

EUMETSAT  
COOPERATION

# EUMETSAT SAF NETWORK

A NETWORK FOR EUROPE



MONITORING WEATHER AND CLIMATE FROM SPACE

 **EUMETSAT**

# A NETWORK FOR EUROPE

## THE GROWING NETWORK OF SAFS DRAWS ON THE EXPANDING RANGE OF SATELLITE OBSERVATIONS TO PROVIDE APPLICATION-SPECIFIC PROCESSED DATA, SOFTWARE TOOLS AND SERVICES

The ability to predict the weather, particularly extreme situations, is one of the major achievements of modern meteorology, thanks in no small measure to satellites. Satellites also have an important role to play when facing one of the biggest challenges of our time: climate change.

EUMETSAT's second generation of Meteosat satellites have opened an entirely new dimension in satellite data quality and quantity, and the advanced instrumentation aboard the organisations' Metop polar-orbiting satellites, offers the user community even more weather, climate and environment applications.

The growing network of Satellite Application Facilities (SAFs) draws on this expanding range of observations to provide application-

specific processed data, software tools and services designed to enhance the monitoring of weather, climate and the environment.

Drawing on specialist expertise from EUMETSAT Member States, SAFs are dedicated centres of excellence for processing satellite data and form an integral part of the distributed EUMETSAT applications ground segment. Each SAF is led by a consortium of institutions under the guidance of a National Meteorological Service. The research, data and services provided by the SAFs complement the standard meteorological products delivered by EUMETSAT's central application facilities in Darmstadt, Germany. EUMETSAT oversees and coordinates the overall activities of the SAF network and the integration of the SAFs into the various operations within the EUMETSAT application ground segment.

The SAFs process data from EUMETSAT geostationary and polar orbiting satellites as well as data and information from other operational and research satellites.

