

Advances in sustaining systematic observations

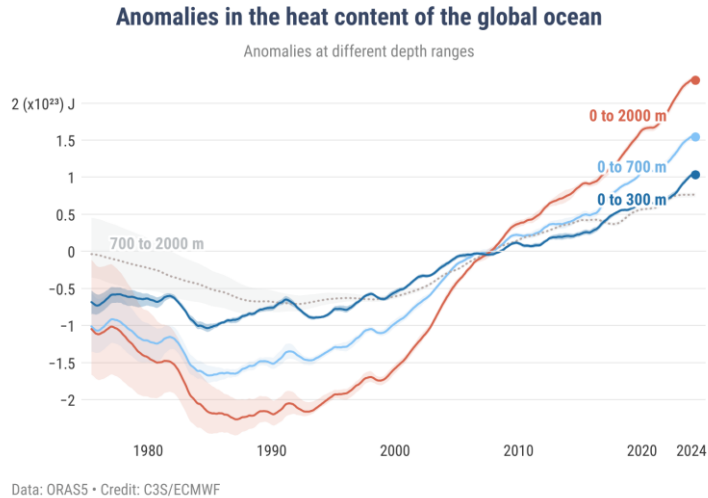
Update from Earth Observation initiatives

Florence Rabier (ECMWF on behalf of CEOS/CGMS and GEO)

Markus Replik (Systematic Observations Financing Facility SOFF)



Understanding and addressing data gaps



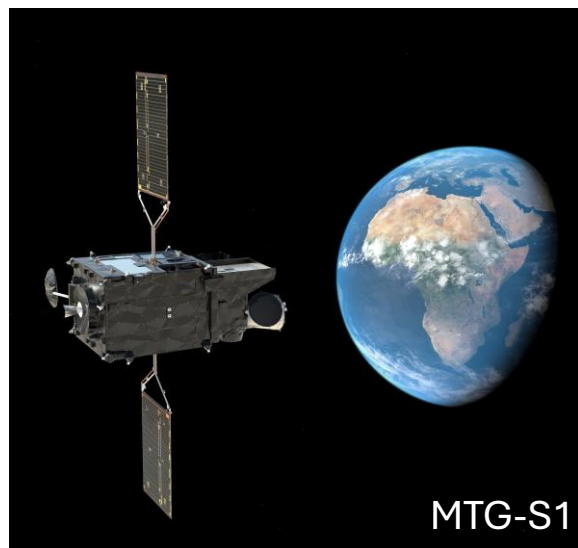
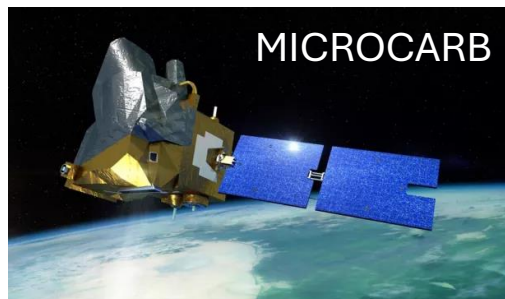
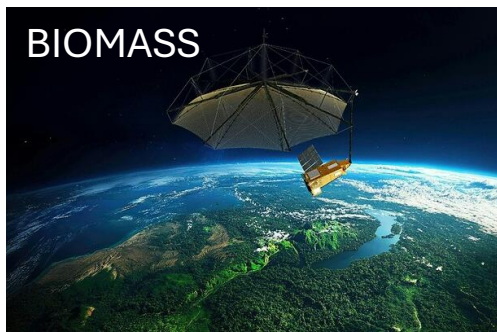
PROGRAMME OF THE EUROPEAN UNION
Copernicus
ECMWF

- Space-based observations have been **transformative** in our ability to **monitor and understand climate change** as well as to **inform** sound adaptation and mitigation **policies**
- **Insights are continually obtained** for instance on the Earth energy imbalance, on ice and glacier loss, on sea level rise, on greenhouse gases and on extreme events (floods, droughts, wildfires, thunderstorms, heat- & cold-waves, tropical cyclones....) support **early warning systems**

- Sustained and systematic space observations is the **backbone of** several long-term **climate data records** for many Essential Climate Variables defined by **GCOS**
- The CEOS-CGMS agencies actively contribute to research and systematic observation, liaising closely with GCOS and responding directly to **their Implementation Plan**



