

Decorative blue and white geometric shapes in the top left corner, including a blue trapezoid and a white circle with lines.

# Future of European Meteorological satellite programmes

## A EUMETSAT perspective

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ESA EO 2040+ workshop, 11 February 2025





- EUMETSAT satellite systems are user-driven
- Member States pay for an operational data services that delivers **benefits** to societies and represent **value for money**
- EUMETSAT programmes = a **European** response to **global operational** requirements of **WIGOS 2040**
  - An **operational** observing system taking into account rapidly evolving environment
  - 3 WIGOS 2040 pillars :
    - Backbone infrastructure, sustained on the long-term
    - R&D opportunity missions – improvement of observations
    - Commercial missions
- Europe is a **world leader** in meteorological satellite systems from operational and scientific perspective



## 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.

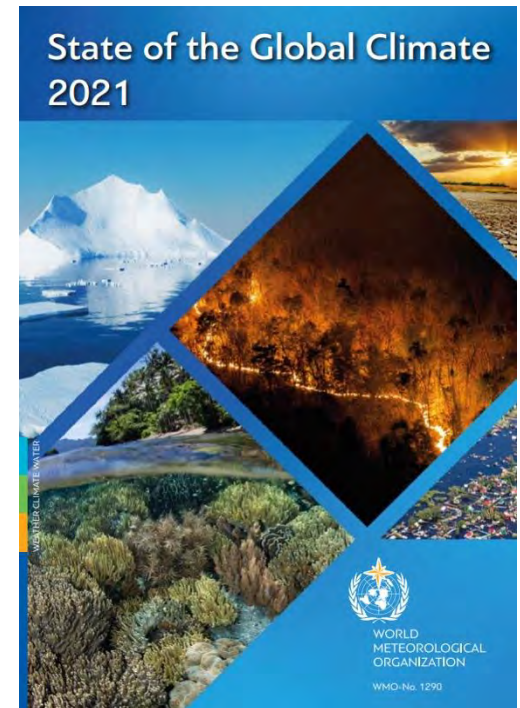
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- Between 1980 and 2020, total economic losses from weather- and climate-related events amounted to EUR 450-520 billion (in 2020 euros) in the 32 EEA member countries
- Based on data from two separate sources, fatalities during the same period amounted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

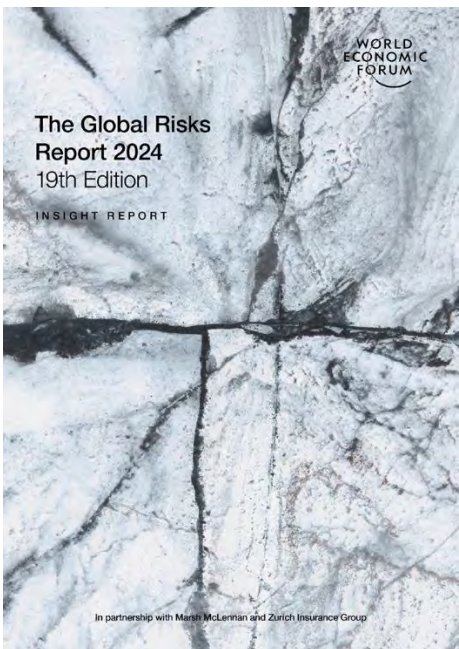




# What we observe has a value

## Global risks perceptions highlight societal and environmental concerns

Respondents to the Global Risks Perception Survey rank failure to mitigate and failure to adapt to climate change as the number one and two long-term threats to the world and the risk with potentially the most severe impacts over the next decade.