FIG. 01

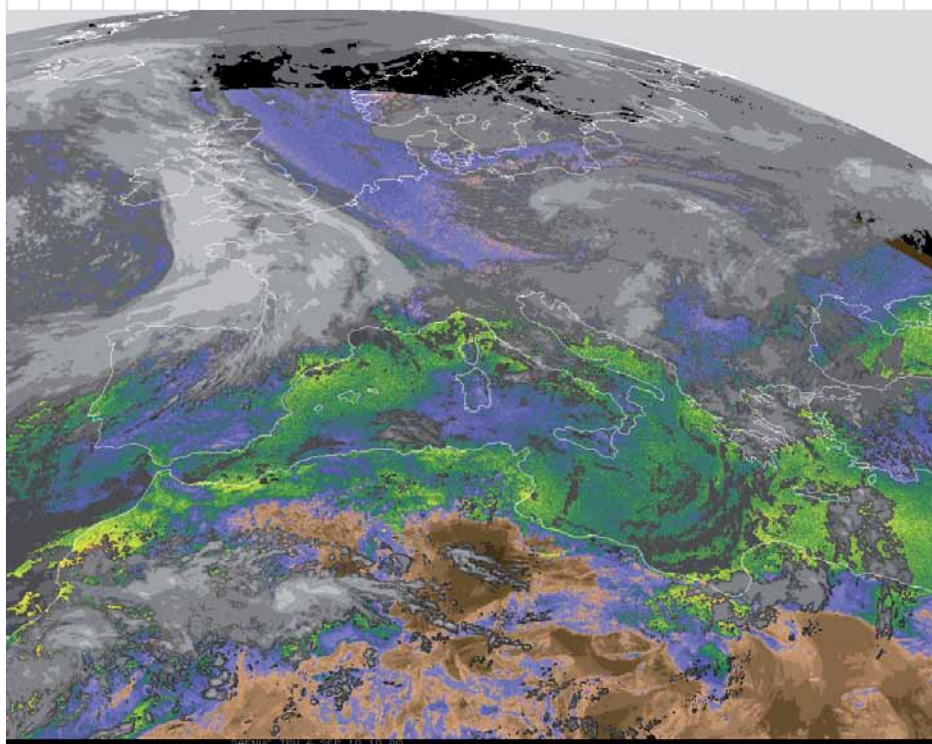


FIG. 02

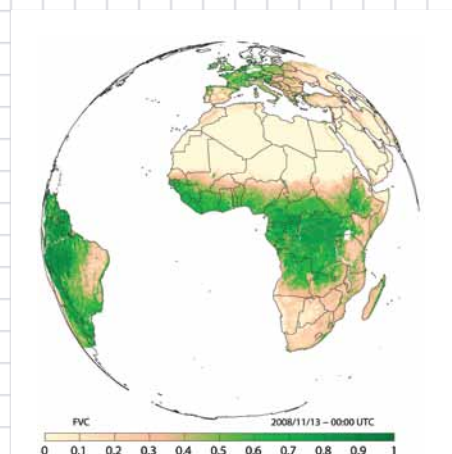




FIG. 01 NWC SAF Total Percipitable Water product

FIG. 02 LSA SAF Surface Albedo product

FIG. 03 EUMETSAT SAF Network in Europe

THERE ARE CURRENTLY  
EIGHT SAFS IN  
VARIOUS STAGES  
OF DEVELOPMENT,  
EACH FOCUSED ON A  
SPECIFIC ACTIVITY:

- Support to Nowcasting and Very Short Range Forecasting (NWC SAF)
- Ocean and Sea Ice (OSI SAF)
- Climate Monitoring (CM SAF)
- Numerical Weather Prediction (NWP SAF)
- Land Surface Analysis (LSA SAF)
- Ozone and Atmospheric Chemistry Monitoring (O3M SAF)
- Global Navigation Satellite System (GNSS) Receiver for Atmospheric Sounding Meteorology (GRAS SAF)
- Support to Operational Hydrology and Water Management (H SAF)

FIG. 03



# AN OVERVIEW ON INDIVIDUAL SAFS



## THE SAF ON SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING (NWC SAF)

The term 'Nowcasting' is used to describe localised forecasting for any period, from the present up to a few hours ahead. The NWC SAF provides the tools and software that deliver tailored satellite information to support forecasting up to 12 hours ahead, known as Very Short Range Forecasting. To improve the accuracy of forecasting, meteorologists need an exact and

up-to-date picture of atmospheric motions and conditions in a particular localised area. These observations become extremely pertinent in the context of hazardous weather situations, when lives can depend on the capability to accurately monitor short-lived but severe weather situations like thunderstorms or tornadoes.



## THE SAF ON OCEAN AND SEA ICE (OSI SAF)

Approximately two thirds of the Earth's surface is covered by oceans. Knowledge of and data on sea temperatures, currents and oceanic weather conditions, as well as the flotation and melting patterns of sea ice, are vital for sea-dependant industries, ocean-going vessels and climate and pollution monitoring. Many operational

oceanography projects are in the process of developing assimilation and forecasting systems on regional and global scales. They are ready to utilise near-real-time ocean products generated using data provided by operational satellites.

