IAF Committee Briefs



Winter 2022

IAF EARTH OBSERVATIONS COMMITTEE (EOC)

1. Introduction

The IAF Earth Observations Committee (EOC) is the Committee responsible for organizing, curating and coordinating all EO-related activities at the IAF, namely running the Earth Observations Symposium during the IAC. The Symposium covers all aspects of Earth observations from space, especially observations related to the Earth's environment, including mission planning, microwave and optical sensors and technologies, land, oceanographic, and atmospheric applications, and ground data-processing systems.

2. Summary

Earth Observation is a growing domain of science, business and intelligence

A wave of Earth observation satellites has been launched in recent years as demand for satellite imaging is increasing due to wars, natural disasters, climate change, and other events. Global and regional powers around the world are increasingly deploying independent satellite reconnaissance systems, an endeavour that was dominated by the United States and the Soviet Union during the Cold War.

Rapid tasking of satellite imagery is today a reality across commercial EO providers

For years, consumers of Earth observation data lamented the time required to task satellites to collect imagery of a specific site. The lag between image order and delivery was typically measured in days and only achieved through lengthy phone conversations. That is no longer the case with new commercial EO players and established ones providing access to cloud-based applications that enable rapid tasking of satellite imagery. Black sky announced Esri's ArcGIS Online Tool; Capella Space and IceEye offer customers access to

an automated scheduler through an API; Planet offers a suite of tasking tools for Earth-imagery; Satellogic unveiled its tasking platform Aleph; Airbus Defence and Space and Maxar Technologies, two companies that have operated Earth observation satellites for decades, also have updated satellite tasking.

Copernicus Sentinel-1B suffers a major anomaly and is lost

A major anomaly occurred on Sentinel-1B on 23 December 2021 related to a power system unit. ESA has performed many recovery attempts on the power unit with no success. Consequently, the launch of Sentinel-1C is being moved up to 2023 in an effort to replace the function of Sentinel-1B as soon as possible.

CNSA launches the BRICS Joint Committee on Space Cooperation on 25 May 2022

The goal is to promote cooperation in remote sensing satellite observation and data sharing among China, Russia, India, Brazil and South Africa, the five nations forming the economic partnership, BRICS. The joint Committee will guide cooperation on the BRICS Remote Sensing Satellite Constellation to better serve economic and social development in member countries.

Satellite Images Captured a New Record Low Sea Ice **Extent in Antarctica**

After nearly 43 years of observing Earth from space, new satellite images revealed the shrinkage of ice in Antarctica. With images captured this year, scientists reported that ice had shrunk to 1.92 million km2 in the Antarctic sea, which is 190,000 km2 less than the record-low observed in 2017.

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3. Highlights

DLR launched the first-ever German optical Earthobserving satellite, EnMAP, on 1 April 2022

EnMAP is a hyperspectral imager with 230 spectral channels in the solar-reflectance range. It will acquire data on a frequent basis with high geometric resolution. On 27 April 2022, EnMAP captured a first light image, recording a strip about 30 km x 180 km over Istanbul.

Planet secures the largest contract to date and unveils more details of its Pelican constellation

Planet secured a \$146 million award from the NRO to provide imagery over five years during the company's 14 June earnings call. Also, in September, Planet released additional information about the hyperspectral constellation the company is developing through the Carbon Mapper public-private partnership – Tanager. The satellites' hyperspectral sensor technology, pioneered by NASA JPL, will provide 30-meter resolution and a full spectral range of shortwave infrared and highprecision 5-nanometer wide bands.

First NASA TROPICS launch failed to reach orbit – NASA is looking for alternative options to launch the remaining four TROPICS CubeSats

TROPICS (Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats) is an Earth Venture mission - sciencedriven, competitively selected, low-cost missions that provide an opportunity for investment in innovative Earth science. It will provide improved time-resolved observations of tropical cyclones compared to traditional observing methods.

Germany's SARah-1 military radar Earth observation satellite launched aboard a Falcon 9 in June

SARah-1 is the first of three spacecraft commissioned by the German Armed Forces to replace their longserving SAR-Lupe constellation. With a mass of approximately four tons, SARah-1 is equipped with an active phased array radar with multiple antenna elements that can be steered electronically. Later in the year, it will be joined by the SARah-2 and SARah-3 spacecraft, which carry passive reflector antennae. SARah-1 was built by Airbus, whereas the overall contractor for the SARah constellation is OHB System AG, from Germany.

