

The background of the slide is a photograph of the EUMETSAT Satellite Application Facility building. The building is a modern, multi-story structure with a curved facade and large glass windows. In the foreground, there are several tall flagpoles with various national flags flying. The scene is set outdoors with green trees and bushes. A dark blue semi-transparent box is overlaid on the left side of the image, containing the title and speaker information. There are also decorative white circular and line elements on the blue background.

# EUMETSAT Satellite Application Facility (SAF) as support to NMHSs' delivery of Services

*Phil Evans*  
*Director-General*



## Economic losses and fatalities from weather- and climate-related events in Europe



The EU adaptation strategy aims to build resilience and ensure that Europe is well prepared to manage the risks from and adapt to the impacts of climate change, including limiting economic losses and other harm. All regions of Europe face economic losses and fatalities from weather and climate extremes every year. To support policy processes on climate change adaptation, data on these losses must be collected and reported across EEA member countries and in a coherent way over decades.

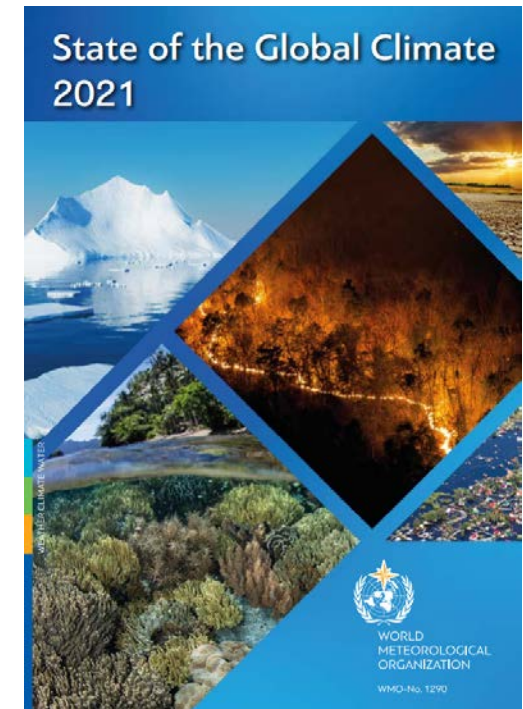
Published 03 Feb 2022 — Last modified 10 Feb 2022 — 11 min read — Photo: © Jonathan Ford on Unsplash



- Between 1980 and 2020, total economic losses from weather- and climate-related events amounted to EUR 450-520 billion (in 2020 euros) in the 32 EEA member countries
- Based on data from two separate sources, fatalities during the same period amounted to between 85,000 and 145,000.

Loss and damages of more than US\$ 100 billion, as well as severe impacts on food security and humanitarian aspects due to high-impact weather and climate events have been reported [in 2021]

WMO Secretary General, May 2022







# Estimated benefits of weather forecasting in EU 27

www.eumetsat.int

Protection of property  
and infrastructure



Added value to the  
European economy



Private use by  
European citizens



TOTAL  
**€61.5bn**  
per year

- The value of hundreds of lives saved each year is not captured, nor the benefits to defense and security
- Also ignored are additional benefits of weather forecasts on specialised forecasts of weather-dependent phenomena, i.e. air quality, marine forecasts, dispersion of pollution in the context of Copernicus

Source: The Case for EPS/Metop Second Generation: Cost Benefit Analysis, 2011



# From observation to socio-economic benefits

Delivery and value



Observations  
(EUMETSAT)



Numerical prediction  
(ECMWF and NMSs)



Forecaster expertise



Forecast & support  
to decision making



Benefits from  
public and  
private decisions

Requirements



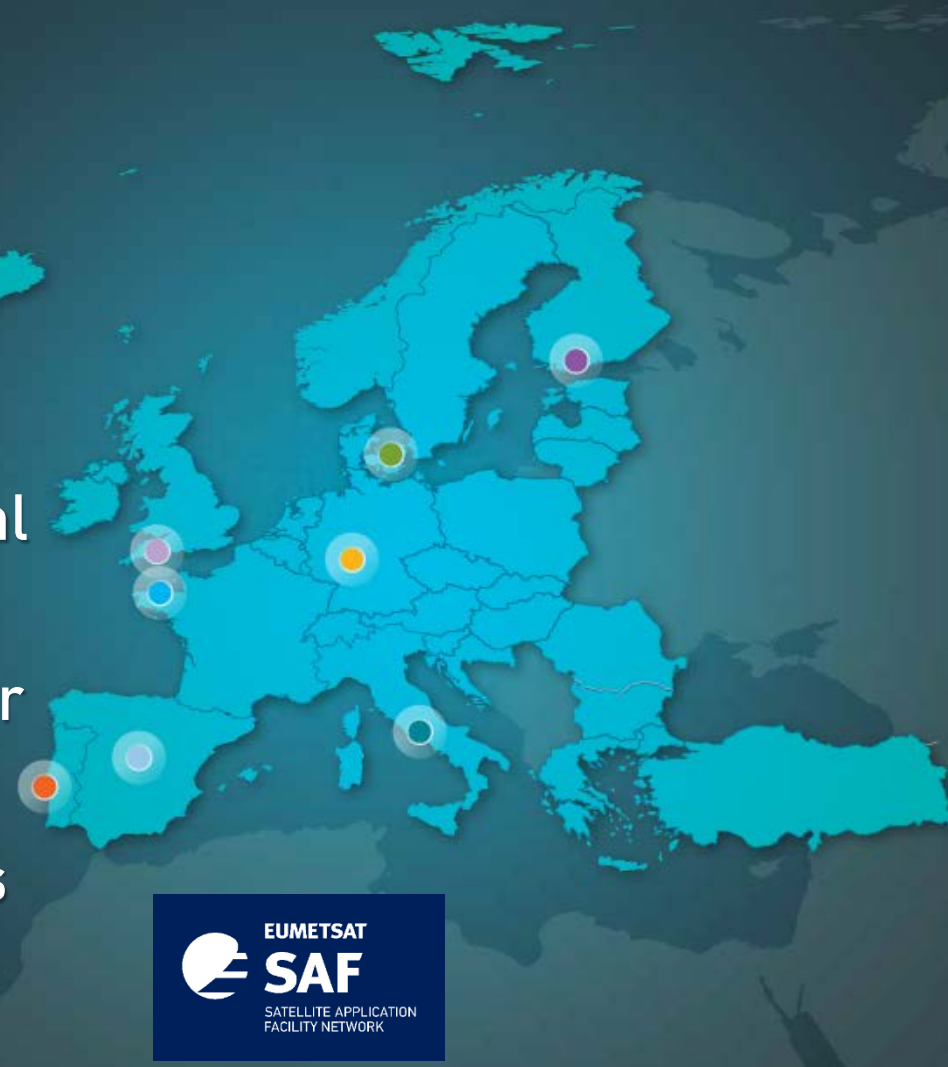
# EUMETSAT's role and Satellite Application Facilities (SAF) contribution



