Space Weather in EUMETSAT:

From Meteorological Operations to Future Lunar Space Weather Services

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Returning to the Moon

Sustained human presence on the Moon set to become an operational reality.



,Switch to Space, Brussels, 18 November 2026

SPACE WEATHER: A LUNAR ENVIRONMENTAL HAZARD

Earth's magnetic field provides substantial protection

The Moon is exposed



Lessons from History

Future extended lunar operations cannot rely on good fortune!

A Historical Warning: The 1972 Solar Storm

A major solar particle event occurred between Apollo 16 and Apollo 17

LESSONS FROM THE PAST FOR A SAFER LUNAR FUTURE



A major solar eruption in August 1972 produced one of the largest solar particle events of the Space Age.

Apollo 16

16 – 27 April 1972



Major Solar Particle Event

4 – 7 August 1972

One of the largest solar proton events of the Space Age.

Apollo 17

7 – 19 December 1972



April 1972
Apollo 16 on the Moon

August 1972
Major solar particle event

December 1972
Apollo 17 on the Moon

What happened?

- Major solar eruption
- High-energy particles reached Moon and Earth
- Event occurred between Apollo missions
- Astronauts on lunar EVA would be dangerously exposed

Key message

- Significant events do occur
- Lunar operations will face this risk
- Crews need advance warning
- Reliable space weather services matter

The 1972 solar storm demonstrates that significant space weather events can and do happen. Future lunar exploration must be prepared.

From Space Weather Observation to Lunar Operational Decision

Maintain the existing and analogous architecture of operational meteorological observation data delivery to end-users.



Why EUMETSAT?

EUMETSAT is the European operational satellite agency for monitoring weather, climate and the environment from space



Maturing User Needs
Space Weather Services

- Aviation / Transport
- Space Operations
- Lunar operations
- GNSS & Comms
- Energy Infrastructure

Policy Drivers

WMO/WIGOS
EUMETSAT Strategy
EU Strategy
ESA Cooperation
Member States

Operational Excellence, User Driven

Acquire
Process
Deliver
24/7

Demand + Policy + Capability = Opportunity

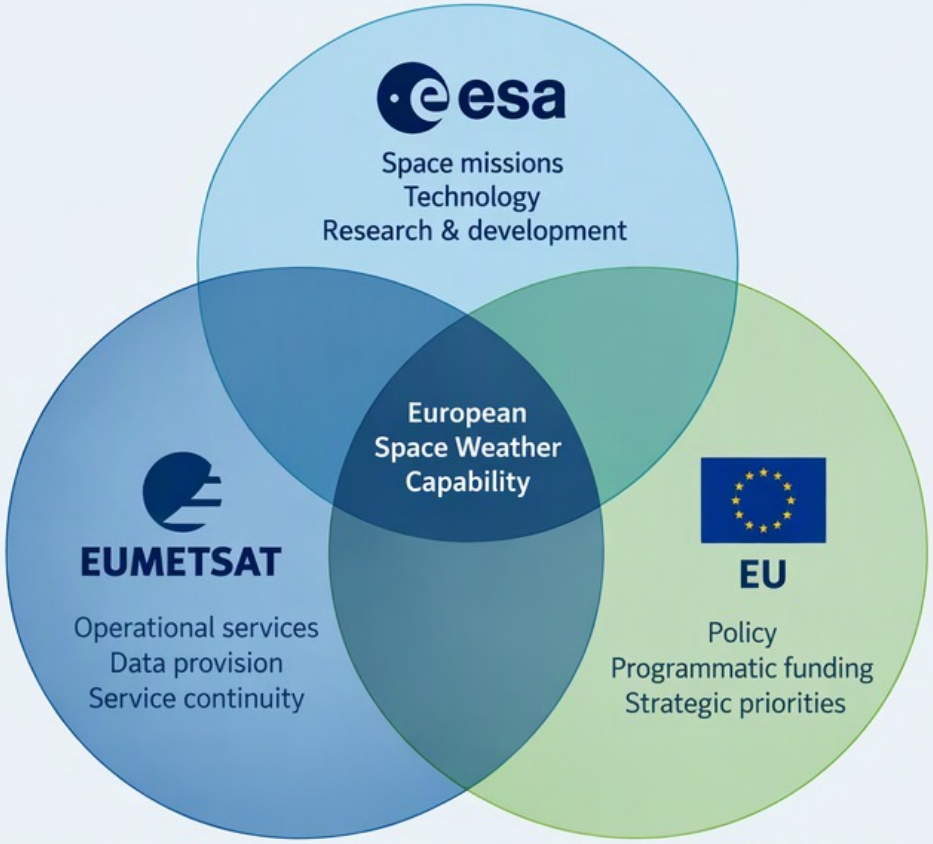
Governance and Funding: A European Challenge