4. Future Outlook

Climate change and the summer of 2022 brought more public awareness: more EO for the future?

The summer of 2022 was plentiful when it came to climate disasters that many people around the globe will not forget. Climate change led to a series of unpredictable and unprecedented weather events for the past months, with catastrophic and even fatal endings. Extreme flooding in Pakistan with the government reporting \$10b in damage; a heat wave devastated the Middle East, Africa, Asia, and Europe with record temperatures that led to droughts and wildfires; tropical cyclones and hurricanes recorded with Typhoon Hinnamnor, South Korea, and hurricane Ina, United States.

Commercial satellite constellations in the coming decade

There is increasing activity surrounding EO payloads, especially considering the growing New Space Market. The ESA Agenda 2025, "Make space for Europe", states that one of the five priorities for ESA for 2025 is to boost commercialization where member states can benefit from the information products and commercial services of the new and innovative upcoming commercial space companies. The EO constellations, enabled by the agility and commercial viability of NewSpace, will be a major role player in adding to the big data that can be transformed into smart information products.

Democratization of the EO Data

Data Democratization is where data is more accessible to all, and therefore there is less of a barrier to retrieving data. According to a thought leadership on the space sector by PWC in May 2019, "Extracting Value from Earth Observation Data," there has been an overall decrease in the price for satellite imagery, which is expected to lead to a 4% decline in the existing market. This decrease will, however, be offset by the expansion of the customer base in existing and new use cases. With more data readily available, there are more opportunities for diversification of EO data with new and innovative applications. The conversion can even result in future B2C industry.

5. Committee activities

EOC Technical Sessions at IAC 2022 were well attended and the presentations were of very high quality. Our Interactive Presentations Session was very heavily subscribed and again resulted in the award winner for the B Category on Appplications and Operations (making at least 4 years in a row)! Given the steadily increasing interest in EO and GEOSS, the committee requested and was assigned an additional session for IAC 2023, so a major activity was re-organizing most of our technical sessions to update them for balance and new trends and developments. The new session B1.7 was fomulated as *"Earth Observations to address Earth's Environmental and Climate Challenges"* to ensure a session dedicated to this highest priority topic.

EOC was awarded one Special Session for IAC 2022 in which several Agency Earth Science Directors discussed the state and future of their efforts on Biodiversity, a critical world environmental challenge. It resulted in a very rich discussion with the audience and directors and imparted a good sense of where we are with these very important efforts. Three members of EOC are the IPC Co-Chairs for the IAF Global Space Conference on Climate Change (GLOC 2023), and many others are supporting and are part of the GLOC 2023 IPC so that is a major focus for the next seven months.

In GEOSS, there are three main efforts being addressed, highlights and plenaries proposals for IAC 2023 to maintain the prominence of Earth Observations in the space community and continue our excellent track record of such programmes; coordination and support for the IAF's role in the intergovernmental Group on Earth Observations (GEO), including preparations for next year's GEO ministerial where IAF leadership will represent the IAF with support from GEOSS, and supporting the development and execution of GLOC 2023.

GLOC 2023 will take place in Oslo, Norway, in May next year. This conference is the top priority for the members of the Committee for the next seven months, working with the IPC and IAF Secretariat to create and implement the Technical Sessions, Keynotes, Plenaries and support the development of the IAF GNFs and high level content. The IPC will also address a feature at the end of the GLOC that summarizes the outcomes, with the objective to produce a documented outcome.

With the conference theme of *"Fire and Ice: Planetary* Extremes in a Changing Climate," and the obective to show that Space is a toolbox for political climate action, the Committee has great expectations for the impact that this conference can have. To create impact, the conference aims for policy and decisionmakers to take an active part and enable engagement across Government, Industry, non-Governmental organization, and academic sectors. The planned result is for useful insights, recommendations, actions and initiatives emerge from from those engagements. It is a wish of all the members of the Committee that the conference be a catalyst to share collaborative solutions, challenges, lessons learned, and paths forward among all nations for maximizing the contribution of the space community to addressing the existential global challenge of climate change.