- We deliver space-based observations, on an operational 24/7 basis, to users to support the better prediction and monitoring of weather and extreme weather events
- By integrating these observations over long period of time, we deliver climate-relevant observation datasets
- All our services are driven by user requirements and therefore evolve quickly to cope with evolving user requirement
- The EUMETSAT SAF are part of this strategy of delivering relevant information to users and decision-makers



- **SAF = Satellite Application Facility**
- Part of the EUMETSAT application ground segment
- Providing operational products and services to users
- Specialised on topics and themes
- Complement production of standard meteorological products at EUMETSAT Central facility
- Located at Weather Services in EUMETSAT Member and Co-operating States
- Developed and operated by consortium of partners





**EUM/C/DEC 21  
ATTACHMENT I**

**EUM/C/92/RES.V**

**EUMETSAT RESOLUTION ON  
POLICY FOR EUMETSAT GROUND SYSTEMS  
AND THE IMPLEMENTATION OF THE MTP GROUND SYSTEM**

**Adopted at the 21st Council meeting on 23-25 November 1992**



- III** That the distributed network elements shall include Satellite Application Facilities which shall be responsible for necessary research, development and operational activities not carried out by the central facility. Such Satellite Application Facilities shall be located within national meteorological services of EUMETSAT Member States or other agreed entities linked to a user community. Each Satellite Application Facility shall be established under a EUMETSAT contract which preserves EUMETSAT control and responsibility. Scientists from all Member States shall be able to participate in such EUMETSAT funded Satellite Application Facilities.