FIG. 04

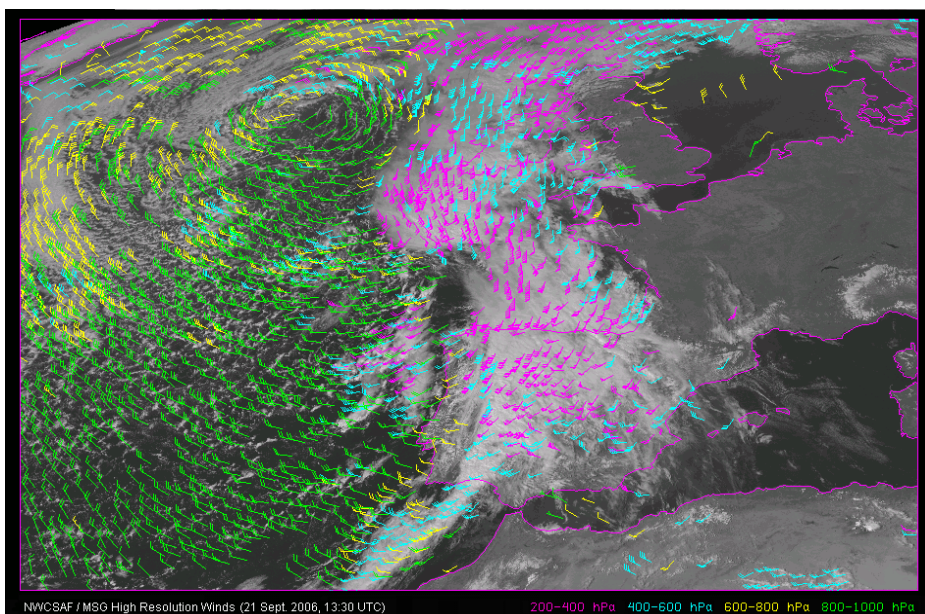


FIG. 05

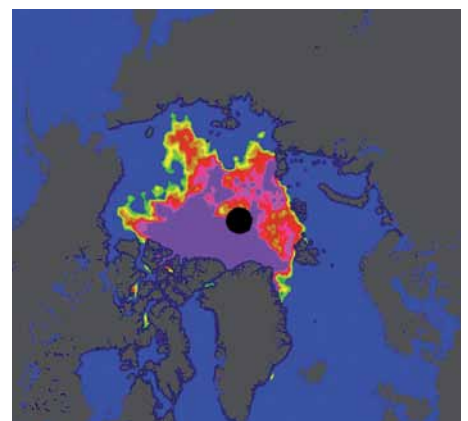




FIG. 04 NWC SAF High Resolution Winds product

FIG. 05 OSI SAF Sea Ice Concentration product, Northern Hemisphere

FIG. 06 LSA SAF Land Surface Temperature product

FIG. 07 NWP SAF Cloud Top Temperature and Height product



#### THE SAF ON CLIMATE MONITORING (CM SAF)

Concerns about the Earth's climate have increased the need not only for international control of greenhouse gases, but also for climate monitoring on a global scale. Space-based observations can deliver

this type of global data, which the CM SAF uses to provide consistent and reliable long-term data sets to support climate monitoring and research.



#### THE SAF FOR NUMERICAL WEATHER PREDICTION (NWP SAF)

Numerical Weather Prediction involves the use of very powerful computers to model the atmosphere and compute forecasts ranging from a few hours up to ten days ahead. Because it determines the accuracy

of a forecast, NWP is a core activity of all the National Meteorological Services. The NWP SAF provides tools and software to effectively use satellite data for NWP.



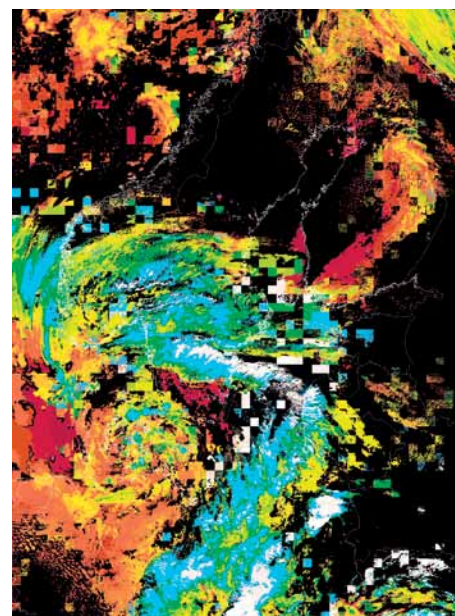
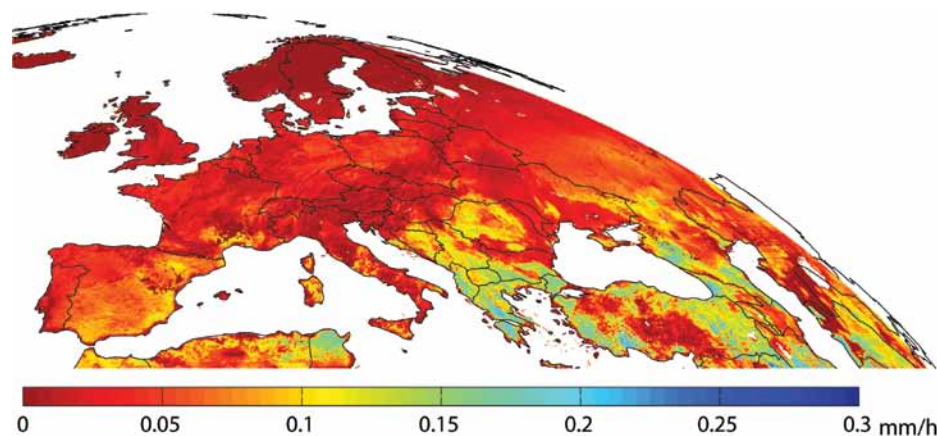
#### THE SAF ON LAND SURFACE ANALYSIS (LSA SAF)