### Severity of risk over next two years



### Risk categories

- Economic
- Environmental
- Geopolitical
- Societal
- Technological

### Severity of risk over next 10 years



Source: World Economic Forum Global Risks Report 2024



# More than just weather

It is easy to take our daily weather forecasts for granted, but the social and economic benefits of accurate forecasts are huge – and this is largely thanks to satellites



Over **95%** of the 40 million observations processed every day for weather forecasting are provided by satellites

Errors in one-day forecasts have been reduced by **64%** thanks to data from satellites



SATELLITE DATA



EARLIER AND MORE ACCURATE WEATHER WARNINGS

Around **1/3** of the European economy is **weather-sensitive**



AGRICULTURE  
ENERGY  
TRANSPORT  
SEARCH AND RESCUE  
INFRASTRUCTURE  
PROPERTY  
TOURISM  
ENVIRONMENTAL PROTECTION



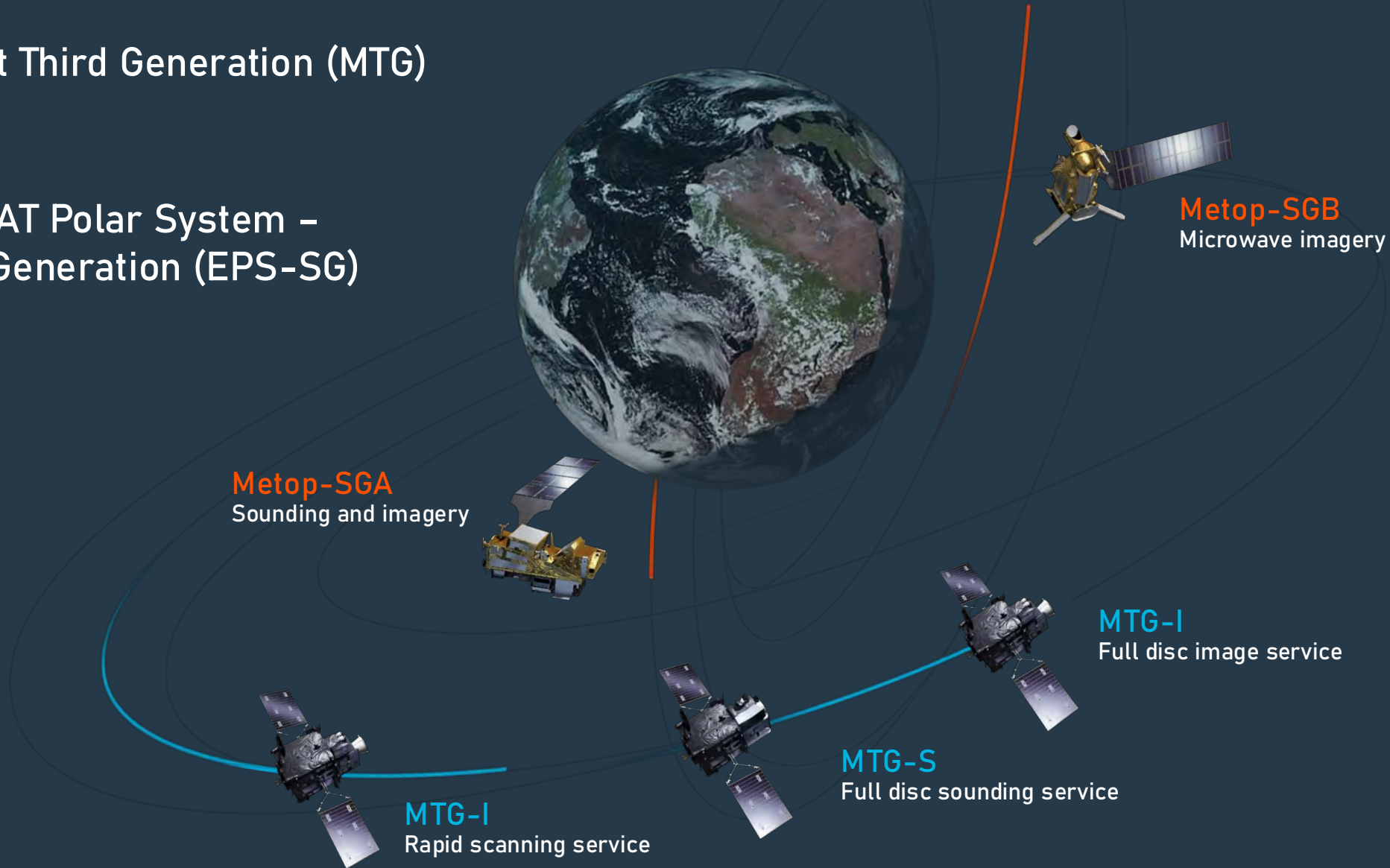
In the EU, the socio-economic benefits of weather forecasting are estimated to be up to

