



# Transforming EO data for operational applications

Estelle Obligis

04/06/2025



Inspire

How to monitor the Ocean?



# An intergovernmental organisation with 30 member states

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





## **Primary objective:**

Establish, maintain and exploit European systems of meteorological satellites.

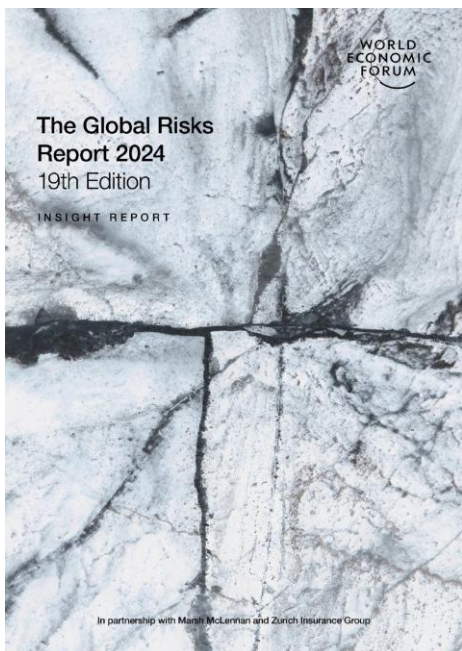
## **Further objective:**

Contribute to the operational monitoring of the climate and the detection of global climatic changes.



## 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.



Source: World Economic Forum Global Risks Report 2024

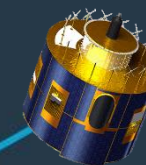
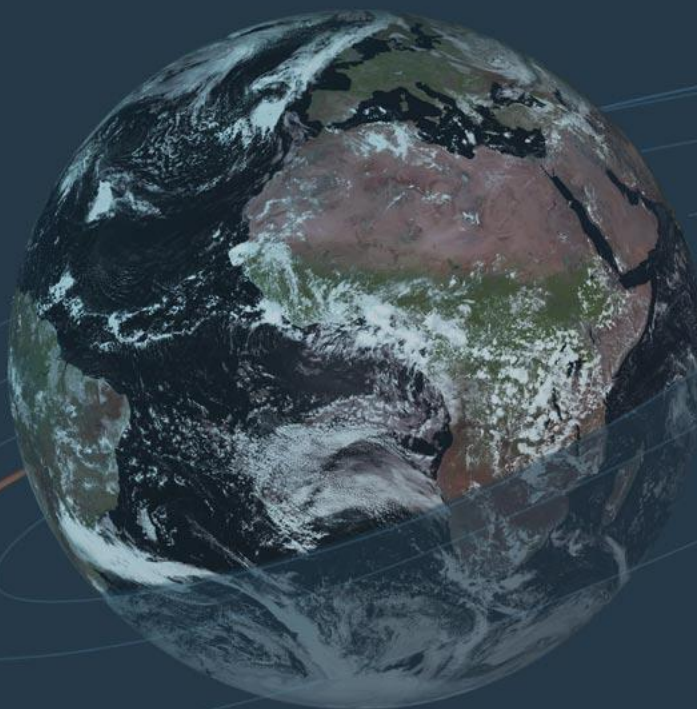
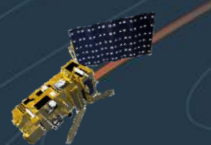