Aligning institutions, mandates and national priorities

SPACE WEATHER
FOR A MORE RESILIENT EUROPE

European institutional landscape

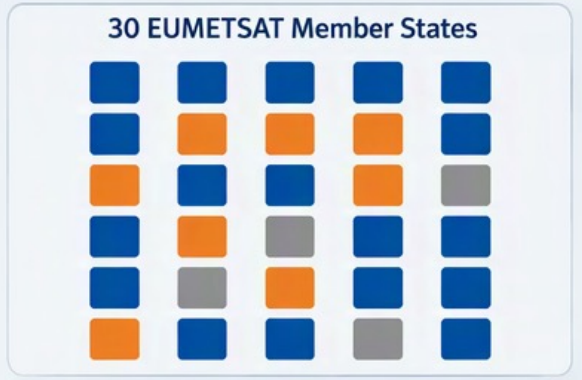
Complementary roles, shared goals, overlapping memberships



Significant overlap exists between ESA, EU and EUMETSAT memberships, but memberships are not identical and mandates differ.

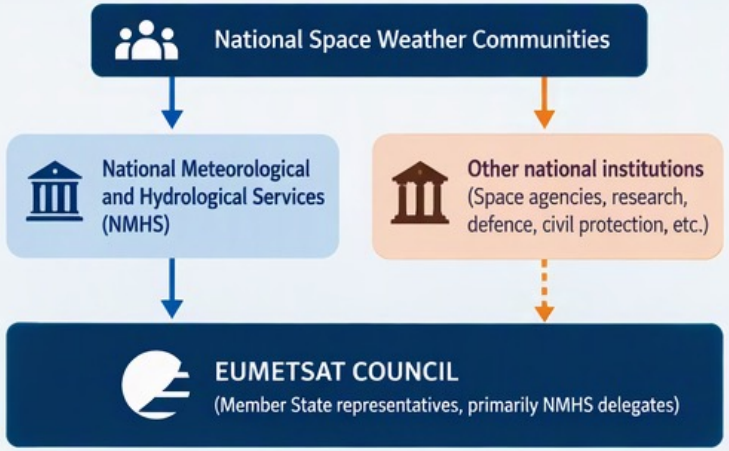
National representation landscape

Different national arrangements for space weather



- Space weather interests represented through NMHS structures (at EUMETSAT Council)
- Space weather interests exist but are represented through other national institutions
- Little or no operational space weather activity

Different institutional pathways to EUMETSAT



Space weather expertise and funding responsibilities do not always reside within the institutions represented at EUMETSAT Council.

This can complicate cooperation agreements, mandates and funding arrangements.

Institutional diversity + Different national stakeholders + External funding dependence = Policy and coordination challenge

2025 EUMETSAT Council position

EUMETSAT may support operational space weather activities when externally funded, without additional mandatory Member State contributions.

Three Takeaways and Closing Statement

1. Lunar operations require operational space weather services

2. Europe has the building blocks

3. The key challenge is coordination and governance

CLOSING STATEMENT

- From weather satellites to lunar operations: trusted information enables safe decisions.
- EUMETSAT can help enable the transition to operations