**€61 billion/year**



# The current system : MTG (GEO) and EPS-SG (LEO)

- Meteosat Third Generation (MTG)
- EUMETSAT Polar System – Second Generation (EPS-SG)



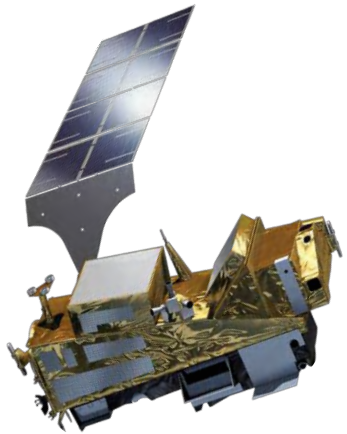


# But we need to plan for the future



M4G

Dev. Phases	De-phased Scenario SK25
Cont. Users Req	2026
Phase 0/A	<b>2028</b>
Phase B	2032
Phase C/D	2035
M4G I1	<b>2042</b>
M4G S1	2043



EPS-TG

Dev. Phases	De-phased Scenario SK25
Phase 0/A	<b>2033</b>
Phase B	2037
Phase C/D	2040
Metop TG A1	<b>2047</b>
Metop TG B1	2048



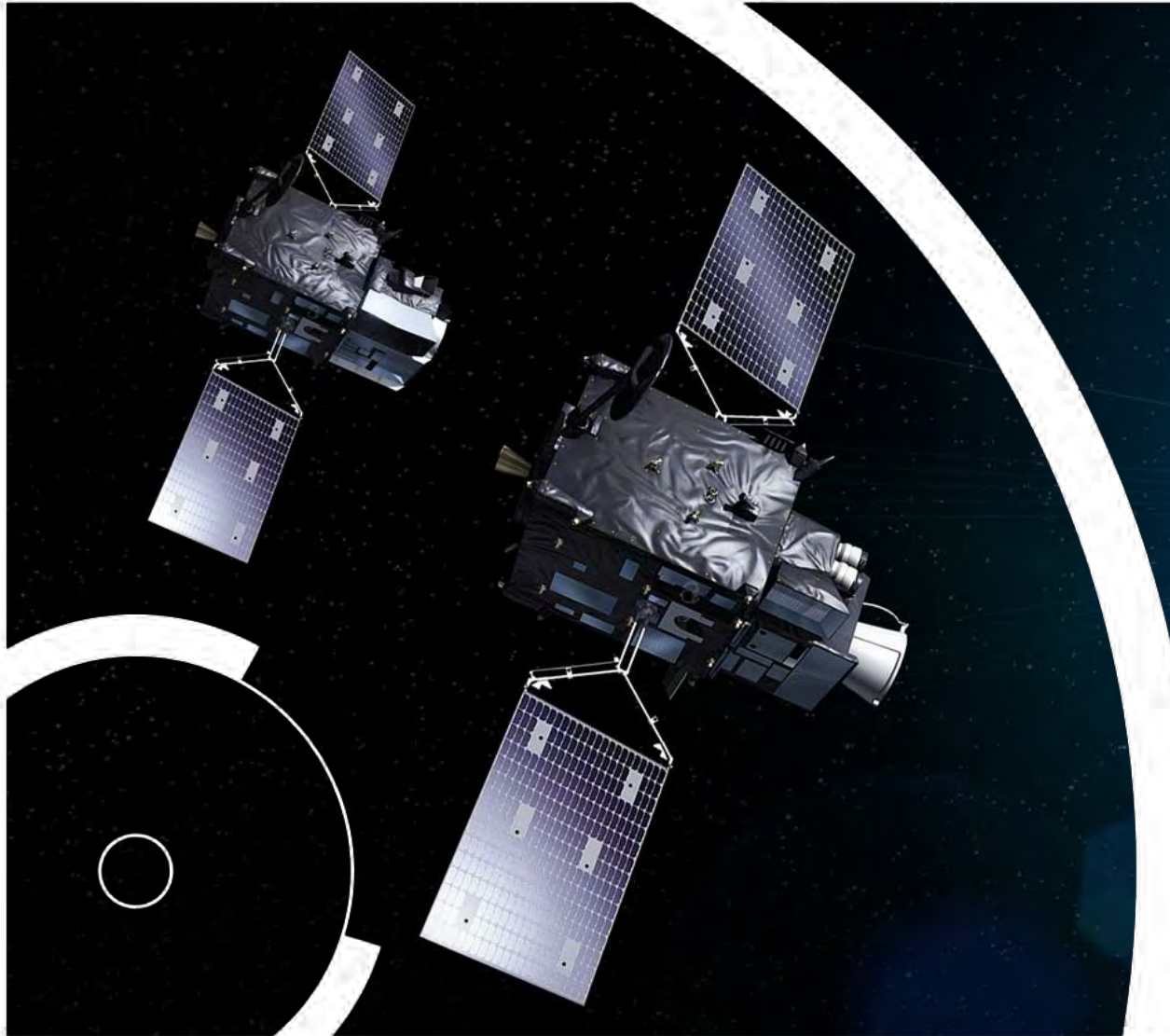
The challenge ?