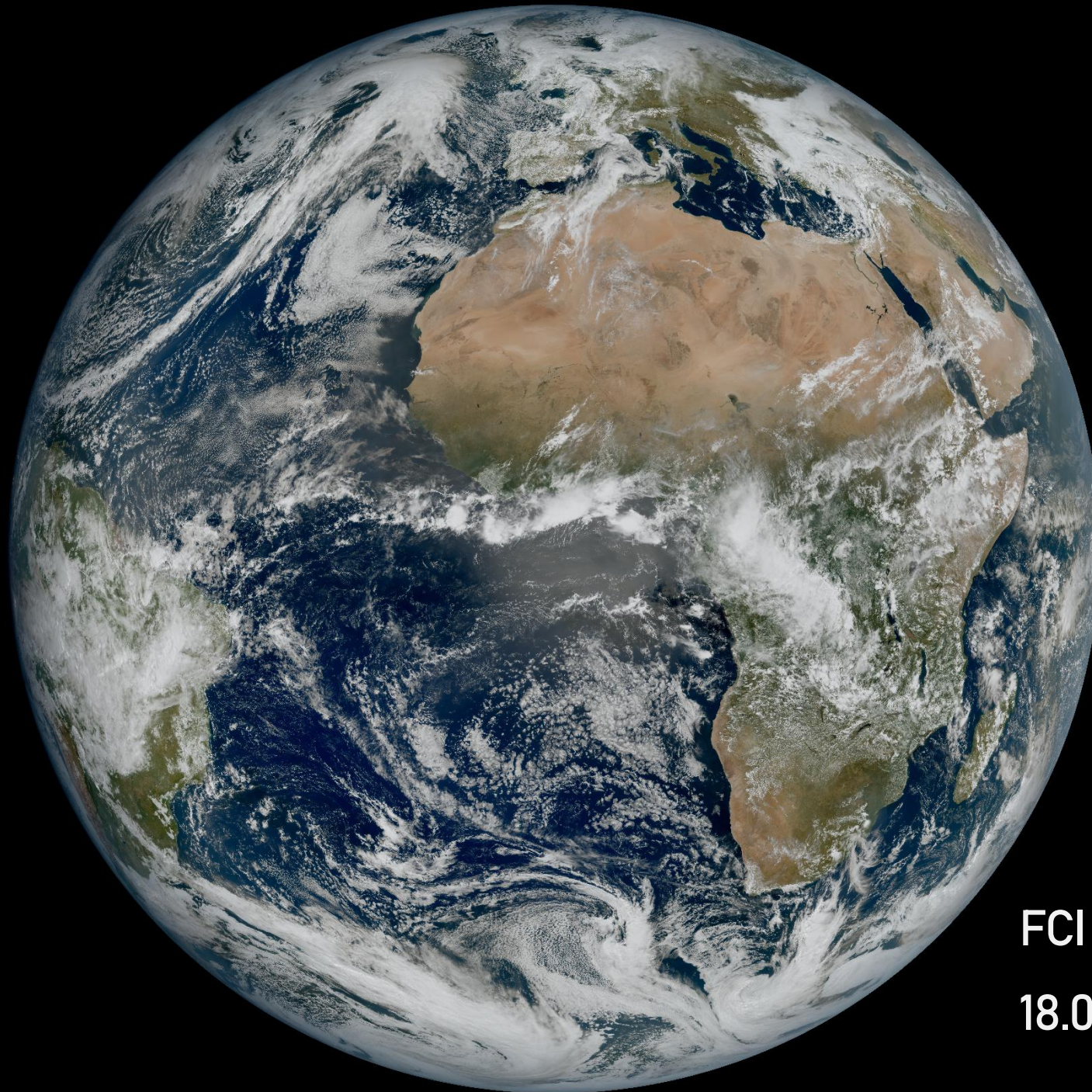
# The need for two types of satellites

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Low-Earth orbit  
650-850km altitude  
Critical for forecasts  
up to 10 days in advance



Geostationary orbit  
36,000km altitude  
Vital for forecasts up  
to a few hours ahead



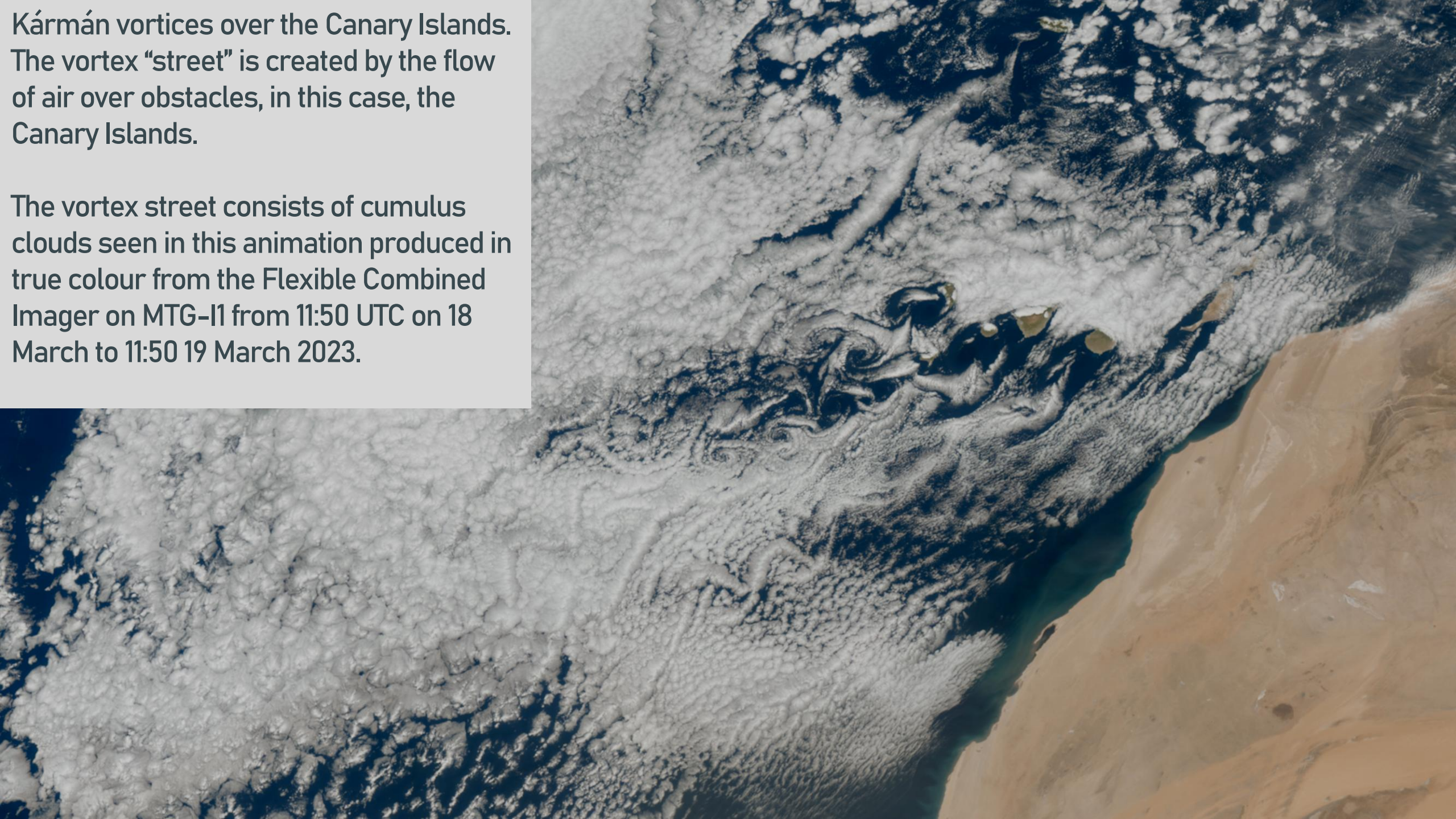
FCI First Image

18.03.2023 12:00 UTC

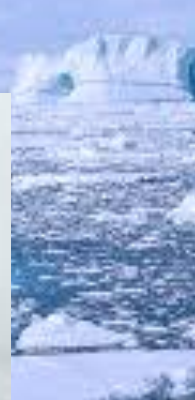
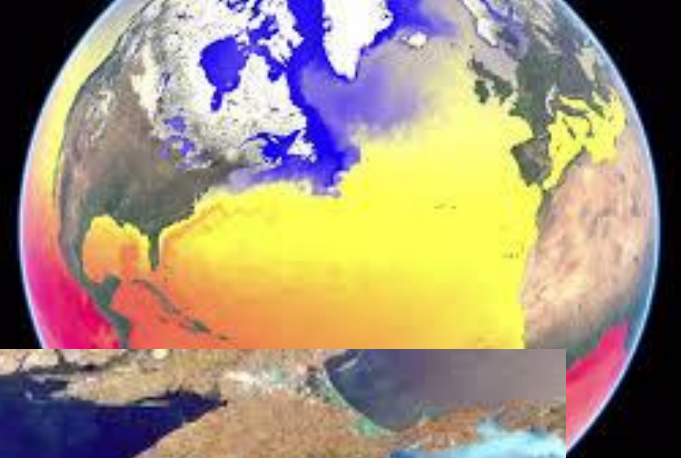


Kármán vortices over the Canary Islands. The vortex “street” is created by the flow of air over obstacles, in this case, the Canary Islands.