Strengthening the global climate observing system



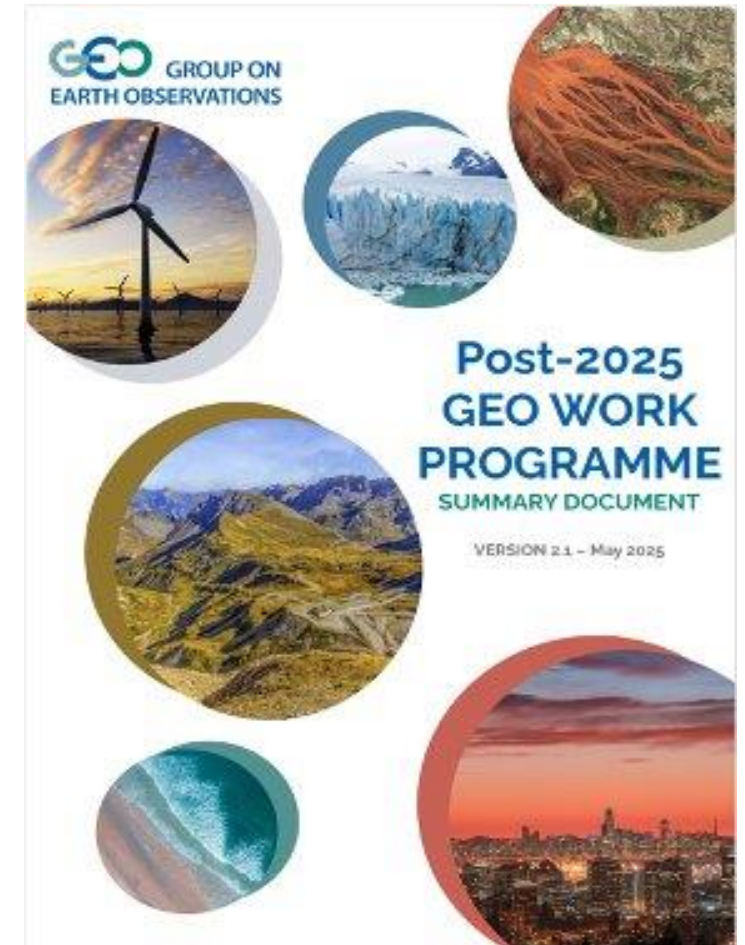
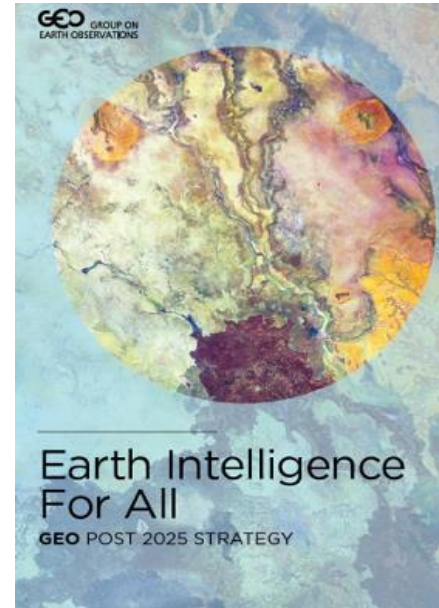
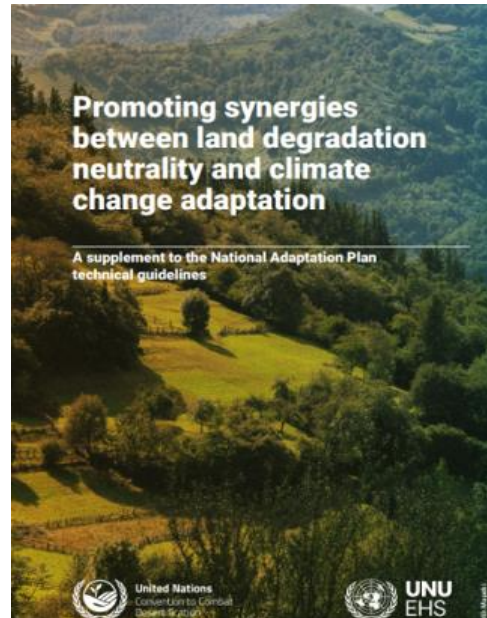
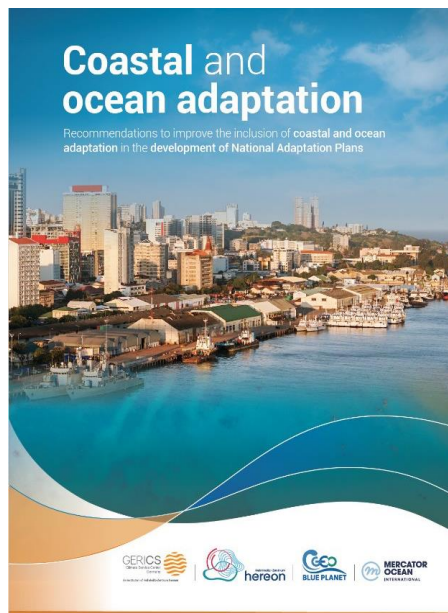
- Capabilities are **continually enhanced** through launch of **new satellites** and development of **technologies to extract** increasingly robust and accurate **information**, often through **co-design with the users** including in-situ observations and dedicated **campaigns** (see break-out presentations).
- Development of **surface-based EO** is not less essential and adds value to investment in Space. One can mention for instance the 10000 Ships for the Ocean initiative.