Information on land surface characteristics is needed for many important applications such as modelling and simulation of weather and climate, forecast and analysis of natural hazards and the monitoring of ecological and

hydrological systems. The LSA SAF specifically addresses these requirements, delivering a range of products, including land surface temperature, surface albedo and snow cover.

FIG. 07

FIG. 06



# AN OVERVIEW ON INDIVIDUAL SAFS



## THE SAF ON OZONE AND ATMOSPHERIC CHEMISTRY MONITORING (O3M SAF)

Monitoring ozone levels is a very important aspect of climate research. Severe loss of stratospheric ozone has been detected in the high latitudes of the northern hemisphere, while over the Antarctic ultraviolet radiation is intensifying, causing skin cancer, eye damage and immune system suppression.

The O3M SAF, with its generated data and information on ozone and other chemical components, supports a better understanding of the causes and effects of pollution of the upper atmosphere and ozone depletion.



## THE SAF ON GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) RECEIVER FOR ATMOSPHERIC SOUNDING METEOROLOGY (GRAS SAF)

The Global Navigation Satellite System (GNSS) Receiver for Atmospheric Sounding (GRAS) is an instrument, flown on EUMETSAT's Metop satellites. It uses the radio signals continuously broadcast by the GPS satellites of the GNSS orbiting the Earth, measuring the time delay of the refracted GPS radio signals as the ray signal path

skirts the Earth's atmosphere on its way from the transmitting GPS to the GRAS receiver on Metop. This shift in the received signals can be processed to obtain vertical profiles of atmospheric parameters, such as temperature, pressure and water vapour in the stratosphere and troposphere.



## THE SAF ON SUPPORT TO OPERATIONAL HYDROLOGY AND WATER MANAGEMENT (H SAF)

The H SAF focuses on the development and delivery of geophysical products related to precipitation, soil moisture and snow and the

utilisation of these parameters in hydrological models, NWP and water management.

FIG. 09

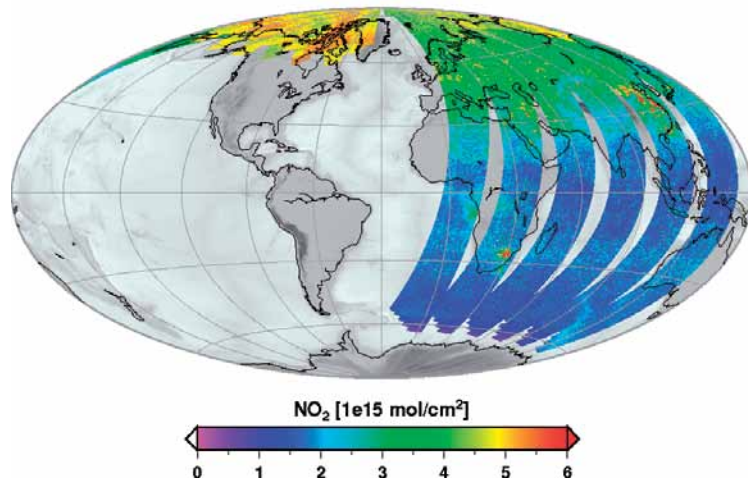


FIG. 08

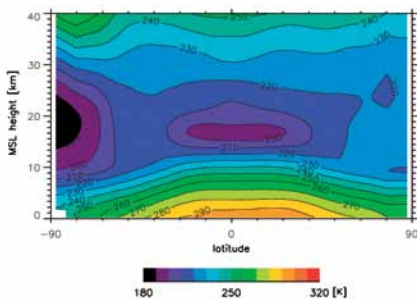


FIG. 10 CM SAF Total Precipitable Water product  
FIG. 11 OSI SAF Sea Surface Temperature product

