

# Securing EUMETSAT's Mission from an Evolving Space Environment

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#### **EUMETSAT: Intergovernmental Organisation of 30 Member States**

#### **Presentation Contents**



- EUMETSAT Mission: High availability provider of low latency, essential, operational weather and climate products.
- Impact of evolving space security environment on space assets.
- Debris environment
  avoidance and prevention
- Space Weather environment:
  - User / Provider / Distributor /
    - Participant in Cooperation
    - Strategic Outlook

#### **Benefits of EUMETSAT Meteorological and Climate Products**



Safety of life, property and infrastructure...

Transport ...

....Energy, agriculture, tourism....

...Climate policy and environment protection

Operational Availability of EUMETSAT Products Critical: High Quality, High Availability, Low Latency Robustness of EUMETSAT Satellites to the Evolving Space Environment is an essential component



# **Current EUMETSAT satellites**

#### METOP-A & -B (98.7° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT

EUMETSAT POLAR SYSTEM (EPS) / INITIAL JOINT POLAR SYSTEM

SENTINEL-3A & -3B (98.65° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT

COPERNICUS SATELLITES DELIVERING MARINE AND LAND OBSERVATIONS

#### JASON-2 & -3 (63° incl.)

LOW EARTH, NON-SYNCHRONOUS ORBIT

OCEAN SURFACE TOPOGRAPHY MISSION, SHARED WITH CNES/NOAA/EU

#### METEOSAT-9, -10, -11

GEOSTATIONARY ORBIT	TWO-SATELLITE SYSTEM
METEOSAT 2 <sup>ND</sup> GENERATION	FULL DISC IMAGERY MISSION (15 MINS) (METEOSAT-11 (0°)) RAPID SCAN SERVICE OVER EUROPE (5 MINS) (METEOSAT-10 (9.5°
	E)) BACKLIP AND GAP FILLING SERVICE (METEOSAT-9 (3.5°F)

#### **METEOSAT-8 (41.5° E)**

**GEOSTATIONARY ORBIT** 

METEOSAT 2<sup>ND</sup> GENERATION PROVIDING IODC FROM FEBRUARY 2017 – MID-2020

## **EUMETSAT** Mission Planning



BENEFIT AREA	LIKELY BENEFIT
Protection of property and infrastructure	€5.4 billion/year
Added value to the European economy	€41.0 billion/year
Private use by European citizens	€15.0 billion/year
TOTAL	€61.5 billion/year

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



#### Major positive impact of Metop and NOAA IJPS on Day 1 forecast





## Safety on Earth intertwined with Space Security



- Protect our space asset communications and from debris and space weather
- Outages from space environment impact ability to provide required weather forecast accuracies. EUMETSAT data end users (infrastructure, transport etc.) impacted directly by Atmospheric Weather and **Space Weather** 
  - Synergies between space and atmospheric weather forecast needs



#### **Debris Environment: Avoidance and Protection**



### **EUMETSAT** Roles in the field of Space Weather



Current Roles

- A USER of SW data for protection of EUMETSAT space assets
- A PROVIDER of SW data from EUMETSAT satellites
- A DISTRIBUTOR of 3<sup>rd</sup> party SW data to Member States
- A PARTICIPANT in international coordination efforts to improve data provision and services.



#### **EUMETSAT** as User of Space Weather Services









## **Provision of SW Data from EUMETSAT Satellites**

- Current set of relevant observations is limited
  - Space Environment Monitoring (SEM)/Metop
  - Radio-occultation: GRAS/Metop, altitude up to 250 km (TBC)
  - Future EPS-SG, MTG, Jason-CS systems
    - RMU on MTG, Metop-SG, Jason-CS
      - Use of data needs development of assimilation (pursued by ESA)
    - RO on Metop-SG A/B: altitude up to 500 km



 RO/TriG on Jason-CS: altitude up to 800 km



### International cooperation : 3<sup>rd</sup> Party Data Distribution

Country	Age	ency	
Canada:	EC	CC	
China:	CM	A, CNSA,	NSOAS
India:	ISR	RO, IMD	
Japan:	JAX	KA, JMA	
Russian Fed	eration: Ros	shydromet	t
South Korea	: KM	A	
United States	s: NA	SA, NOAA	A
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## International Coordination Participation : CGMS etc.



EUMETSAT active in the CGMS Space Weather Coordination Group and also acting as user representative in external activities in framework of ESA and EU.



## **EUMETSAT Strategy: Challenge 2025**





#### Available on www.eumetsat.int



## **Space Weather in Challenge 2025 Strategy**

- Continue to protect operational space assets
  - Use Operational Services in US and Europe and ensure EUMETSAT requirements going into European initiatives.
- Meet additional needs through cooperation
  - EUMETSAT will assess how space weather data and forecasts from international partners could be made available to its Member States



- Planning for future programmes
  - Requirements for observations of space weather will be considered based on the experience available in Member States and at NOAA taking into account opportunities within possible EU SSA initiatives



# **Proposed Next Steps for EUMETSAT in Space Weather**



Above: ESA Space Weather Network and ESA L5 Mission Proposal Courtesy of ESA Consolidate EUMETSAT and partner capabilities and assess how they can be used together with a focus on operational space weather needs .

- Together with/supporting ESA:
  - Consolidating the European data requirements
  - Establishing a potential role for EUMETSAT in a future operational European L5 (Lagrangian) mission
  - Defining the Agencies roles and responsibilities within European Space Weather Services
  - Consult with Member States



## **Concluding Remarks**



### **Concluding Remarks**

- EUMETSAT is deeply engaged in issues relating to the security of its space assets to safeguard its core operational mission:
  - Radio Frequency and Comms security
  - Space Debris Avoidance and Prevention
  - Space Weather:
    - Protection of our assets
    - Provider of in-situ data
    - Distributor of 3<sup>rd</sup> Party SW operational data
    - Participation in international cooperative ventures
    - Engaging with Member States and partner organisations to define future possible operational roles to support the wider SW user community.