**10 000
SHIPS
FOR THE
OCEAN**



Promoting co-production and scaling up of EO solutions

- **Post-2025 GEO Work Programme** approved: advancing the GEO Strategy by Earth Intelligence with integration of new technology & innovation (e.g. **AI/ML**)
- Strengthening the **EO value chain for ECVs**: with WMO and GCOS; GEO leading pilots on *urban heat & ecosystem resilience*.
- 2 new **NAP Technical Guidelines Supplements** by GEO initiatives partners: coastal/ocean adaptation & land degradation neutrality, with knowledge/tools to embed EO in adaptation planning.



Addressing gaps in EO data, knowledge & solutions

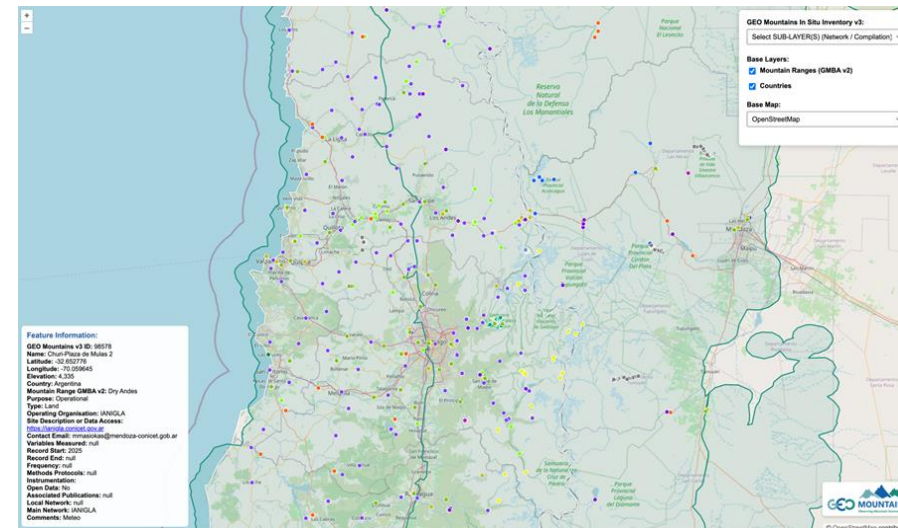
Examples from GEO Initiatives:

- **Digital Earth Pacific** now delivers AI-powered, free, open, decision-ready EO products to 22 Pacific Islands & territories, **expanding products** from 3 in 2023 to **9 in 2025**.
- **GEO Mountains**, just released an updated *In Situ Inventory* of over 150,000 observatories worldwide — about **15%** related to the cryosphere; will be part over thousand knowledge items in **GEO Knowledge Hub**

Using AI / ML tools applied to 8-30 years of open satellite data (Sentinel and Landsat)



Now exploring use of foundational models and TerraMind for land cover land use mapping.



Screenshot of GEO Mountain's In Situ Inventory web map interface showing all stations in region of Santiago, Chile (Andes).

