EUMETSAT: An intergovernmental organization with 30 Member States
EUMETSAT mission and vision

**Primary objective:**

Establish, maintain and exploit European systems of meteorological satellites taking into account as far as possible the recommendations of the WMO

**Further objective:**

Contribute to the operational monitoring of the climate and the detection of global climatic changes
The need for two types of meteorological satellites

Geostationary orbit
for nowcasting & forecasts up to a few hours

Polar orbit
for forecasts up to 10 days
Deploying the Meteosat SG and Metop satellite series

- **MSG-1 (Meteosat-8)** launched 28 August 2002
- **MSG-2 (Meteosat-9)** launched 21 December 2005
- **MSG-3 (Meteosat-10)** launched 5 July 2012
- **MSG-4 (Meteosat-11)** launched 15 July 2015

- **METOP-A** launched 19 October 2006
- **METOP-B** launched 17 September 2012
- **METOP-C** launch on 7 November 2018
Metop-C launch scheduled on 7 November 2018 (CET)
Current EUMETSAT satellites

**METOP-A & -B (98.7° incl.)**
- LOW EARTH, SUN-SYNCHRONOUS ORBIT
- EUMETSAT POLAR SYSTEM (EPS)

**JASON-2 & -3 (63° incl.)**
- LOW EARTH, NON-SYNCHRONOUS ORBIT
- OCEAN SURFACE TOPOGRAPHY MISSION, SHARED WITH CNES/NOAA/EU

**SENTINEL-3 A & B (98.65° incl.)**
- LOW EARTH, SUN-SYNCHRONOUS ORBIT
- COPERNICUS SENTINEL-3 MARINE MISSION

**METEOSAT-8 (41.5° E)**
- GEOSTATIONARY ORBIT
- METEOSAT 2ND GENERATION

**METEOSAT-9, -10, -11**
- GEOSTATIONARY ORBIT
- METEOSAT 2ND GENERATION

- TWO-SATELLITE SYSTEM
  - FULL DISC IMAGERY SERVICE (15 MINS): METEOSAT-11 (0°)
  - RAPID SCAN SERVICE OVER EUROPE (5 MINS): METEOSAT-10 (9.5° E)
  - HOT BACK UP TO BOTH SERVICES: METEOSAT-9 (3.5° E)
Meteosat observes Africa better than Europe
MSG for nowcasting of severe weather: thunderstorms
Meteosat applications in Africa

Cyclone in the Indian Ocean, Farquhar Island, Meteosat, May 2016

Dust storm, May 2016
Meteosat 8 provides IODC service at 41.5° E

Meteosat Second Generation satellite
Best geostationary imagery satellite over the Indian Ocean
Images every 15 mn, 12 channels, 1-2 km resolution
Closer to Africa than Meteosat-7
EUMETSAT Polar System: part of the Initial Joint Polar System shared with the US
ECMWF is world leader of medium-range NWP
Impact of satellite observations on forecasting cyclones

Forecast with satellites

Forecast without satellites

700hPa initial conditions (humidity and wind) with satellites

700hPa initial conditions (humidity and wind) without satellites
EUMETSAT Polar System has highest positive impact on NWP

Source: Met Office, UK
Launch of Metop-C scheduled on 7 November

Higher impact expected from 3-Metop constellation: 2019-2022
EUMETSAT network of Satellite Application Facilities

- EUMETSAT NWP SAF: Numerical Weather Prediction
- EUMETSAT OSI SAF: Ocean and Sea Ice
- EUMETSAT NWC SAF: Support to Nowcasting and Very Short Range Forecasting
- EUMETSAT LSA SAF: Land Surface Analysis
- EUMETSAT AC SAF: Atmospheric Composition Monitoring
- EUMETSAT ROM SAF: Radio Occultation Meteorology
- EUMETSAT CM SAF: Climate Monitoring
- EUMETSAT H SAF: Support to Operational Hydrology and Water Management

13th EUMETSAT User Forum in Africa, Abidjan, Côte d'Ivoire
Global Metop data impacts regional NWP through BCs from global models

**EARS and RARS-AFRICA (SAWIDRA):**
Regional Metop data within 30 mn from sensing for direct assimination
EARS plus RARS-Africa (SAWIDRA) cover full Africa

EARS, which is a project of the European Space Agency (ESA), provides Earth observation services to support various sectors such as agriculture, meteorology, and disaster management. RARS-Africa, on the other hand, is a regional system that enhances the coverage of satellite data in Africa. The combination of these two systems ensures comprehensive coverage of the African continent.

The map shows the coverage areas of EARS plus RARS-Africa across Africa, with different shades indicating various coverage percentages. Key cities marked on the map include Athens, Muscat, Maspalomas, and Saint-Dennis.
EARS plus RARS-Africa (SAWIDRA) cover full Africa

Location are indicative

13th EUMETSAT User Forum in Africa, Abidjan, Côte d'Ivoire
Cooperative Jason missions

- **TOPEX-POSEIDON**
  - 1992-2006
- **JASON-1**
  - 2001
- **OSTM/JASON-2**
  - 2008
- **JASON-3**
  - 2016
- **SENTINEL-6/JASON-CS**
  - 2020
Jason provides highest accuracy mean sea level measurements

Overall trend: 3.18 mm/yr
Global altimeter data
Corrected for GIA
Annual signal removed
Contributions to the EU Copernicus programme
Ocean monitoring missions