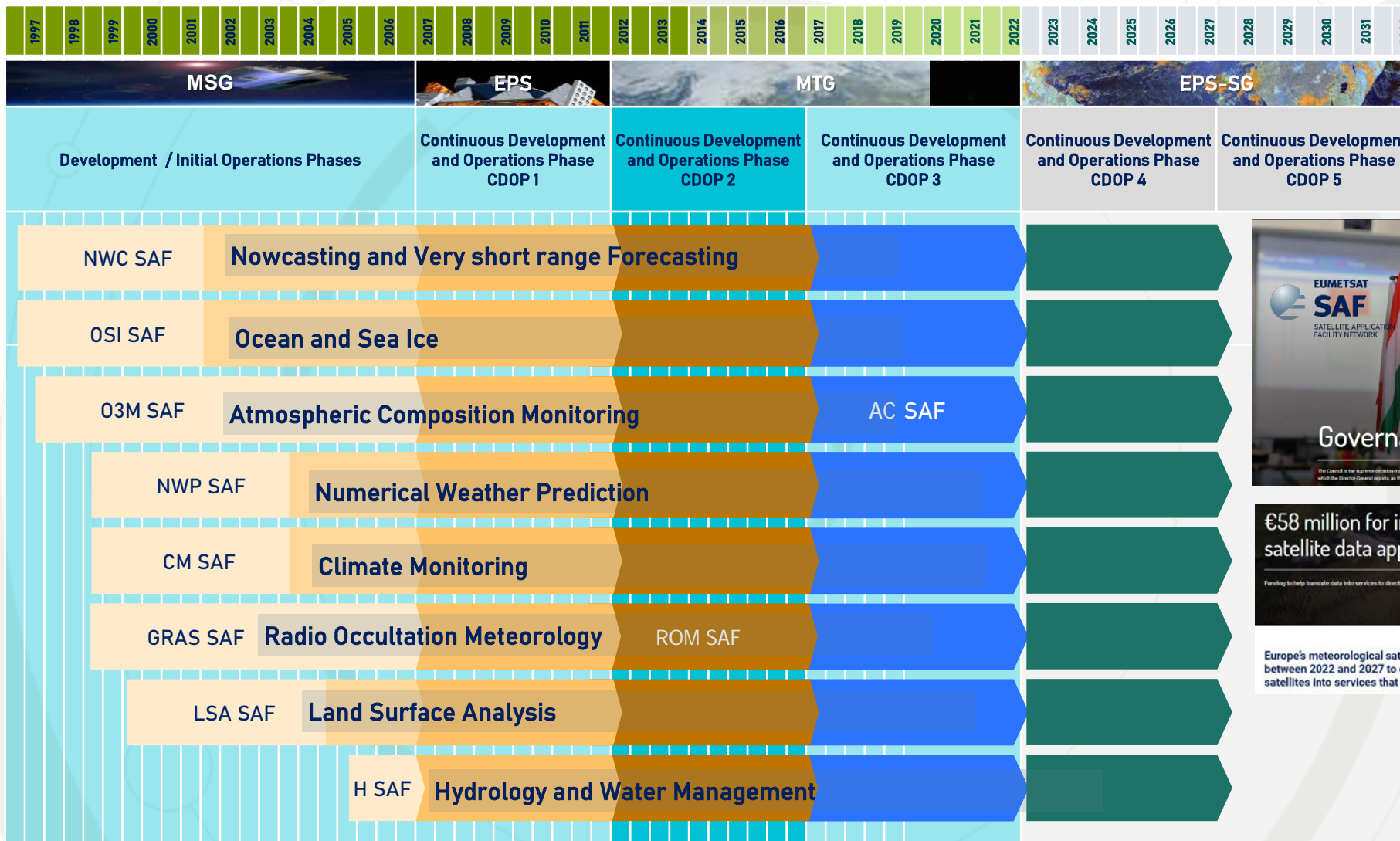




# SAF History and Perspectives

1997

2032



Europe's meteorological satellite agency, EUMETSAT, will invest more than €58 million between 2022 and 2027 to develop innovative approaches to translate data from its satellites into services that will provide significant benefits to its users and society.



# The first SAF: Nowcasting SAF (NWC SAF)

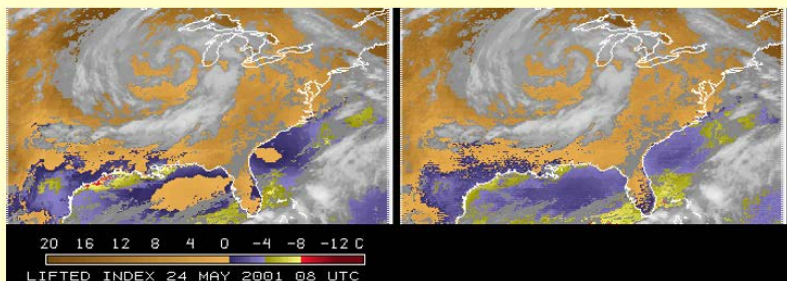
*“When, around 1992-1993, the idea of the SAFs appeared, ..., and, also, the peak of Expo-92 and the Barcelona Olympic Games had passed, so that the deputy director Conchita Martínez must have thought that there was a risk of falling into idleness and that it was necessary to look for new and exciting challenges.*

*She then convinced the director Manuel Bautista that the institute should be in charge of a SAF devoted to weather surveillance and severe storms.”*

(Marcelino Manso, AEMET)