The vortex street consists of cumulus clouds seen in this animation produced in true colour from the Flexible Combined Imager on MTG-II from 11:50 UTC on 18 March to 11:50 19 March 2023.





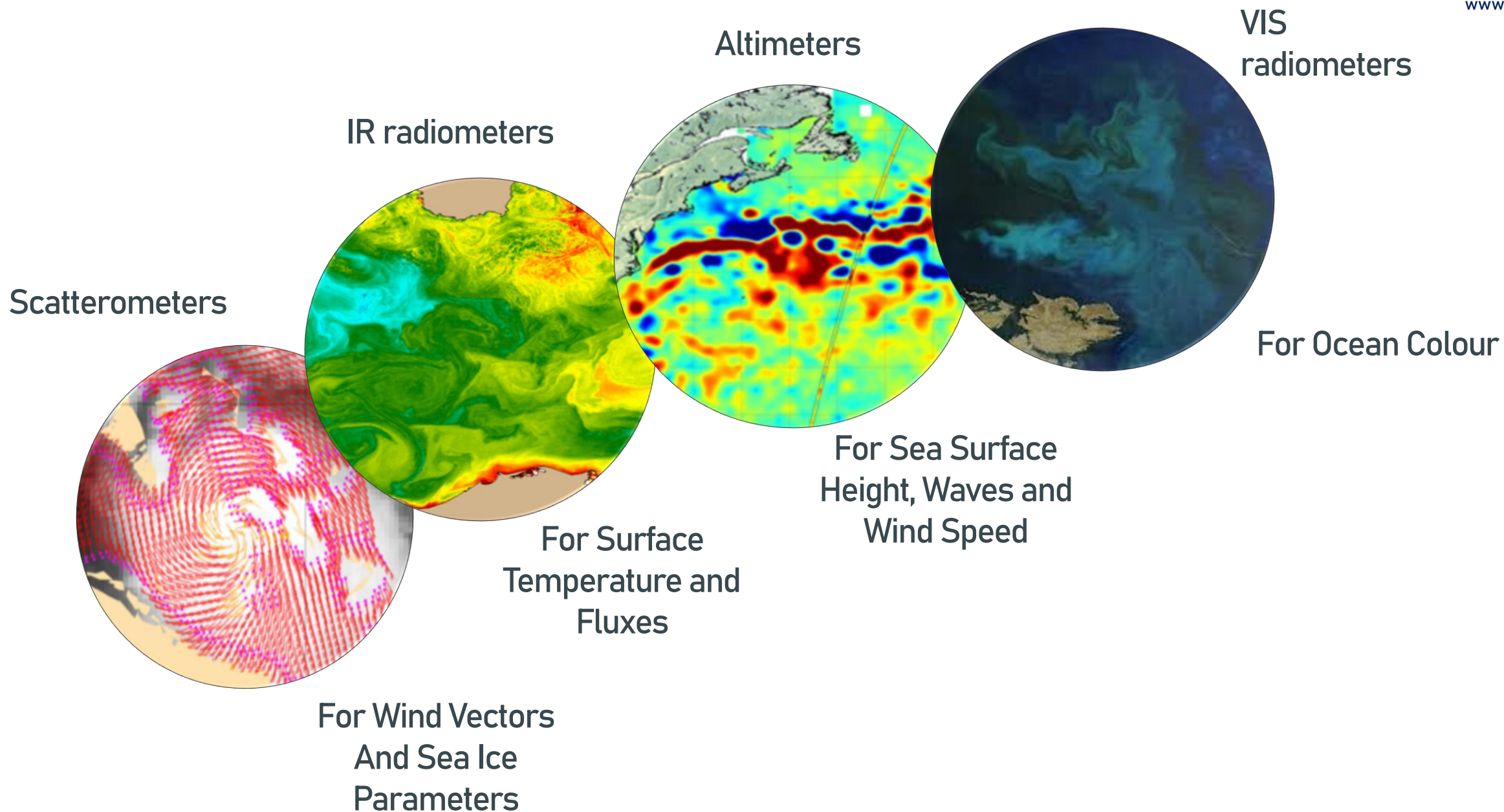






# A growing integrated stream of marine products

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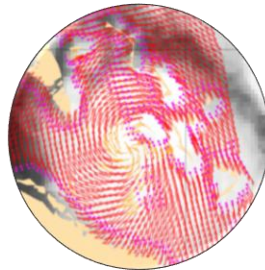




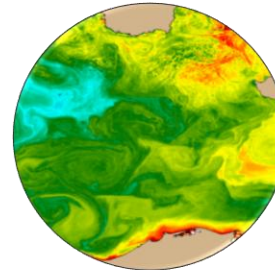
# Key applications

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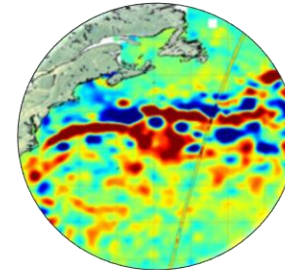
Wind Vectors  
Sea Ice  
Parameters