# THE BENEFITS

## SAFS REPRESENT A MAJOR SHIFT IN THINKING ABOUT THE USE OF METEOROLOGICAL SATELLITE DATA

SAFs represent a major shift in thinking about the use of meteorological satellite data. For the first generation of Meteosat satellites, EUMETSAT identified and provided the main meteorological products required by users, including cloud motion winds and cloud-top temperatures. Together with the Surface Albedo Product used for climate monitoring purposes, these are still the most important products delivered by the product extraction facility based at EUMETSAT headquarters. Making use of the additional capabilities provided by EUMETSAT's

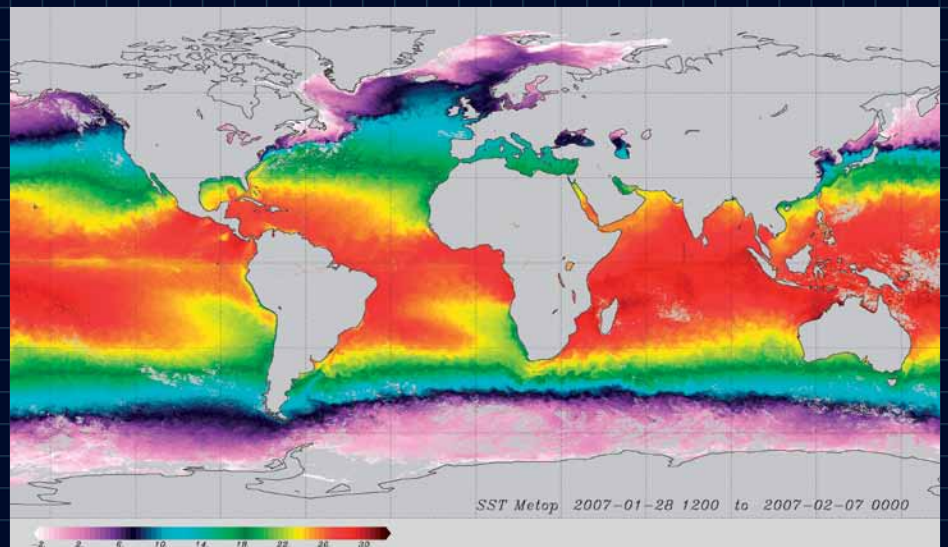
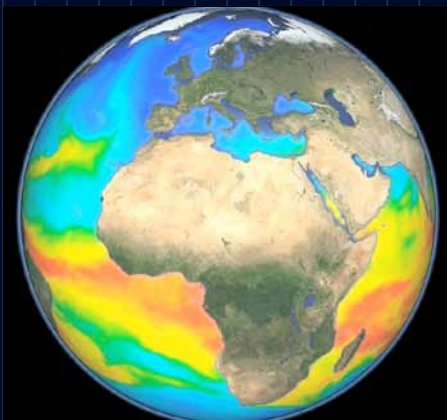
Meteosat Second Generation and EUMETSAT Polar System programmes, products derived from SAFs address other specific applications and give researchers the opportunity to exploit data in new and creative ways. In addition, SAFs work as multipliers, spreading access to important data to thousands of users e.g. meteorologists and other scientists, and in the process helping to stimulate new applications of these data in the areas of weather forecasting and climate monitoring.

### A DISTRIBUTED NETWORK OF SAFS:

- provides EUMETSAT Member and Cooperating States with the capability to exploit even more of the available satellite data;
- ensures a cost-effective balance between EUMETSAT central services and the distributed services provided by the National Meteorological Services;
- makes use of the expertise and infrastructure available in Member States to generate geophysical and environmental data products and services;
- fosters the development of cooperation with non-Member States and other organisations.

FIG. 11

FIG. 10





Member States 

Cooperating States 



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\* Pending full ratification

EUMETSAT also has established cooperation agreements with organisations involved in meteorological satellite activities, including the National Meteorological Services of Canada, China, India, Japan, Korea, Russia and USA.

#### MEMBER STATES



#### COOPERATING STATES