## Nowcasting SAF Air Mass Products

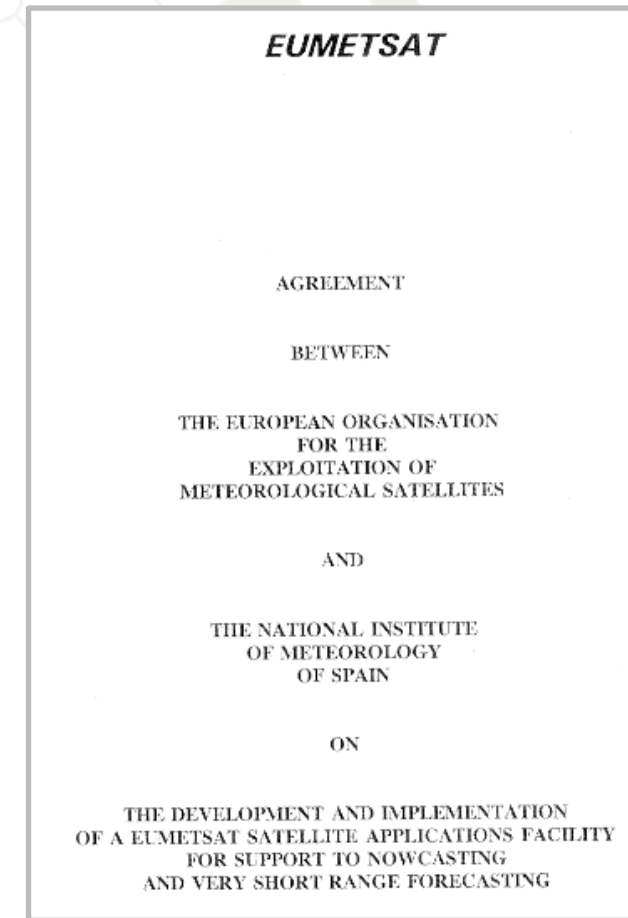
### Stability Analysis Imagery



Physical Retrieval

Neural Network Retrieval

Lifted Index from GOES Sounder Data, 24 May 2001



Very first SAF Agreement (NWC SAF)  
signed 05 December 1996



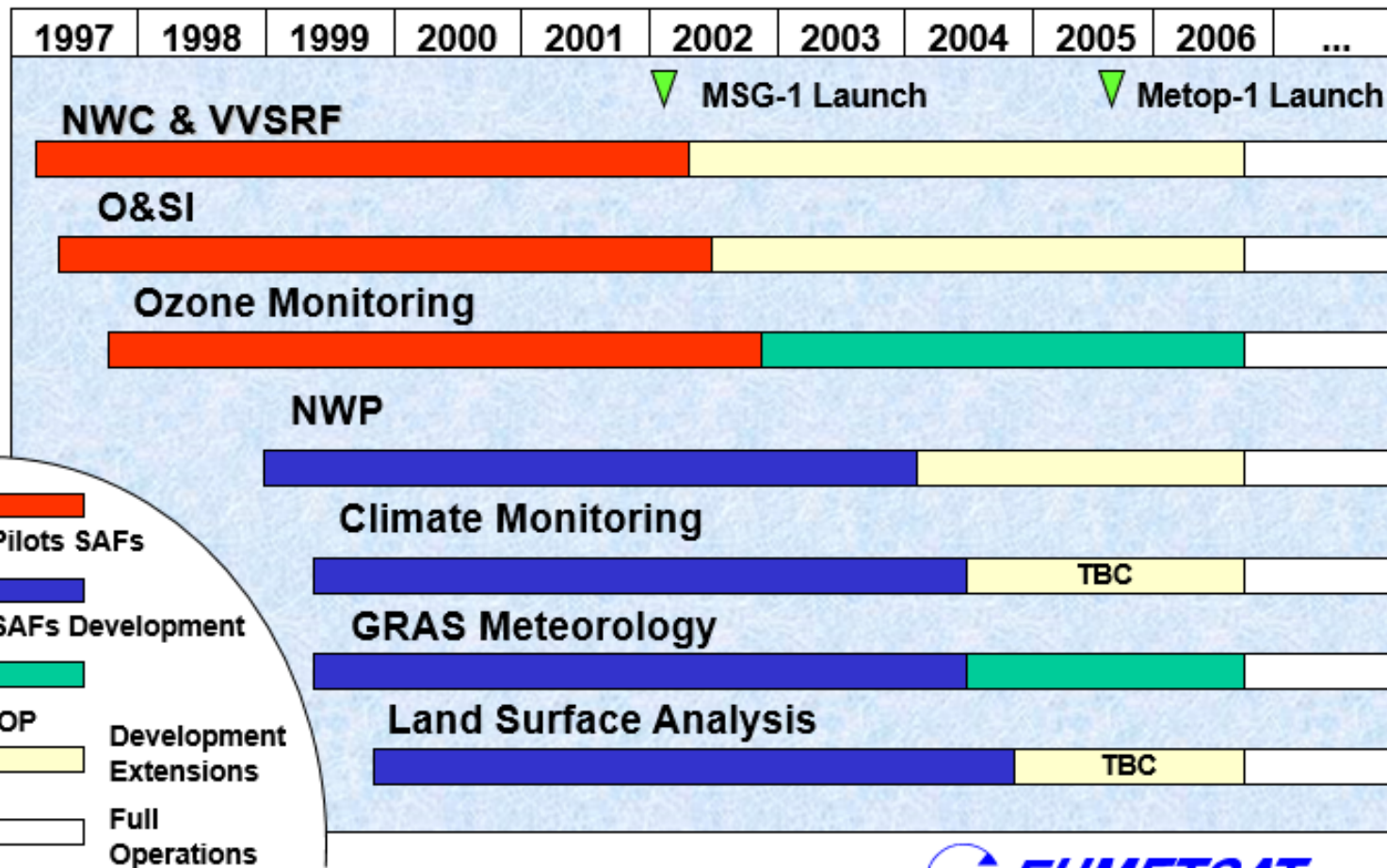
image profile



Dr. Lorenzo Sarlo

Dr. Lorenzo Sarlo, appointed as EUMETSAT SAF Network Manager in December 1999,

## SAF Network Status - Overview

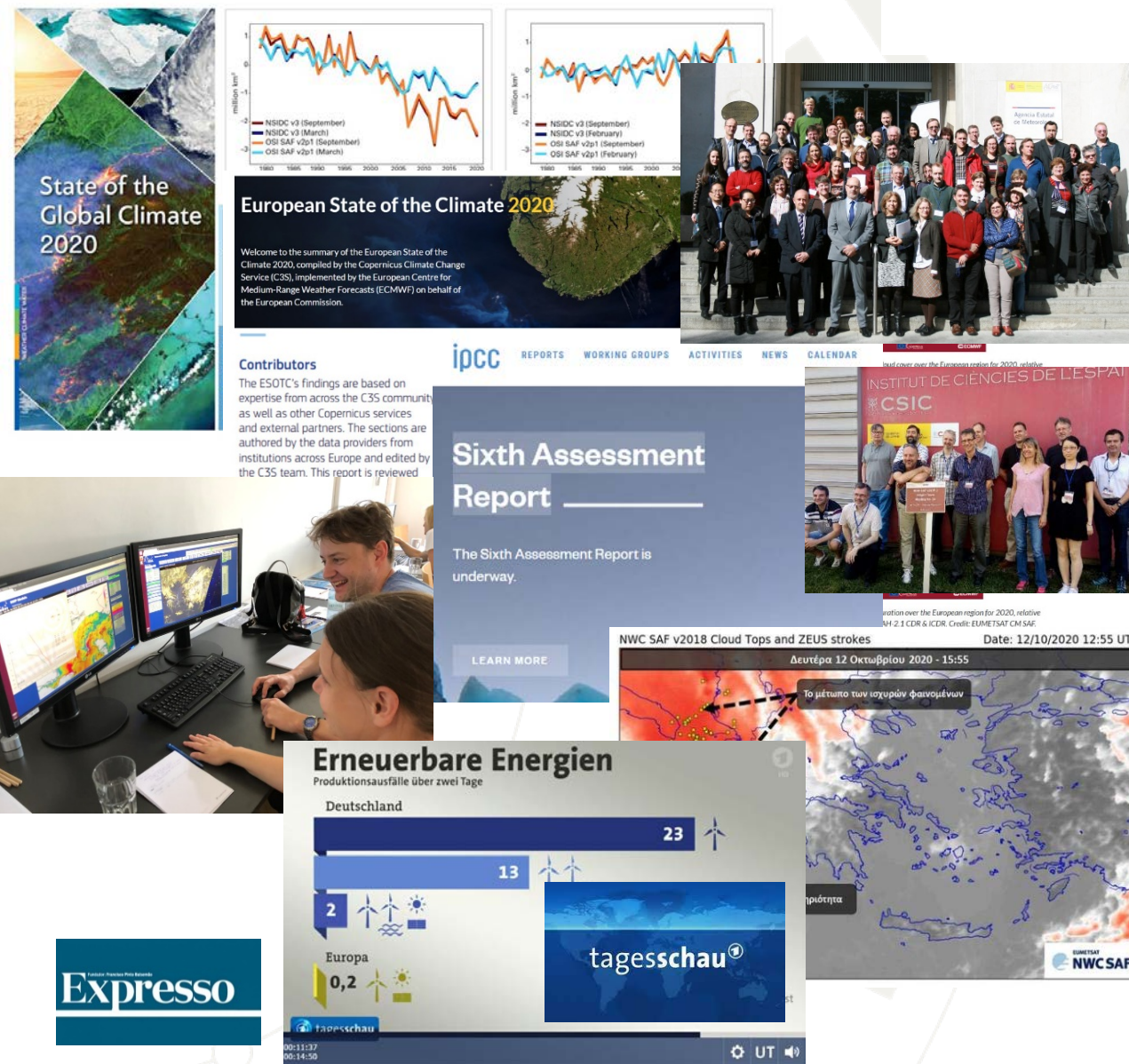