Sea Surface  
Temperature  
Fluxes



Sea Surface Height  
Significant Wave  
Height  
Wind Speed



Ocean Colour



Operational Oceanography



Numerical Weather Prediction



Marine Meteorology



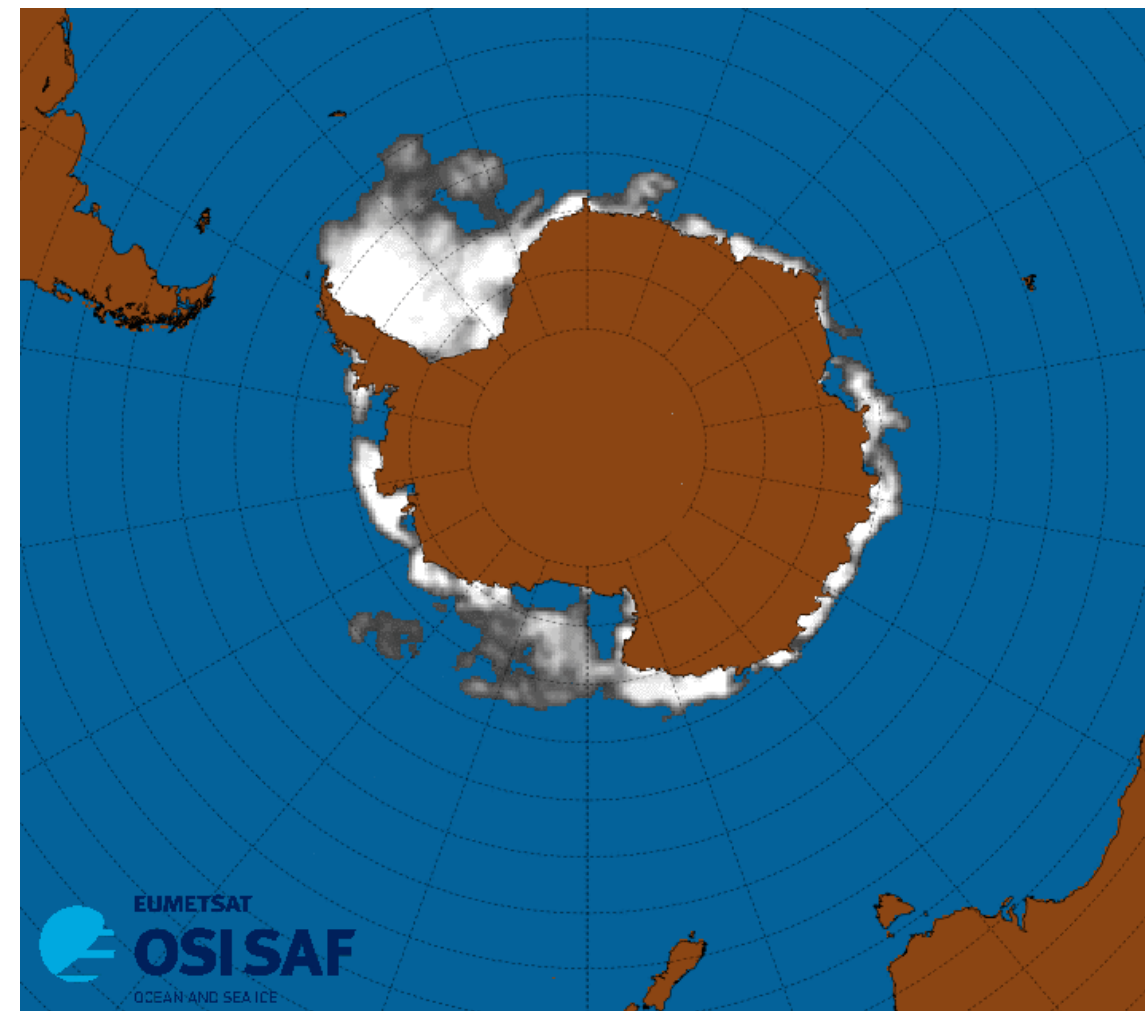
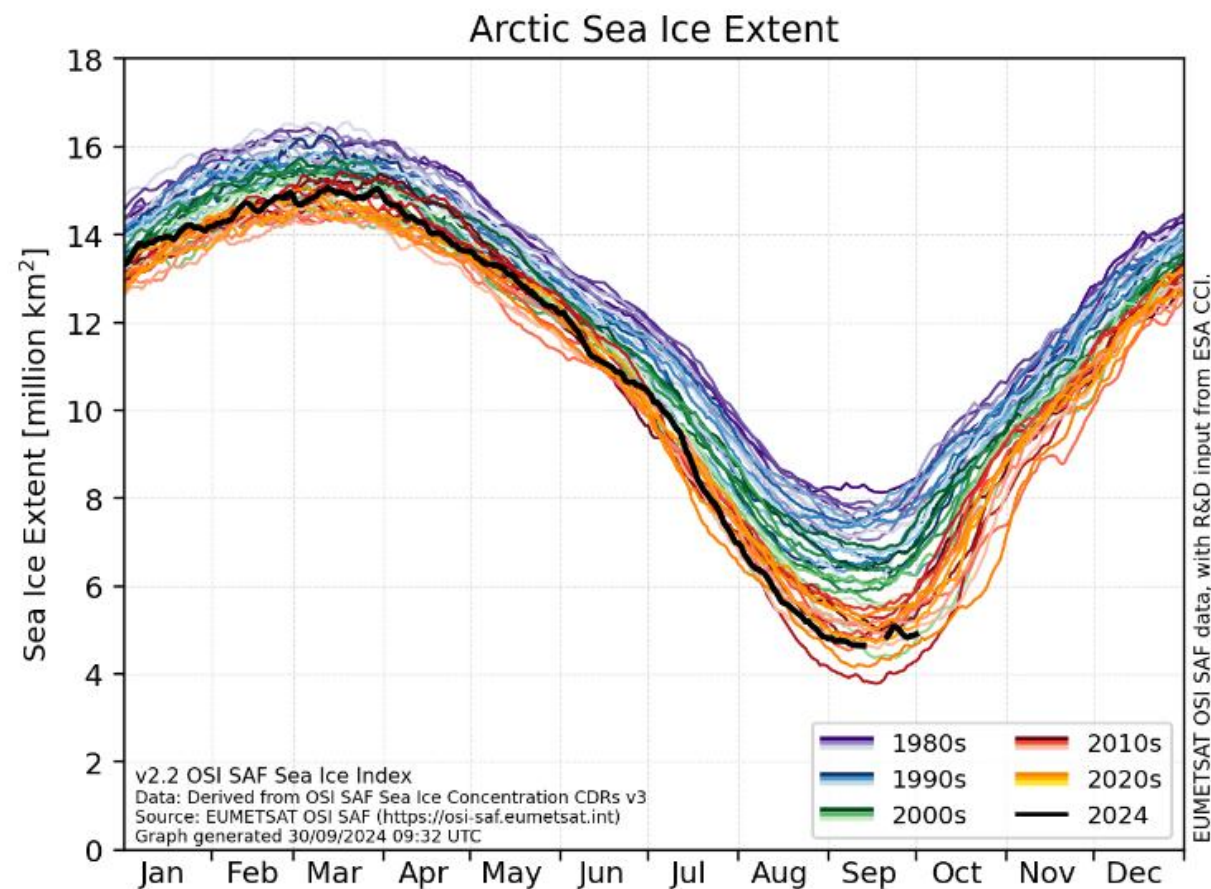
Climate Analysis