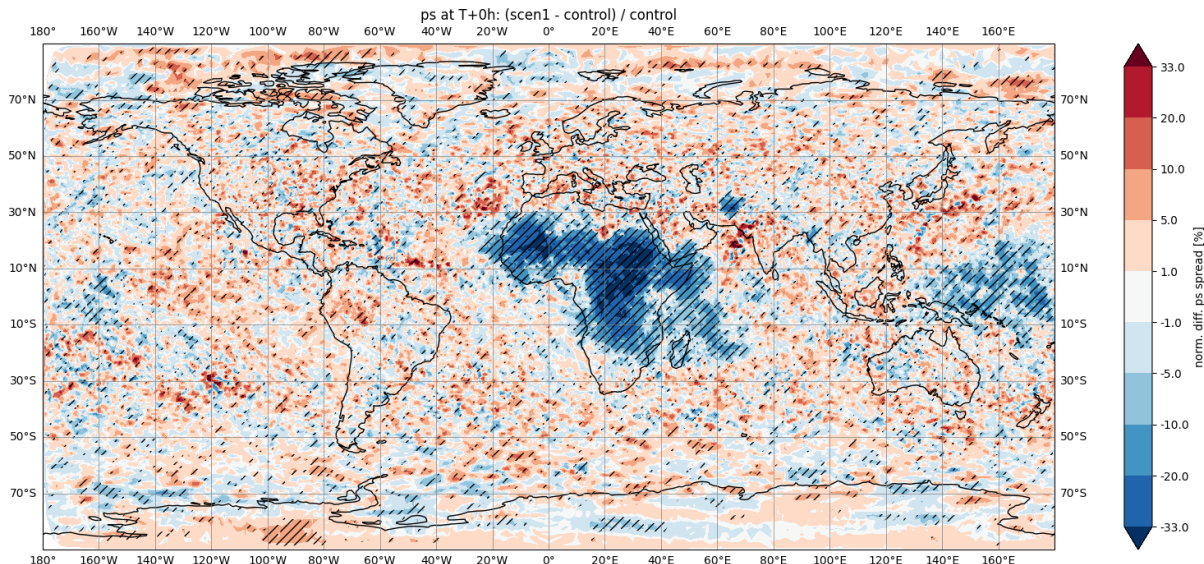


Learn more from EID **breakout presentation 4 & 5** on *cryosphere changes monitoring* and *economic and non-economic loss* in room 1



Addressing gaps in EO data : closing developing countries' gaps leads to major weather forecast improvements

ECMWF 2025 SOFF impact experiments provide strongest scientific evidence to date about importance of closing in-situ data gaps in developing countries



Africa: Forecast uncertainty decreases by more than 30 percent

Pacific Islands: Forecast uncertainty decreases by up to 20 percent

Upper-air data crucial: Radiosonde data has an outsized impact, especially in the tropics.

Local investment, global impact: Local improvements (12 hours) propagate across the globe - benefiting people around the world.

Blue: The additional observations are **reducing analysis uncertainty**

Hatching ////: change is **statistically significant**

SOFF innovates the way support is provided to close the basic in-situ observation gap



SOFF is the single-purpose UN Fund to support countries in generating and internationally exchanging mandatory basic weather and climate observations.

A partnership on equal footing

not charity

- ✓ Long-term
- ✓ Grant-only funding
- ✓ Peer-to-peer support

An engaged community

not silos

- ✓ Speed
- ✓ Ease of access
- ✓ Low cost

SOFF is innovating finance to urgently close the data gap

Investing in a global public good

Basic weather and climate data

Target finance for highest impact

Observations from data sparse areas

Frontload funding to act quickly

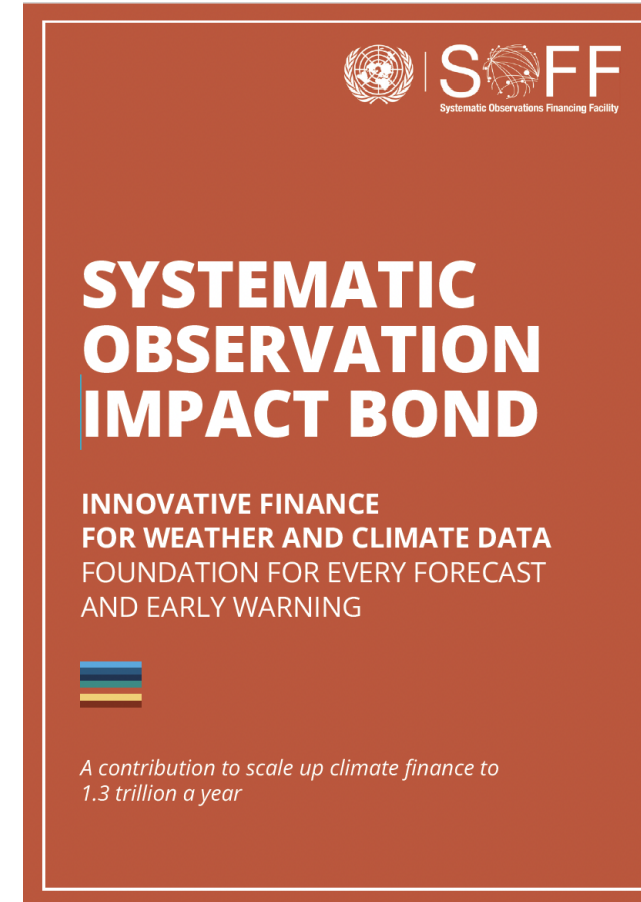
5 billion USD costs of inaction per year

A 'systematic observation *Mutirao*'

Coalition of public and private partners

Deliver impact

500% increase of data shared
independently verified by WMO



SYSTEMATIC OBSERVATION IMPACT BOND

INNOVATIVE FINANCE
FOR WEATHER AND CLIMATE DATA
FOUNDATION FOR EVERY FORECAST
AND EARLY WARNING



*A contribution to scale up climate finance to
1.3 trillion a year*

SHARE. JOIN. INVEST.