# The SAF Network Today

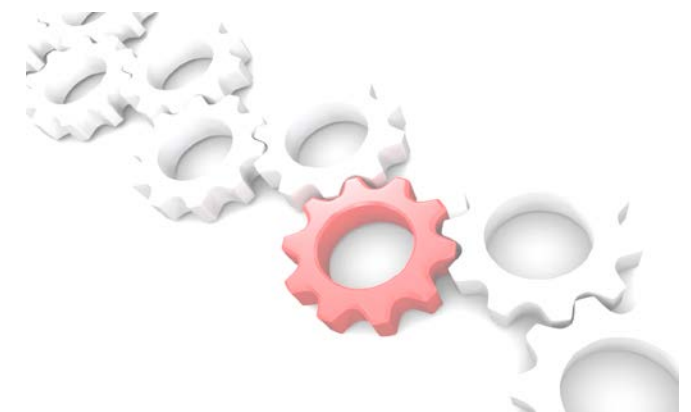
- Increased relevance of SAF products and activities
- SAF Network in a period of changing generations
  - People
  - Programmes
  - Infrastructure
- Robustness of the SAF concept





**The goal of SAFs is to provide operational products.**

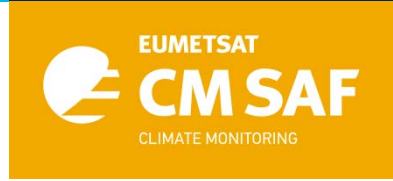
- Continuity of product provision, improvements, quality monitoring
- Committed user services
- Validation and review before official release/launch
- Complete documentation of products, algorithms, validation results