- Constellation of three satellites in orbit: Jason-3 & Sentinel-3
  - Jason-3 operational since July 2016
  - Sentinel-3A operational since October 2017
  - Sentinel-3B launched on 25 April 2018, under commissioning

- Sentinel-6/Jason-CS under development as a follow up of Jason-3
Contributions to the EU Copernicus programme
Atmospheric composition monitoring missions

- Geostationary and polar orbits

- GEO: Sentinel-4 mission hosted in MTG system
  - Synergy between Sentinel-4, IRS, FCI, LI measurements

- Sentinel-5 mission hosted in EPS-SG system
  - Synergy between Sentinel-4, IRS, FCI, LI measurements
NEXT GENERATION SATELLITE SYSTEMS
METEOSAT THIRD GENERATION : MTG-I AND MTG-S MISSIONS

**Imagery mission** implemented by two MTG-I satellites
- Full disk imagery every 10 minutes in 16 bands
- Fast imagery of Europe every 2.5 minutes
- New Lightning Imager (LI)

**MTG-S hyperspectral infrared sounding mission:**
- 4D weather cube: temperature, water vapour, O3 every 30 minutes (Europe)
- Air quality monitoring and atmospheric chemistry (synergy with the Sentinel-4 instrument)

**Start of operations in 2021 and 2023**
MTG FULL OPERATIONAL CONFIGURATION: 2 MTG-I + 1 MTG-S
Spectral bands of FCI image onboard MTG-I
MTG – Lightning Imager

Preliminary data - Not for operational use

GOES-16 GLM 2017-04-28 18:00 UTC 6000.0x real time
EPS Second Generation: a two-satellite system

- 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

- Europe’s contribution to the Joint Polar System (JPS) shared with the US/NOAA

- Operational exploitation: 2022 – 2043

- Three successive pairs of satellites
EPS-SG mission capabilities

• Major improvements to all EPS observation missions
  • Infrared and microwave sounding
  • Optical imagery
  • Scatterometer
  • Radio-occultation

• New imagery missions
  • 3MI: first operational imaging polarimeter
  • Microwave imager (MWI): imagery of precipitation
  • Ice Cloud Imager (ICI): ice clouds
COOPERATION WITH AFRICA
From strategy to activities

EUMETSAT Strategy
Long term commitment to cooperate with Africa
Ease data access and exploitation of the data

Institutional framework with EU, AUC, RECs, WMO, AfDB
Capacity building initiatives and projects

EUMETSAT activities in Africa

Data coverage
Long term perspectives -> 2040
Data policy: free for least developed countries

Data access
EUMETCast

Training
4 training CoE:
- IMTR, Nairobi
- EAMAC, Niger
- SAWS, S.A.
- DMN, Morocco

User support & interactions
- Help Desk
- User Fora
- RAI DEG

Contribution to Capacity Building initiatives/ projects
Data policy: free data for EU-funded projects
Support to use of satellite data for Sustainable Development
PUMA, AMESD, MESA, SAWI DRA, GMES&Africa, GFCS-ACP

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Contribution to EU-Africa projects

• PUMA – 2001-2006, 11M€ (8th EDF), implemented by KMD
  • 53 PUMA stations deployed at NMHS
  • 350 African NMHS technicians trained
  • Support to 6 Pilot Projects (Outlook activities) -> AMESD

• AMESD – 2007-2013, 21M€ (9th EDF), implemented by AUC
  • 110 PUMA and AMESD stations maintained and/or deployed
  • User Training (1000 experts trained)
  • Support to development of Meteorological and Environmental services

• MESA – 2013-2017, 37M€ (10th EDF), implemented by AUC
  • 180 PUMA and AMESD stations maintained and/or deployed
  • User Training (1600 experts trained)
  • Support to development of Meteorological, Environmenta Climate services
Contribution to EU-Africa projects

• Disaster Resilience R3 - 2014-2019, 20M€ (10th EDF) implemented by AfDB
  • Access to Metop data for regional NWP
  • Support to set up of X/L band stations of RARS-Africa
  • User Training (all Regional Meteorological Centres and NMHS)

• GMES&Africa Phase I – 2016-2019, 26M€ (PANAF), by AUC
  • Maintenance of MESA stations, Copernicus data
  • User Training programme (under preparation)
  • 13 regional grants for services implementation (Marine and Land monitoring)

• Intra-ACP Climate Services – 2018-2022, 85M€ (11th EDF), implemented by ACP Sec, AUC and the regions
  • Support to upgrade of PUMA 2015 stations and “climate stations”
  • User training and support to Regional Climate Centre for provision of regional services (as per GFCS)
EUMETCast Africa - New Service starting May
New EUMETCast-Africa service

- New Africa footprint, as of May 2018: EUTELSAT-8 West
- Technological upgrade: DVB -> DVB-S2
- Typical antenna sizes in Africa 2.4 m
- Full uplink solution for products dedicated to Africa
- Service until 2024, options until 2027
As of 31 July 2018:

- 358 registered users (entities)
- 764 stations
  (some sharing same antenna)

- #users per country:
  
  National and regional Meteorological services

  National and regional entities dealing with environment,

  Universities and research centers

  Private sector and individuals
Merci!
Thank you!
Obrigado!
Choukran!