Marine Ecosystems Monitoring



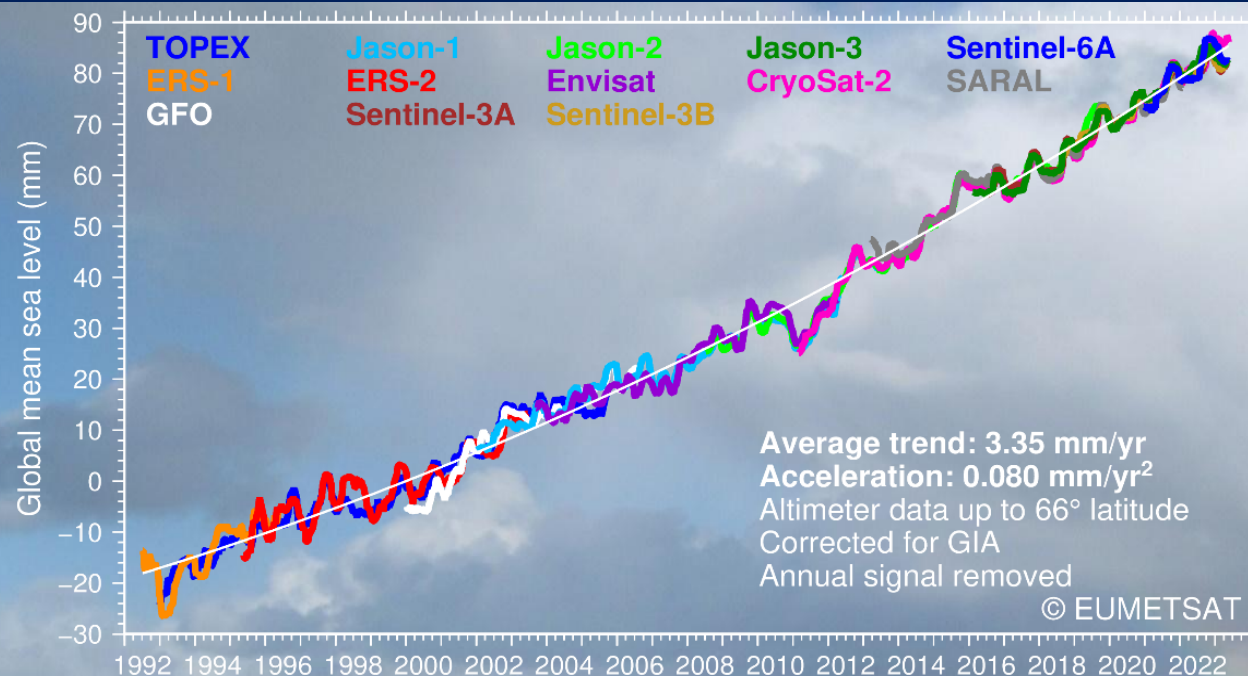




Sea ice concentration is the ocean area fraction of a cell covered by sea ice. It is given as a real number in percentage, with a range from 0-100%. It's a useful tool when monitoring the effects of climate change on the ocean ice.



# Monitoring of Global Mean Sea Level change @EUMETSAT



Thanks to 30 years of reference altimetry missions, we know that:

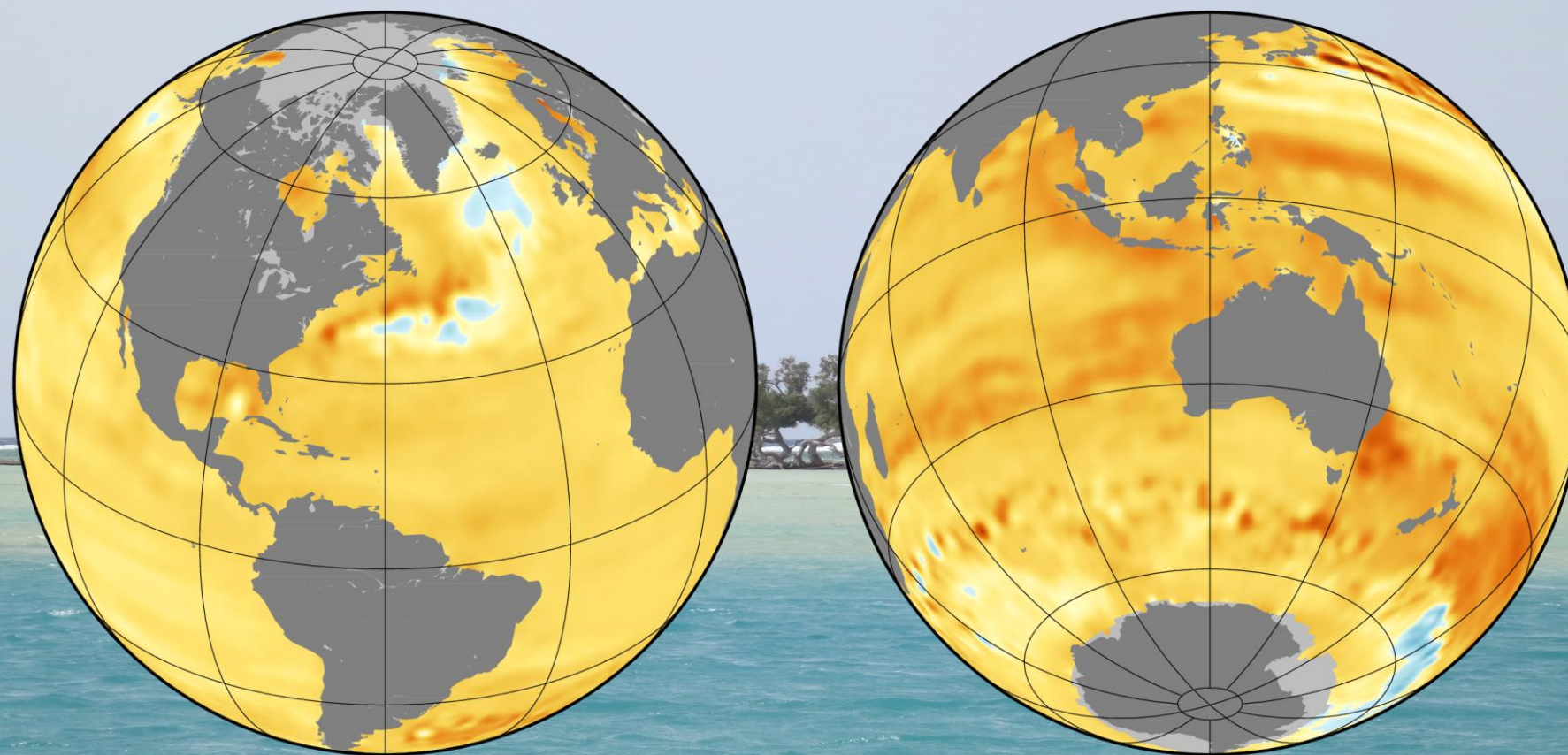
- Sea level rose on average by 10 cm over last 30 years
- Trend was 2.1 mm/year in 1992, 4.6 mm/year in 2022
- If unabated, sea level will rise 68 cm over the 21st century, which is just below IPCC's worst case prediction of 84 cm;

Considerable challenges!

- Precision, accuracy, stability, and coverage of the measurement system
- Data availability, reliability, standardization and know-how

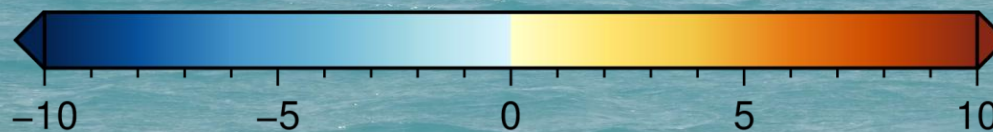


# Regional sea level change (1992–2017)



Sea Level Change (mm/year)

© EUMETSAT



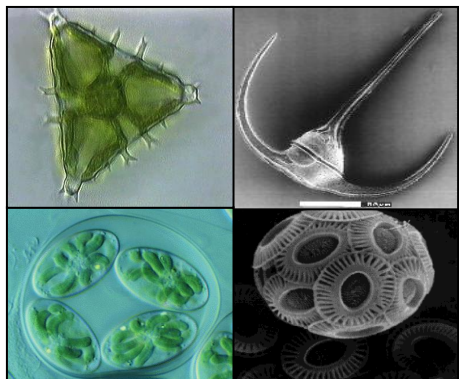
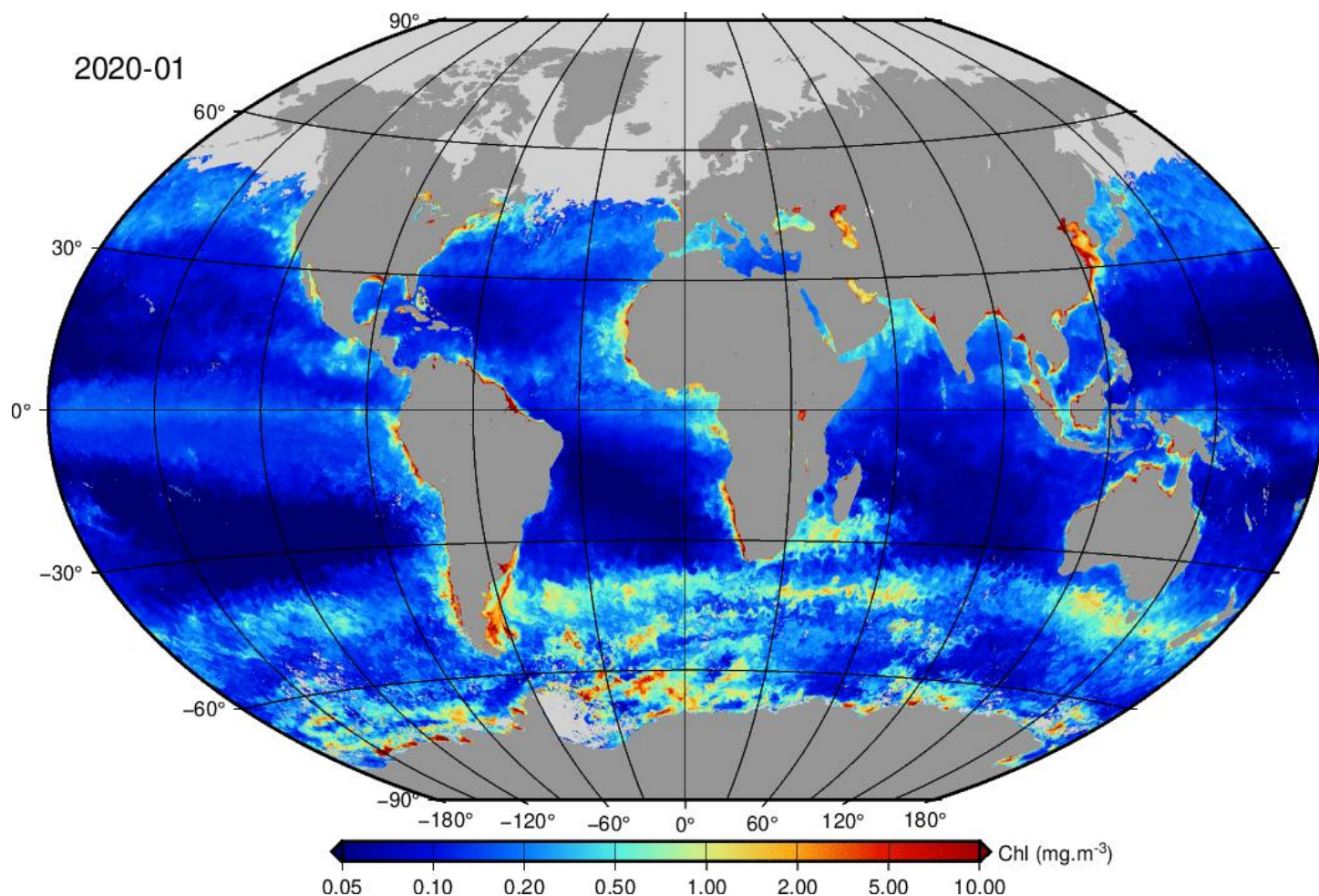




