2025

IAF EARTH OBSERVATIONS COMMITTEE (EOC)

Introduction

Earth Observations continue to expand their impact in 2025, with global recognition of their role as essential infrastructure for resilience, security, and sustainable development. The convergence of climate change, disaster risk, and biodiversity loss has intensified demand for timely, high-resolution, and actionable data. At the same time, rapid progress in satellite constellations, cloud-based geospatial platforms, and advanced analytics is transforming EO into a service domain accessible well beyond traditional space actors.

The integration of Artificial Intelligence (AI), Machine Learning (ML), and Digital Twins is accelerating the ability to extract knowledge from massive and diverse EO datasets, enabling predictive insights for climate adaptation, agriculture, water management, health, and urban resilience. These tools are increasingly coupled with in-situ and non-space technologies, creating hybrid observation systems that enhance both local and global decision-making processes.

The EO ecosystem itself is evolving, marked by the rise of agile private companies, new forms of public-private partnerships, and multi-stakeholder coalitions. Governments continue to invest in strategic EO missions, but industry and civil society are playing a larger role in shaping innovation, policy, and user engagement. Importantly, inclusivity and capacity-building remain central-ensuring that EO benefits extend to developing nations and vulnerable communities.

As Earth Observations enter this new phase, the Inter-national Astronautical Federation (IAF) Earth Observations Committee remains a platform for collaboration across scientific, governmental, commercial, and societal domains, advancing the shared goal of transforming EO data into global resilience and opportunity.

Summary

EO as a core element of national security. In the past year, Earth Observations have become a core element of national security strategies worldwide. Governments are no longer purchasing only data – they are acquiring end-to-end EO systems as assets, ensuring independence in intelligence, border monitoring, disaster response, and infrastructure protection. The priority is placed on secure, autonomous EO capabilities. As dual-use satellites increase rapidly, EO has solidified its role as both a strategic defense tool and a driver of global resilience.

EO companies are adjusting their strategies. Earth Observation (EO) companies are shifting their focus from data sales to satellite or satellite system sales to cater to the changing needs of global markets, which is opening new avenues for growth, unforeseen only a few years ago. [Satellite Today: Geopolitics Drive Shifts in EO Business as Companies Hone Focus on Defense Market]

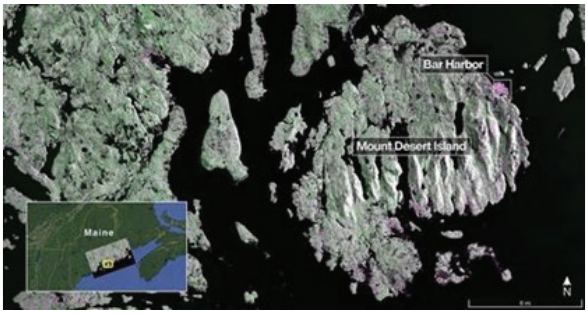
Uncertainty at NASA. Recent comments by NASA's acting administrator have created uncertainty about the future of Earth science programs at the space agency which has been a core part of the work of the Agency since its inception. "All of the climate science and all of the other priorities that the last administration had at NASA, we're going to move aside," he said. "All of the science that we do is going to be directed towards exploration, which is the mission of NASA. That's why we have NASA, is to explore, not to do all of these Earth sciences." [SpaceNews: Duffy comments seed doubts about future of NASA Earth science]

Highlights

First Light Image NISAR Launch and Deployment a Roaring Success Image from NISAR's L-band radar

shows Maine's Mount Desert Island (Credit: NASA/JPL-Caltech)

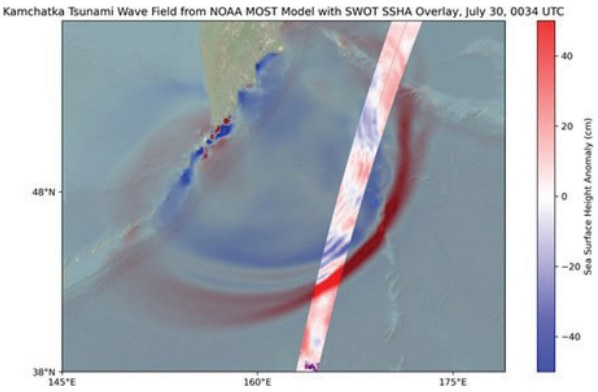
The NASA-ISRO Synthetic Aperture Radar (NISAR)