WIGOS 2040 evolving towards Earth System Monitoring systems  
WIGOS 2050

New technologies on space and ground systems

New space, AI/ML

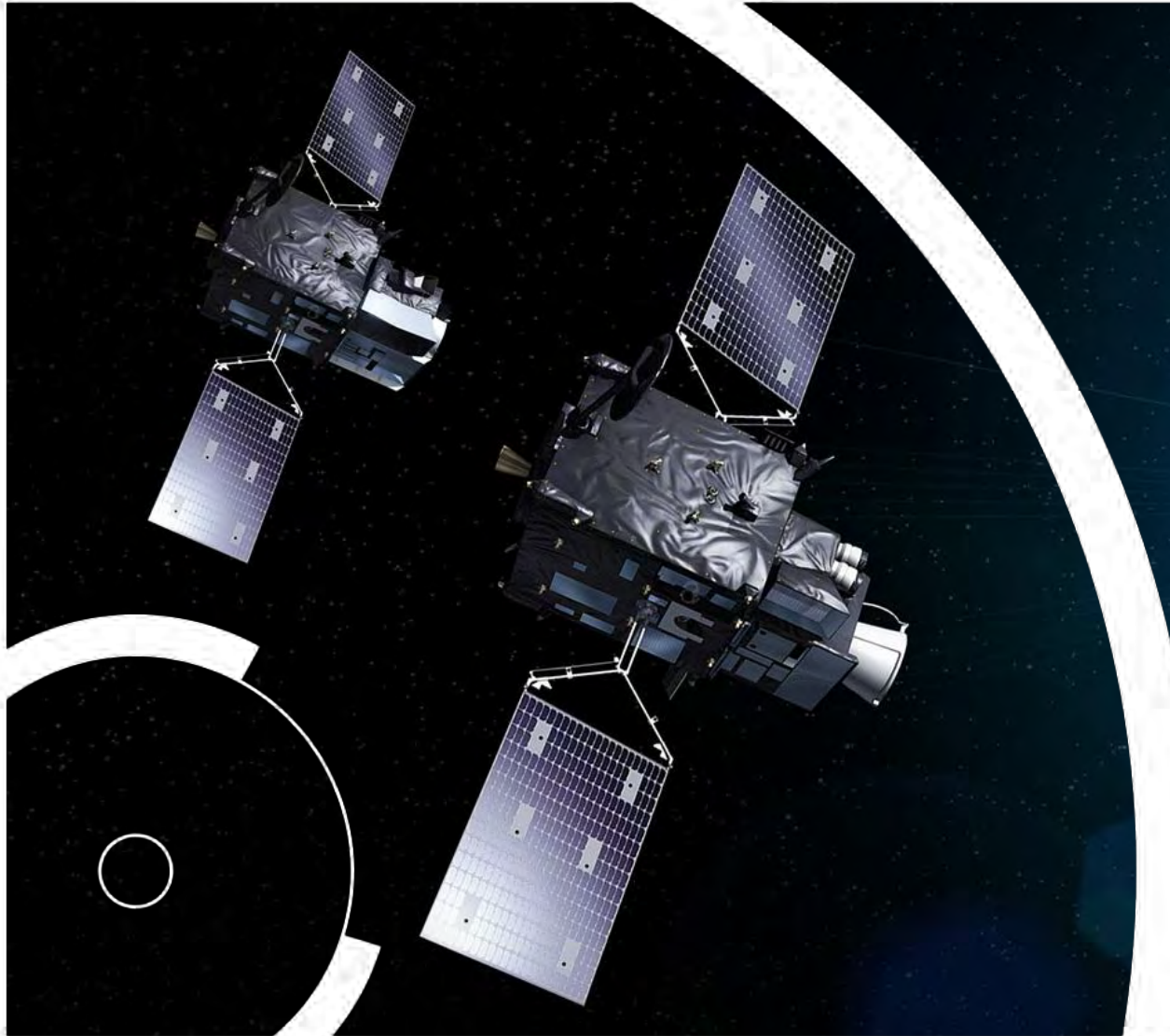




**The future will be different**

**US and China are going