Monitoring of free-floating photosynthetic organisms (phytoplankton) and inorganic particles.

Key to study the marine ecosystem and monitor water quality

Sentinel-3A and Sentinel-3B OLCI constellation monthly average at 300m resolution





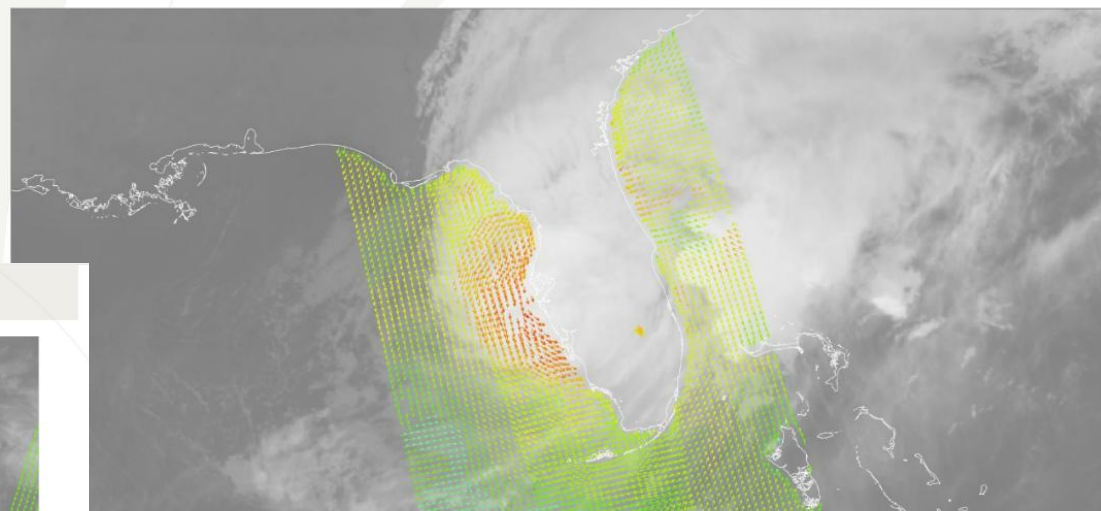


# Winds over the Ocean @EUMETSAT

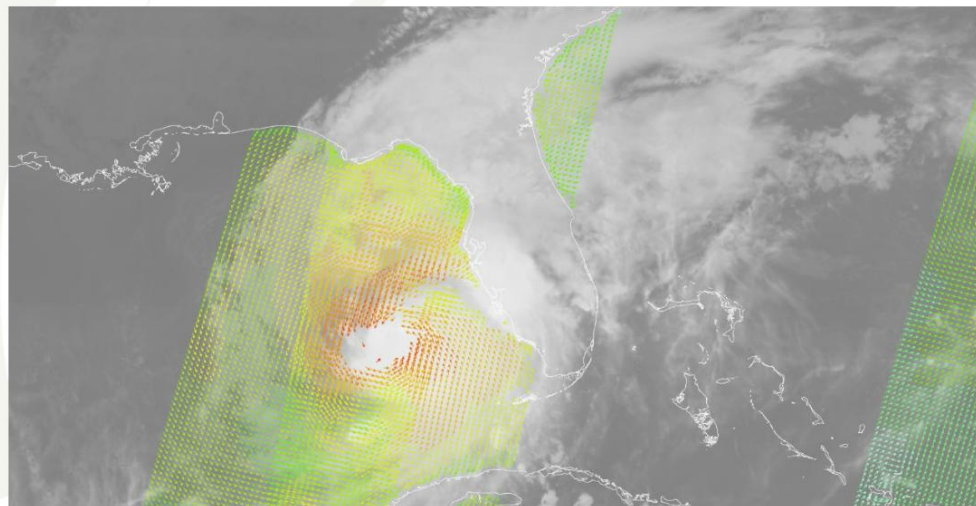
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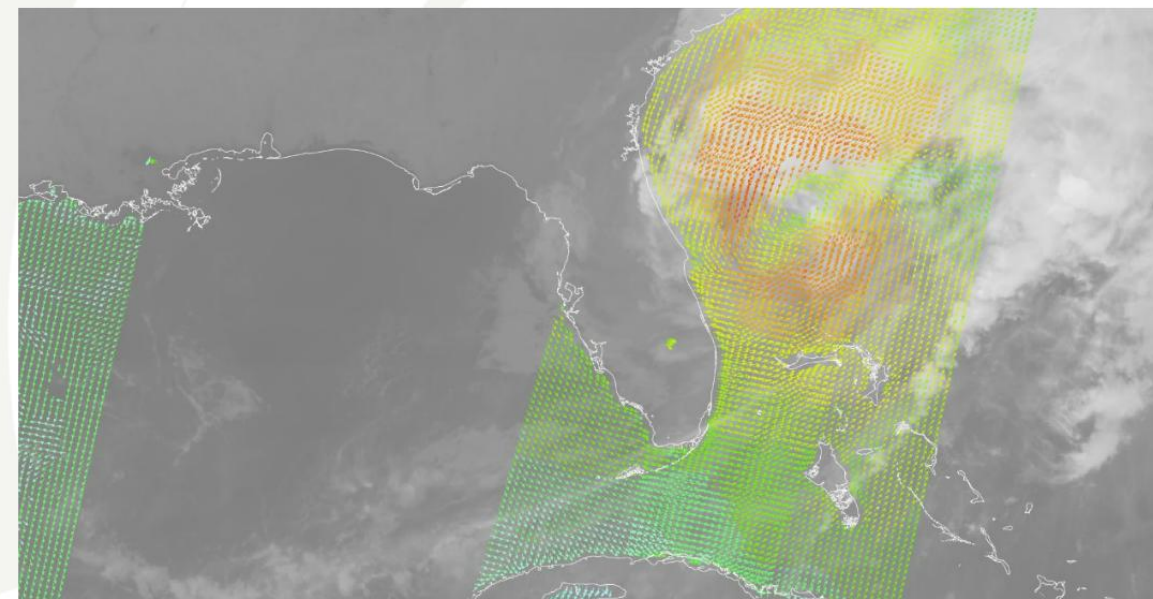
Milton 10.10 03UTC / 23 local