Spacecraft was launched successfully on 30 July 2025, then deployed its 9m boom, and 12 m diameter reflector. The L band radar electronics were turned on and first light images were obtained. To date, everything is working seamlessly. Commissioning takes about 90 days and then NISAR will move into the Science Operations phase. All NISAR data products will be made available freely and openly at the Alaska Satellite Facility (ASF) Distributed Active Archive Center (DAAC) (https://search.asf.alaska.edu) once the project team is comfortable with the preliminary calibration, which we anticipate in the coming weeks.

SWOT image catches Tsunami

The SWOT satellite captured a tsunami in July 2025 following a major earthquake off Russia's Kamchatka Peninsula. The satellite provided a detailed view of the tsunami's leading edge, measuring its height, shape, and direction, which helps scientists improve tsunami forecast models. This observation demonstrates SWOT's ability to monitor hazardous events and potentially improve early warning systems for coastal communities.



The US-French SWOT satellite caught the leading edge of a tsunami wave (red) after a massive earthquake near Russia on July 30. The basemap is the prediction by NOAA of the tsunami. (Photo Credit: NASA/JPL-Caltech)

NOAS Luxembourg successfully placed its first national Earth observation satellite into orbit on 26 August 2025, aboard a SpaceX Falcon 9. Built by OHB Italia S.p.A., NAOS supports applications including military operations, treaty monitoring, disaster management, climate change, humanitarian aid, and land administration. Equipped with Elbit Systems' Jupiter space camera, it delivers panchromatic, RGB, and near-infrared imaging, with data shared with Luxembourg's institutions and international partners such as the EU, NATO, UN, and IAEA.

Dror-1 Successfully launched in July 2025 aboard SpaceX Falcon 9. Developed as part of Israel's national communications satellite program, Dror-1 ensures secure and independent satellite communications. It also features additional payloads for selfie imaging and Earth Observation. See the following image:

Ofek-19 successfully launched in September 2025 on the Shavit launcher. Built by Israel Aerospace Industries (IAI) for the Israeli Ministry of Defense, Ofek-19 is part of Israel's national satellite program. This synthetic aperture radar (SAR) observation satellite is designed to provide advanced high-resolution imaging, enhancing Israel's intelligence, surveillance, and national security capabilities.

CNES/Airbus CO3D The Airbus-built CO3D (Constellation Optique 3D) satellites have been successfully launched in July 2025 into SSO orbit aboard Vega-C rocket. Developed in partnership with CNES the four satellites are set to begin delivering a highly detailed 3D map of Earth's surface. These dual-use satellites are designed to produce global high-resolution Digital Surface Models (DSMs), capturing 50 cm stereo imagery for CNES and 2D imagery for both government and commercial customers. The mission reinforces Airbus's portfolio of advanced optical and radar satellite systems.

CNES MicroCarb scientific mission was successfully launched from the European Spaceport in Kourou, French Guiana. A joint collaboration between France and the UK to map, on a global scale, the sources and sinks of carbon dioxide; the main greenhouse gas caused by human activity. It is the first European mission to monitor and map atmospheric carbon dioxide. MicroCarb will show how space-based science can improve our understanding of the vital carbon cycle and contribute to informed climate policy decisions to help protect our planet. Thales Alenia Space was responsible for the assembly, integration and testing of the satellite platform as well as launch preparations.

JAXA GOSAT-GW Japan's Global Observing SATellite for Greenhouse gases and Water cycle (GOSAT-GW), a follow-on mission to GCOM-W and GOSAT-2, was launched aboard a H-IIA rocket from Tanegashima Space Centre on 29 June 2025. It carries two instruments: TANSO-3, for measuring atmospheric greenhouse gases, and AMSR3, for monitoring key water cycle variables including precipitation, sea surface temperature, and soil moisture.