for  
“disintegrated” architectures**

**What is the stand of EUMETSAT ?**



## EUMETSAT innovates while remaining

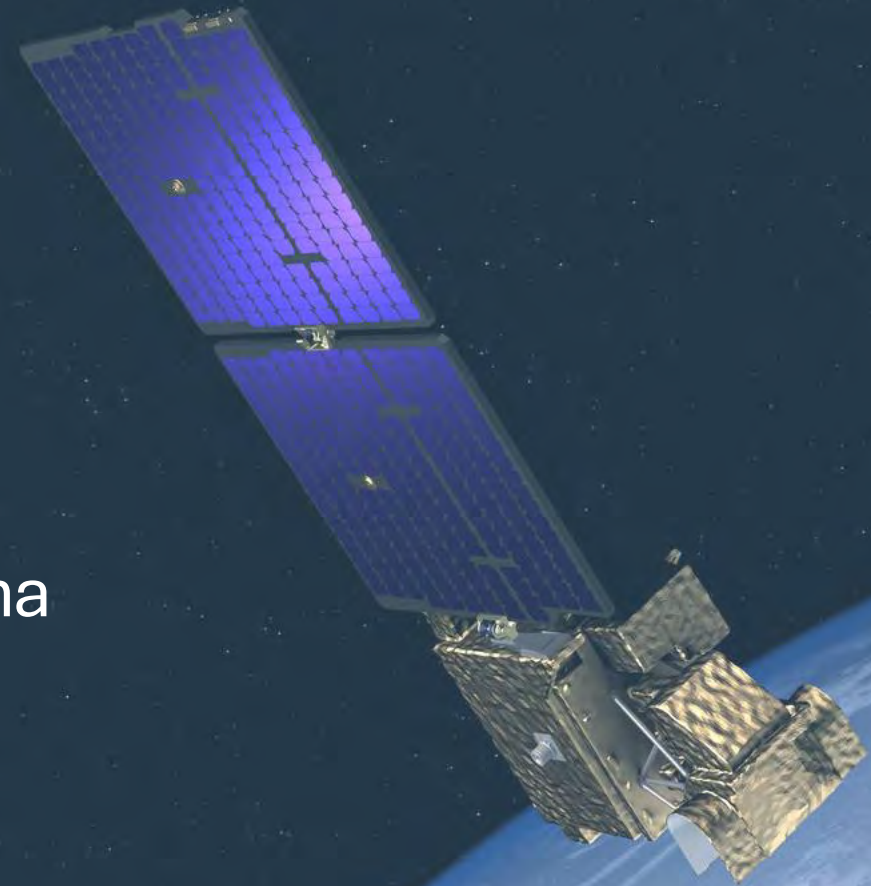
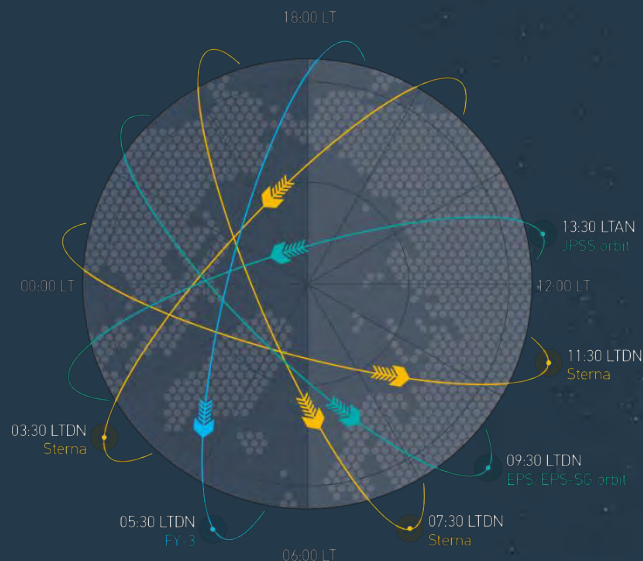
- Relevant
- Operational
- Affordable