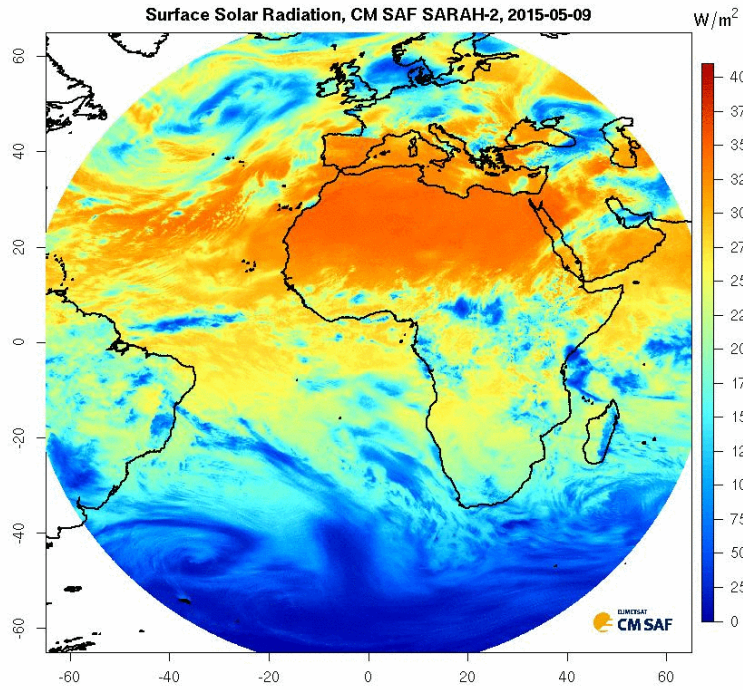
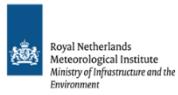


# Example of Climate Monitoring SAF (CM SAF)

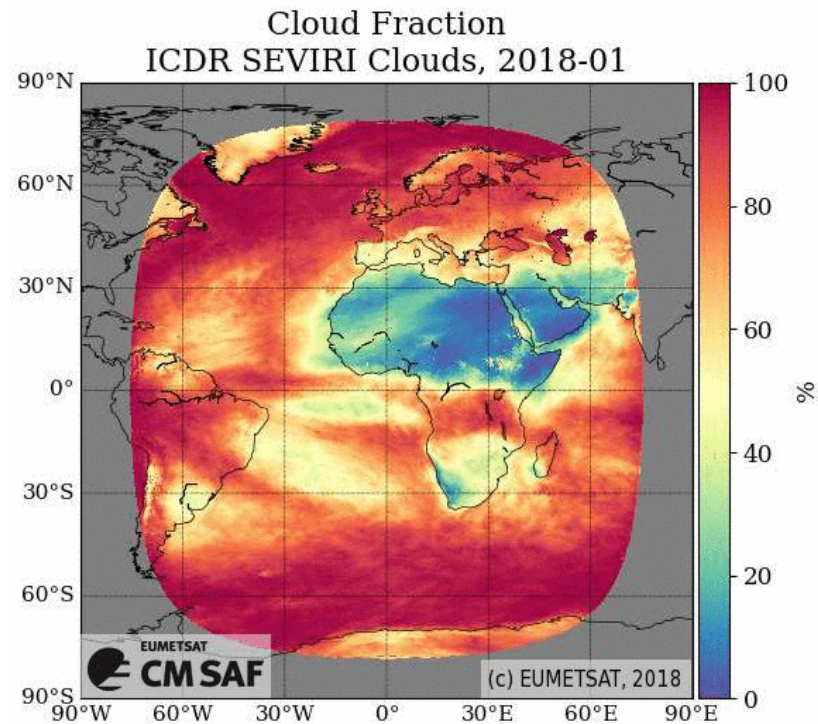
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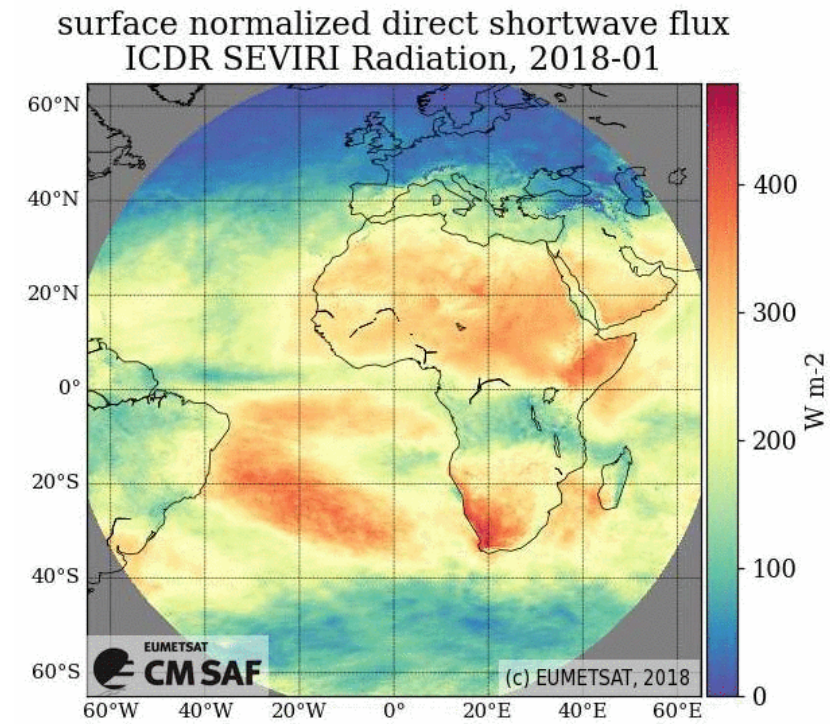
CM SAF is a consortium of eight European meteorological services with Deutscher Wetterdienst (DWD, Germany) as the leading entity.