Milton 09.10 15UTC / 11 local



Milton 10.10 15UTC / 11 local

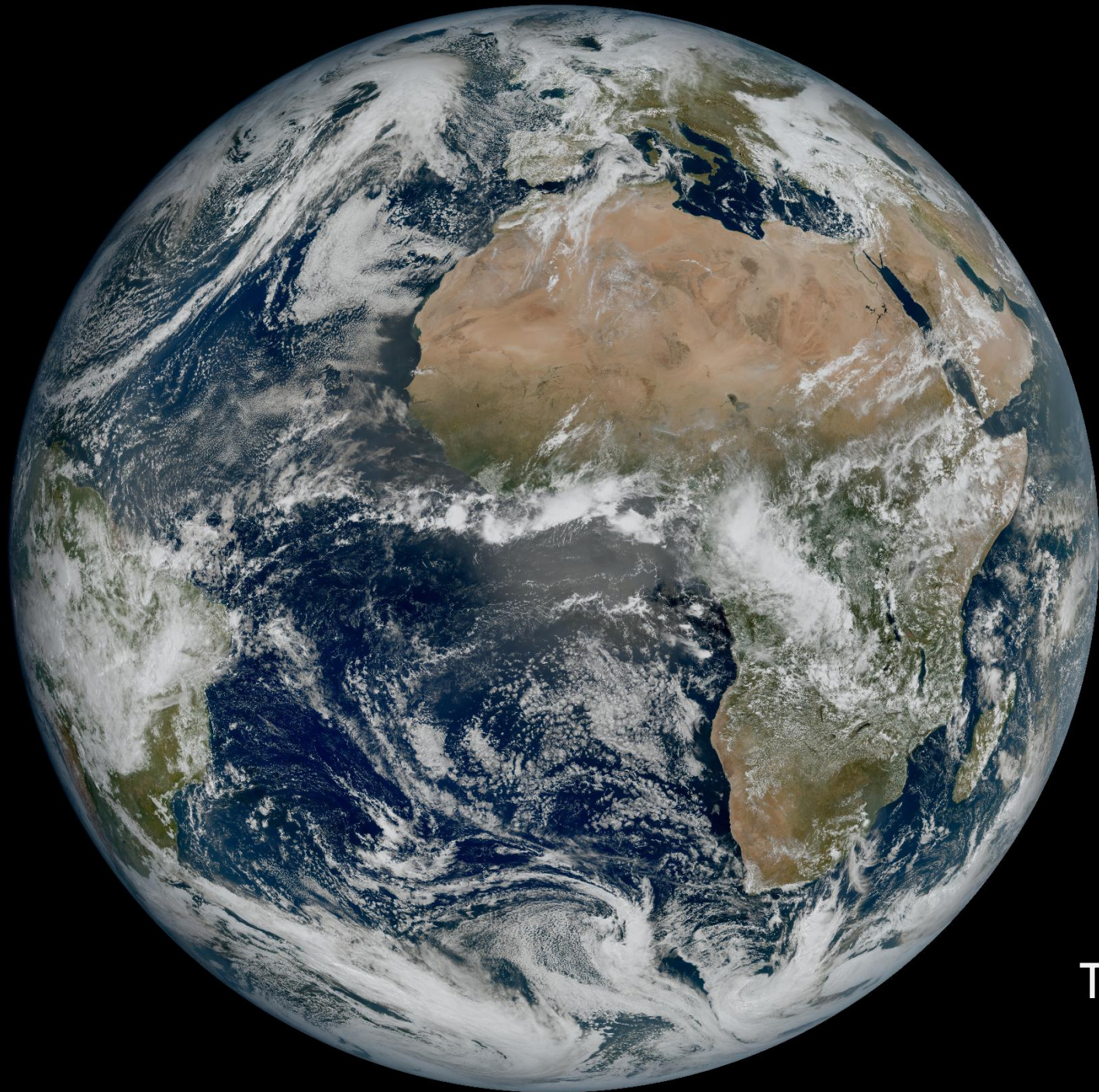


Hurricane Milton observed by ASCAT  
(October 2024)



- Increasing Scope
  - ✓ From Physical Oceanography to Environment Monitoring to Climate Monitoring to Weather Prediction
- Increasing Societal Impact and Demand
  - ✓ From blue (physical ocean parameter), to green (bio-geo chemistry, aqua culture) and white economy (high-latitude)
- From Research to Operational Services
  - ✓ Numerical modelling with commensurate IT resources (e.g. high-res, coupled models, data volumes, etc.)
  - ✓ Sustainable long-term (and international) space programmes





THANK YOU !