Actions taken for 2025 – 2040 timeframe



# EPS-Sterna operational innovation

- Known instruments (MWS)
- Demonstration mission (ESA AWS)
- Small sats – new space concept
- Operational constellation
- Part of a global system with US and China








- High impact mission for improvement of NWP
- Unique European Technology
- Transition of ESA Earth Explorer into an operational mission → R20






# EUMETSAT Altimetry programme

www.eumetsat.int

Jason-1  
2001-2013



Topex-Poseidon  
1992-2006




Jason-2  
2008-2019

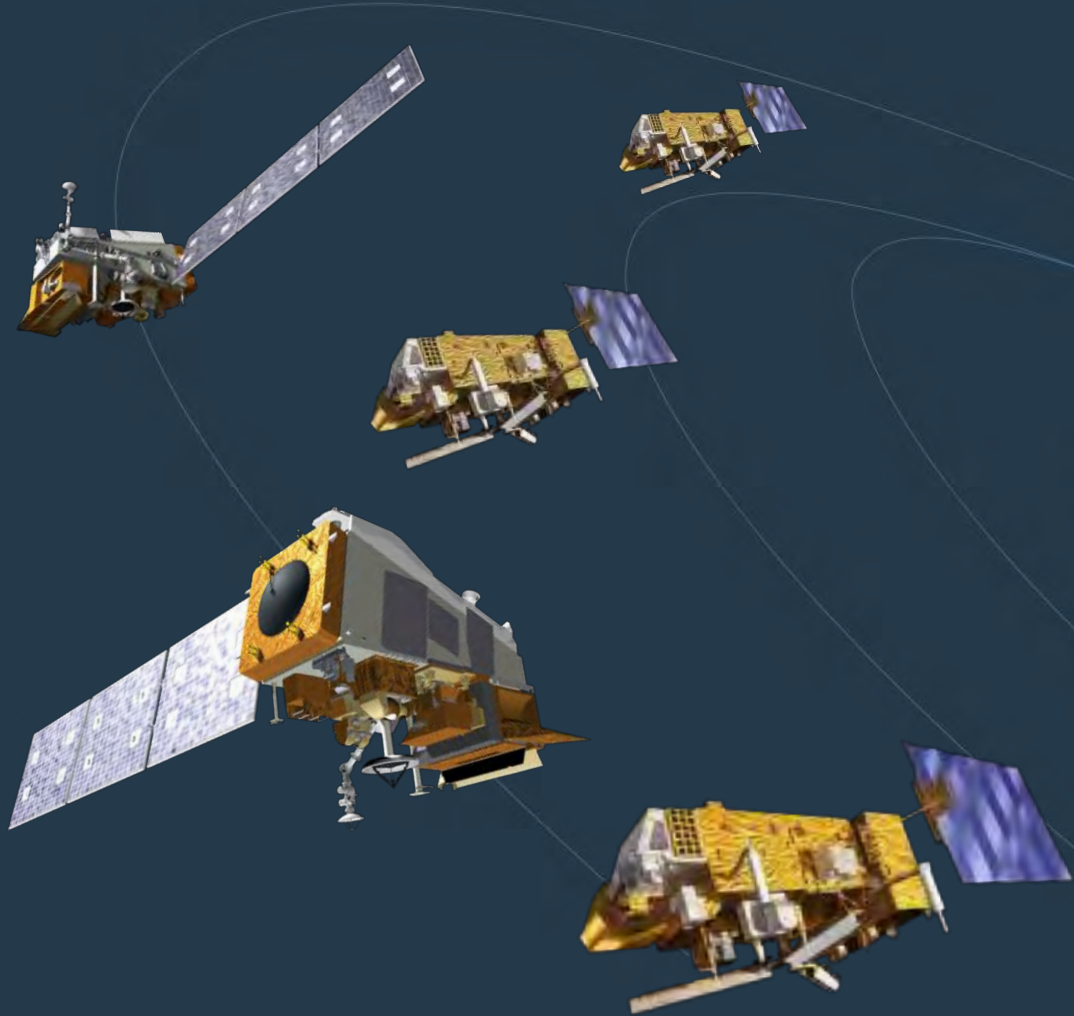


Jason-3  