ESA Living Planet Symposium 2025 ESA's 2025 Living Planet Symposium (LPS) took place in June in Vienna, Austria. Held every three years, LPS is one of the world's premier events in Earth observation (EO). This year 6,900 participants from 125 countries took part.

ESA Biomass Biomass, ESA's forest-mapping satellite, was launched on a Vega-C rocket from Kourou, French Guiana, on 29 April 2025. It carries the first space-based P-band Synthetic Aperture Radar (SAR) and offers fully polarimetric measurements to derive forest biomass and carbon stocks in three dimensions.

ESA/EUMETSATMTG MTG-S1 (Meteosat Third Generation - Sounder), part of Europe's series of third-generation geostationary meteorological satellites, was launched aboard a SpaceX Falcon 9 rocket from NASA's Kennedy Space Centre on 1 July 2025. Alongside the Infra-Red Sounder from which MTG-S1 takes its name, the satellite also hosts the Sentinel-4A payload, an imaging spectrometer that will monitor air quality over Europe by measuring aerosols and trace gases like nitrogen dioxide and ozone. Thales Alenia Space is responsible for the development, assembly, integration and testing of the main payload..

ESA/EUMETSAT MetOp-SG A new era of weather and climate monitoring from polar orbit, the first in a new series of satellites, MetOp Second Generation, has been lofted into orbit in August 2025. As part of the satellite's instrument package is the new Copernicus Sentinel-5 instrument, which is designed to deliver critical data on air pollutants, ozone and climate-related gases.

ESA SIRIUS mission study contract. It aims to observe European cities from space using thermal infrared (TIR) data products, which allow the measurement of the temperature of objects from a distance. The objective is to understand how Urban Heat Islands modify the local climate.

ESA/EC COPERNICUS Sentinel-1D will lift off on November 4th from Europe's Spaceport in Korou, ensuring the continuity of services on which a wide range of end users rely worldwide. Sentinel-1D has a C-band synthetic aperture radar (SAR) instrument on board, which allows it to capture high-resolution imagery of Earth's surface. This powerful radar system operates in several modes, including wide swath and high-resolution, providing detailed data on land subsidence, ice movements and ocean conditions.

Norway NORSAT-4, the Norwegian maritime monitoring microsatellite, launched on the SpaceX Transporter-12 rideshare mission on 14 January 2025. The satellite carries an AIS receiver as well as a novel Low Light Imager. The latter is capable of detecting ships longer than 30 meters, even during periods of darkness or under poor lighting conditions.

ROSKOSMOS Kondor-FKA N2, an S-band Synthetic Aperture Radar (SAR) mission, launched on 29 November 2024. The ROSKOSMOS mission will monitor disasters, the sea surface, and environment, with a particular focus on sea ice measurements. The satellite is operating in a sun-synchronous orbit, at an altitude of 510 km and inclination of 97.4°.

ISRO's RISAT-1B, also known as EOS-09, was launched on 18 May 2025, aboard the PSLV-C61 rocket, carrying a C-band SAR. The mission failed due to an anomaly in the rocket's third stage, preventing the satellite from reaching orbit.

MBZ-SAT and Etihad-SAT MBRSC releases first images from MBZ-SAT, Etihad-SAT. MBZ-SAT, launched in January 2025, is the region's most advanced satellite using optical imaging, while Etihad-SAT, launched in March 2025, is MBRSC's first Synthetic Aperture Radar (SAR) satellite capable of capturing data in all weather and lighting conditions. Together, the satellites deliver consistent, high-resolution data to support key sectors such as disaster management, smart agriculture, and infrastructure development.

France Security & Defence CSO-3 optical Earth-

observation satellite successfully launched. CSO-3 will provide increased coverage and revisit capabilities to enable more effective conduct of military operations and faster crisis response.

