upcoming SAF Events

Take benefit to meet the SAF Experts at this conference and at the upcoming dedicated user workshops:



- **H SAF User Workshop:** ***3-6 November 2014
in Reading***
- **OSI SAF User Workshop:** ***19-20 November 2014
in Toulouse***
- **NWC SAF Workshop:** ***24-26 February 2015
in Madrid***