Surface solar radiation from SARAH 2 data record ,2015



Cloud fraction derived from SEVIRI data, 2018



Surface normalized direct shortwave flux from SEVIRI data, 2018

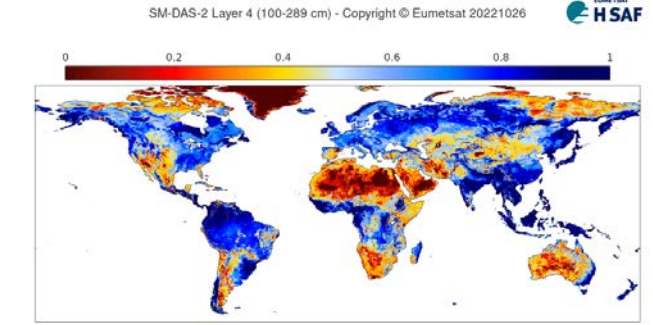




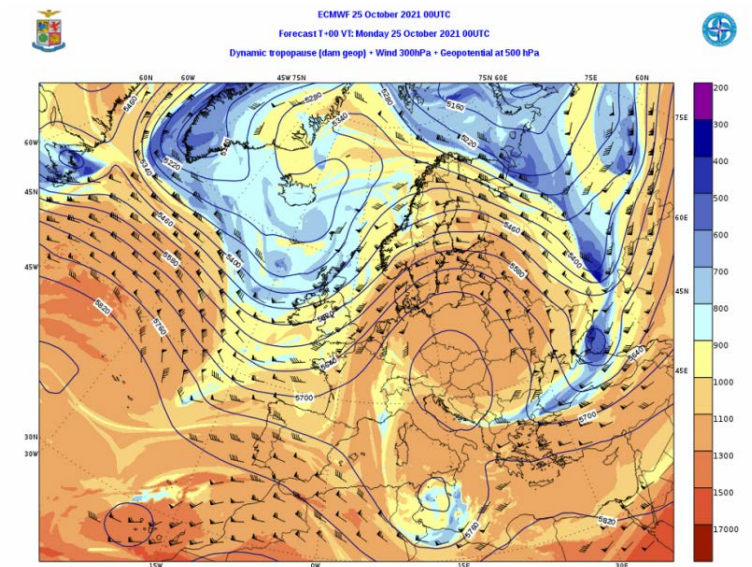
# Hydrology SAF



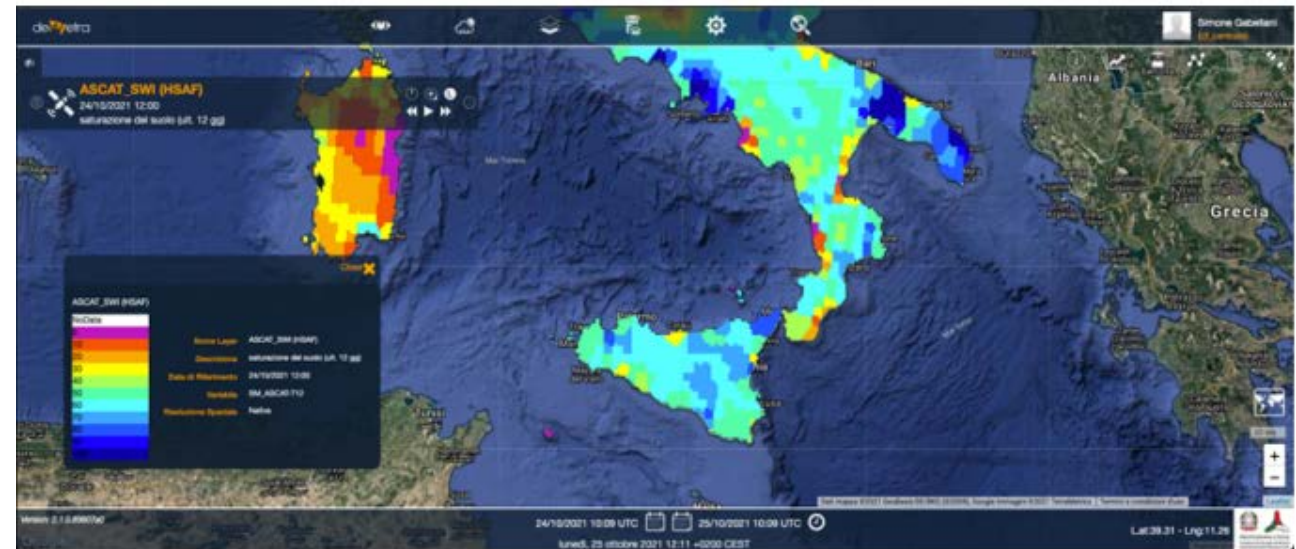
- to provide new satellite-derived products from existing and future satellites with sufficient time and space resolution to satisfy the needs of operational hydrology, by mean of the following identified products:
- precipitation (liquid, solid, rate, accumulated);
- soil moisture (at large-scale, at local-scale, at surface, in the roots region);
- snow parameters (detection, cover, melting conditions, water equivalent);
- to perform independent validation of the usefulness of the new products for fighting against floods, landslides, avalanches, and evaluating water resources; the activity includes:
- downscaling/upscaling modelling from observed/predicted fields to basin level;
- fusion of satellite-derived measurements with data from radar and raingauge networks;
- assimilation of satellite-derived products in hydrological models;
- assessment of the impact of the new satellite-derived products on hydrological applications.



## Operational use of H SAF products by Italian Civil Protection



October 25th, 2021 - Mediterranean Cyclone



The soil moisture wetness index estimated by ASCAT is used to evaluate the antecedent condition. This information is operationally used into the Civil Protection risk evaluation phase to determine the alert level.