Useful links



SFFF
Systematic Observations Financing Facility

**Action Report
2025**

Time to scale up



The cover features a stylized illustration of a man and a woman on a red ground with buildings and a white balloon against a blue sky with clouds and stars.



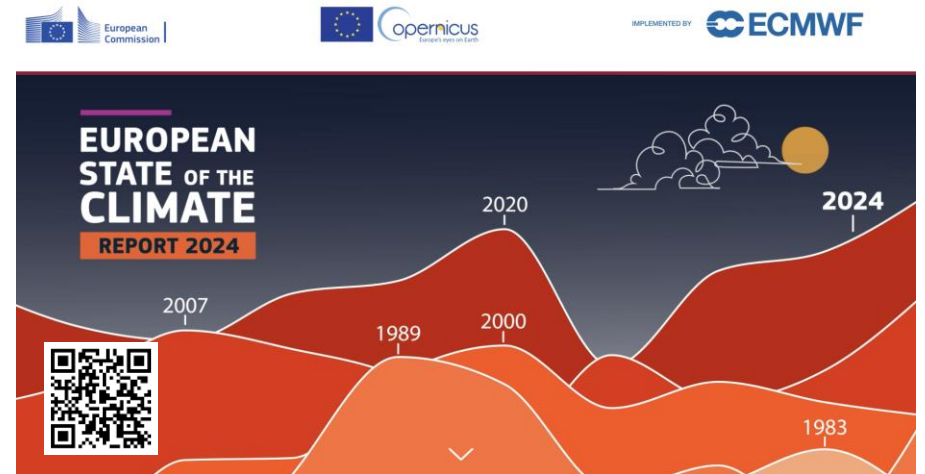
CGMS **CEOS**

**SPACE AGENCIES' RESPONSE
TO THE 2022 GCOS
IMPLEMENTATION PLAN**




Version 1.0
May 2025

The cover has a dark blue background with a satellite image of Earth at the bottom right.



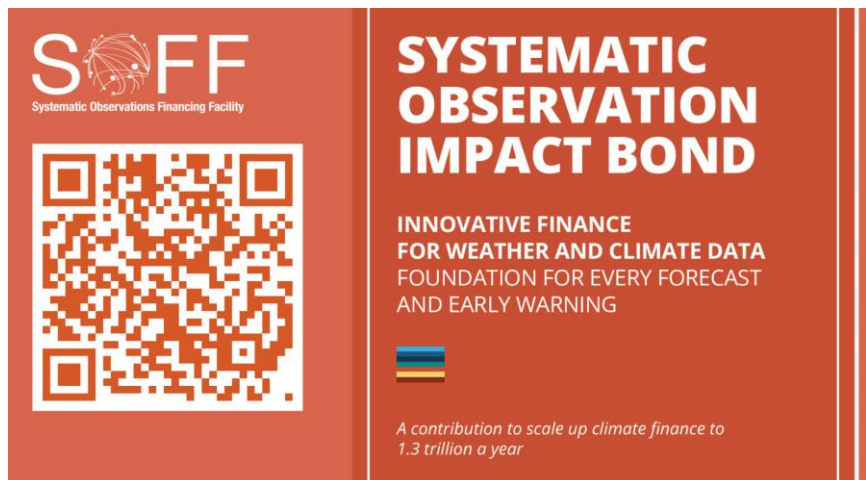
European Commission | Copernicus
IMPLEMENTED BY ECMWF

**EUROPEAN
STATE OF THE
CLIMATE
REPORT 2024**



2007 1989 2000 2020 2024 1983



The cover features a stylized landscape with red and orange hills and a sun/moon in the sky.



SFFF
Systematic Observations Financing Facility

**SYSTEMATIC
OBSERVATION
IMPACT BOND**

INNOVATIVE FINANCE
FOR WEATHER AND CLIMATE DATA
FOUNDATION FOR EVERY FORECAST
AND EARLY WARNING



*A contribution to scale up climate finance to
1.3 trillion a year*

The cover is a solid orange color with a QR code and the Hungarian flag.