2016

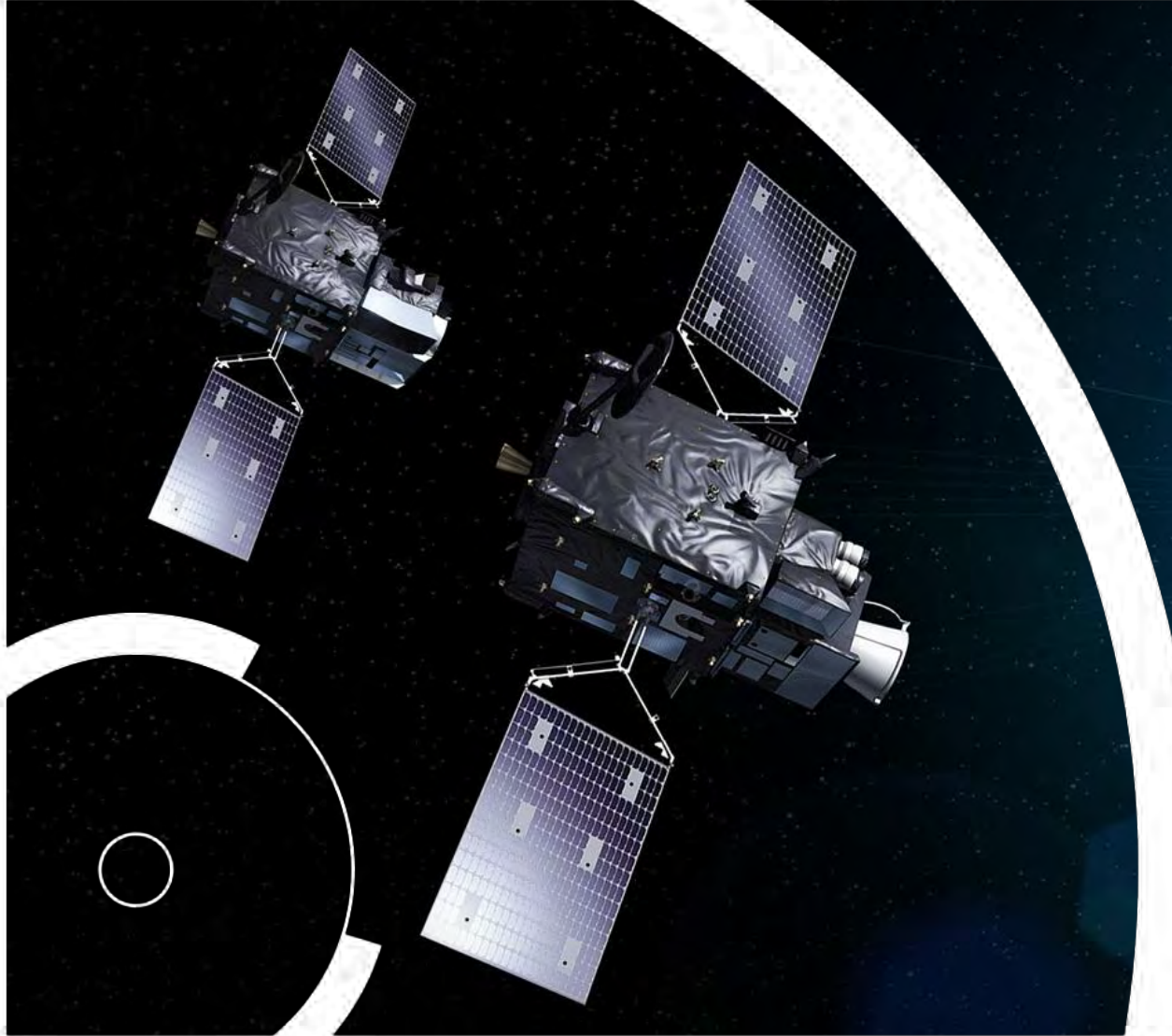


Copernicus Sentinel-6/Jason-CS  
2020 - 2025





- It needs to have a positive impact – operational !
- Demonstration that it can work but interesting lessons learned !
- European response ?



EUMETSAT provides  
**continuity and innovates**  
along the 3 pillars of  
WIGOS 2040



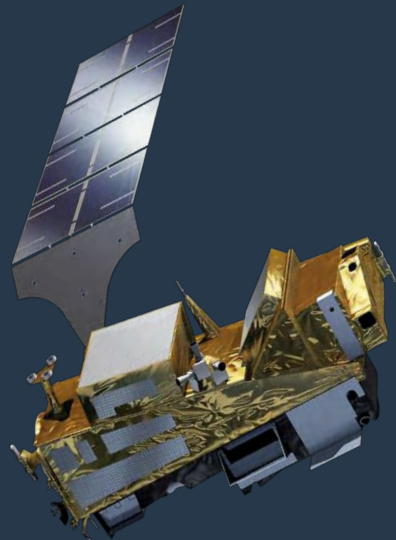
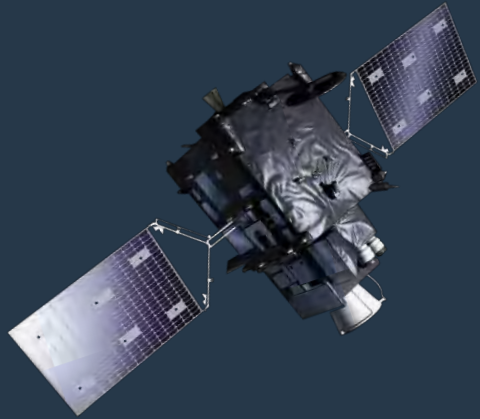
# What do we need from ESA and industry ?

[www.eumetsat.int](http://www.eumetsat.int)

We need to work together to provide more observations, but observations of good quality for core measurables – remain a world leader !

- Support to preparation of future European backbone sustained systems – i.e. M4G, EPS-TG
- Support to development of technologically / scientifically leading operational systems – miniaturisation,...
- Support to development of European commercial capabilities
- In orbit demonstration of European capacity for innovation

**With an operational focus (accuracy, cost, sustainability,....)**







Thank you for your attention

Any question is welcomed

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