# SAF Product Impact



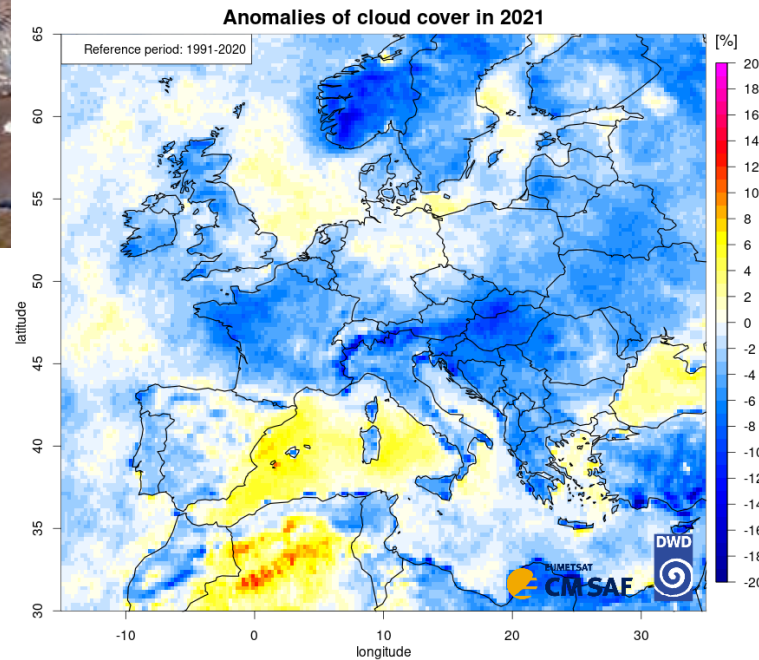
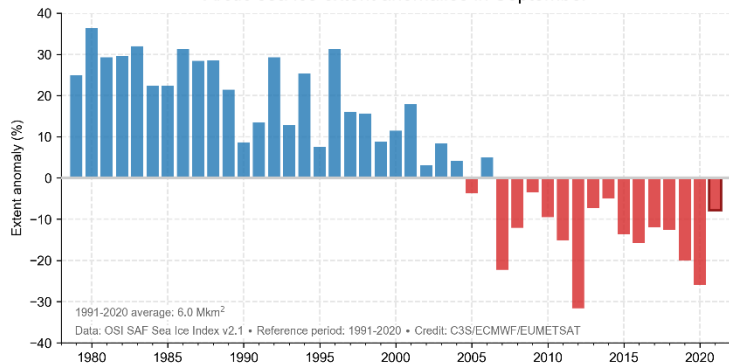
About Us What we do Data



## European State of the Climate 2021

Welcome to the summary of the European State of the Climate 2021, compiled by the Copernicus Climate Change Service (C3S), implemented by the European Centre for Medium-Range Weather Forecasts (ECMWF) on behalf of the European Commission.

Arctic sea ice extent anomalies in September



## Datasets used in 'Europe 2021' and 'Arctic 2021'

- ▼ ERA5
- ▼ ERA5-Land
- ▼ E-OBS surface air temperature and precipitation
- ▼ E-OBS climate indices
- ▼ Station data from ECA&D and the National and Regional Meteorological Services
- ▼ Reports from the National Meteorological Services and other agencies
- ▼ Copernicus EMS fire danger data record
- ▼ Copernicus EMS active fire and burnt area data
- ▼ Copernicus EMS model-derived river discharge
- ▼ CAMS Global atmospheric composition forecasts
- ▼ CAMS wildfire data record
- ▼ CM SAF sunshine duration climate data record
- ▼ CM SAF data record on cloud products
- ▼ C3S Climate and energy indicators for Europe
- ▼ C3S Ocean Colour CDR/ICDR v5.0
- ▼ C3S Sea Ice Edge and Type CDR/ICDR v2.0
- ▼ C3S Sea Ice Thickness CDR/ICDR v2.0
- ▼ C3S Soil Moisture data record v202012 PASSIVE
- ▼ Vegetation Optical Depth Climate Archive (VODCA)
- ▼ ESA CCI/C3S SST Level-4 Analysis Climate Data Record v2.1
- ▼ EUMETSAT OSI SAF Global Sea Ice Concentration CDR/ICDR v2.0
- ▼ EUMETSAT OSI SAF Global Low-Resolution Sea Ice Drift (OSI-405-c)
- ▼ EUMETSAT OSI SAF Sea Ice Index v2.1
- ▼ GloboLakes/C3S lake surface water temperature data record
- ▼ GPCP monthly precipitation
- ▼ UTCI based on ERA5
- ▼ SoilClim GCRI





## New variables and services covered by SAF product portfolio

- Several geophysical variables to be provided by SAFs the first time (e.g. Iceberg parameter, Sea Ice age, Dust profile);
- Provision of observation operators related to retrievals (sea ice);
- Integrated products (ground-based + satellite);
- Index products (e.g. sea ice, air quality, anomalies);
- “Georing” based products: quasi global coverage through combination of meteorological satellites in geo orbit;
- More agile approach for software deliverables: more and faster releases in the dynamic phase after commissioning of MTG and EPS-SG.



Thank you!  
Questions are welcome.