Commercial:

- **NIBE EO Constellation contract award**, for the deployment of India's first private Earth Observation constellation.
- **NAOS (National Advanced Optical System), Luxembourg's dual-use** observation satellite system, capable of acquiring imagery at 0.5 m resolution;
- **Pelican-3,4 from Planet**, the company's very high-resolution imaging satellites with onboard processing, capturing at 0.3 m resolution;
- **Acadia-6 from Capella Space** (acquired by IonQ), continuing launch of its next-generation SAR satellite, capturing data at 0.5m;
- **FFLY-1,2,3 from Pixxel**, joining the first three satellites launched in January and completing the company's first phase of its operational constellation;
- **LEAP-1 from Dhruva Space**, which hosts two EO payloads from Australian startups Akula Tech with onboard processing unit and OTR-2 by Esper Satellites with a hyperspectral imager.

Future Outlook

Integration of EO AI foundation models into geospatial analytics Earth Observation field is entering a new phase shaped by the integration of AI foundation models into geospatial analytics. These large-scale AI systems, trained on multimodal EO and in-situ data, will enable more accurate forecasting, cross-domain insights, and near-real-time decision support. Their ability to generalize across sensors, regions, and applications represents a breakthrough in transforming raw EO data into actionable knowledge. In the coming years, a major focus will be on applying these capabilities to Early Warning Systems (EWS). By coupling EO foundation models with climate, hydrological, and socio-economic data, it will be possible to deliver earlier, more precise, and more accessible warnings for hazards such as floods, droughts, wildfires, and epidemics. This shift aligns with the UN's Early Warnings for All initiative and will enhance resilience in vulnerable regions. These trends point toward a future where EO becomes an intelligent, predictive infrastructure – not just observing Earth, but helping humanity anticipate and shape its response to global challenges.

The rise of VLEO 2025 marks also the start of the Very Low Earth Orbit (VLEO) and Very Very High Resolution (VVHR) era, set to disrupt competition going forward. The Chinese Chutian constellation deployed its first prototype in 2024 and is preparing for larger deployment this year. In the US, commercial players have also started deployment, signaling a new generation of high-resolution, low-latency capabilities. Operating at lower altitudes than traditional satellites, VLEO satellites offer benefits like reduced launch costs and enhanced resolution. Advances in propulsion and AI are enhancing satellite capabilities for applications such as broadband internet, environmental monitoring, and security. Key players, including Sierra Space and Redwire, are at the forefront of this competitive landscape, integrating advanced technologies. As the market grows, challenges such further overcoming atmospheric drag and regulatory compliance will demand attention.

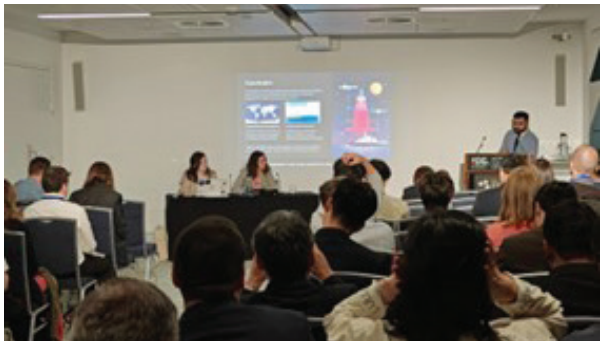
It is widely acknowledged that EO will continue to be a critical enabler for a better way of life, and better societies, hence one can well expect **the value of EO as a public good will only continue to grow.**

Committee activities

International Astronautical Congress (IAC 2025) marked the first full year of the new IAF Earth Observations Committee (EOC) Chair team (2025-2027). With a 3-point focus on: (i) further operationalising the committee activities, (ii) growing its Comms and Outreach, and (iii) deploying a tailored approach for membership growth, the first year has been a promising one.

IAC 2025 A successful IAC in Sydney took place in Fall 2025 with the conference featuring 8 EO-dedicated Technical Sessions, a Plenary, and Special Sessions co-ordinated or supported by the IAF EOC. For 2026, a new permanent session B1.8 addressing the emergence of AI and EO Foundation models across the EO value chain has been proposed.

On July 10. 2025, the IAF Earth Observation Committee has participated in the **IAF Technical Committees Webinar Series with the IAF**. You may rewatch it under this link.



The IAF Earth Observations Committee at IAC 2025 Sydney, Australia