

# IAF Committee Briefs

2024

## IAF SPACE OPERATIONS COMMITTEE (SOC)

### Introduction

The Space Operations Committee is covering all aspects of human and robotic spaceflight missions and involves many organisations and industries across the globe, which are active in this field.

### Summary

During its regular committee meetings member organisations and industries provided their report on the latest status.

ESA reported on the latest operations status of its missions:

- The Bepi Colombo mission completed its 4<sup>th</sup> Mercury swing-by despite some technical problems preventing its thrusters from operating at full power. The operations and flight dynamics team have designed a new trajectory accounting for these, which will lead to an expected final arrival at Mercury in Nov-2026.
- The Euclid space telescope, which is investigating the “dark universe” and which was launched on Falcon-9 in Jul-2023, has entered its 6 years routine survey phase. A second set of fascinating scientific early release observations were published in May-2024 (see below and [https://www.esa.int/Science\\_Exploration/Space\\_Science/Euclid/ESA\\_s\\_Euclid\\_celebrates\\_first\\_science\\_with\\_sparkling\\_cosmic\\_views](https://www.esa.int/Science_Exploration/Space_Science/Euclid/ESA_s_Euclid_celebrates_first_science_with_sparkling_cosmic_views)).
- The ESA-Japan earth science mission, EarthCare, was launched on Falcon-9 in May-2024 and is currently in commissioning. The objective of the mission is to study the role of clouds and aerosol with respect to solar radiation reflection and trapping of infrared radiation emitted by earth.
- The Ariane 6.2 maiden flight took place on 9-Jul-2024 from French Guiana.

- The Copernicus/Sentinel 2C mission (European Union/ESA) was launched successfully with the last Vega rocket on 5-Sep-2024. After a successful Launch and Early Operations (LEOP) phase the mission has now entered its commissioning phase.
- One of the four Cluster II spacecraft has safely re-entered the earth’s atmosphere by a targeted re-entry (see [https://www.esa.int/Science\\_Exploration/Space\\_Science/Cluster/Goodnight\\_Cluster\\_brilliant\\_end\\_totrailblazing\\_mission](https://www.esa.int/Science_Exploration/Space_Science/Cluster/Goodnight_Cluster_brilliant_end_totrailblazing_mission)).

The remaining spacecraft will follow in the coming years. This marks the end of more than 2 decades of a unique science mission to explore the interactions between the solar wind and earth’s magnetosphere.



Figure 1 Euclid Early Release Observation #2  
(6 different sky scenes)

JPL reported that

- **Voyager 2 turned off one instrument to save power.** Mission engineers at NASA have turned off the plasma science instrument aboard the Voyager 2 spacecraft due to the probe’s gradually shrinking electrical power supply. <https://www.jpl.nasa.gov/news/nasa-turns-off-science-instrument-to-save-voyager-2-power/>
- Getting ready for Europa Clipper launch:

- » <https://www.jpl.nasa.gov/news/8-things-to-know-about-nasas-mission-to-an-ocean-moon-of-jupiter/>
- » <https://www.jpl.nasa.gov/news/nasa-to-preview-europa-clipper-mission-to-jupiter-moon/>
- NASA's Perseverance Rover to Begin Long Climb Up Martian Crater Rim: After 3½ years exploring Jezero Crater's floor and river delta, the rover will ascend to an area where it will search for more discoveries that could rewrite Mars' history.
  - » <https://www.jpl.nasa.gov/news/nasas-perseverance-rover-to-begin-long-climb-up-martian-crater-rim/>
- **NASA Mission Concludes NEOWISE Mission After Years of Successful Asteroid Detections:** The infrared NEOWISE space telescope relayed its final data to Earth before the project team at JPL sent a command that turned off its transmitter
  - » <https://www.jpl.nasa.gov/news/nasa-mission-concludes-after-years-of-successful-asteroid-detections/>

**DLR** reported their latest status:

- ESA, DLR, and Bavaria signed an MoU for support of the Human Exploration Control Center (HECC) in Oberpfaffenhofen on 13-Mar-2024 and the transition from Columbus to Lunar Gateway operations. The federal state of Bavaria is investing 33 Mio. € in infrastructure and operational concepts there.
- LUNA, a unique analogue test facility for preparation and training of lunar robotic and astronautic exploration, has been inaugurated in Cologne, Germany, on 25-Sep-2024.
- GRACE-C, the successor satellite mission in cooperation between NASA/JPL and DLR passed the ground segment (MOS) PDR with flying colors on 17-Sep-2024.
- Since Apr-2024, DLR GSOC is in preparation for the handover of satellite control of the "Heinrich Hertz" satellite (H2SAT) with full MIL KPIs on 1st of July 2025 from the LEOP/IOT control center.

The **Eumetsat** status is as follows:

The commissioning of the Meteosat Third Generation (MTG) I1 satellite is nearing completion, with the operational dissemination of Lightning and Image data and products planned for release to the user community before the end of 2024. This follows the development of an alternative ground-based calibration method due to a permanent anomaly with the on-board calibration mechanism. The launch of the MTG-S1 sounding

mission is planned for mid-2025, and the second imaging satellite MTG-I2, providing a rapid scanning service planned for 2026.

EUMTSAT Polar System – Second Generation (EPS-SG) will consist of 3 pairs of 2 Metop Second Generation (Metop-SG) satellites operating in a sun-synchronous polar orbit at an altitude of 823-848km. Metop-SG satellites will provide high resolution observations of temperature, precipitation, clouds, winds, sea ice, aerosols, pollution, soil moisture, volcanic dust, and a multitude of other parameters, data critical data for forecasts and environmental monitoring. Metop-SGA1 is planned for launch in 2025 and Metop-SGA2 in 2026.

Sentinel-6B is planned to be launch in November 2025. This will initially fly in tandem with Sentinel-6A. The Copernicus Sentinel-6 mission measures global sea surface height, an observation crucial for climate monitoring. The data also are important for seasonal weather forecasts and ocean forecasts. Other instruments assess temperature changes in the troposphere and stratosphere and support weather forecasting.

Sentinel-3C is planned for launch in 2026 following on from Sentinel-3A and B. The Copernicus Sentinel-3 satellites observe global ocean colour, sea surface temperature and sea surface height. EUMETSAT operates the satellites, in cooperation with ESA, and delivers the marine data on behalf of the European Union.

CO2M satellites will be the main satellite component of a new European CO2 monitoring and verification support capacity (CO2MVS) for monitoring global anthropogenic (human-made) CO2 and CH4 emissions. CO2MVS is being developed as part of the EU's Copernicus Atmosphere Monitoring Service. The first of the two CO2M satellites will be launched in 2026 and will operate for a minimum of 7.5 years. Both satellites will carry a near-infrared and shortwave-infrared spectrometer (CO2I) to measure atmospheric carbon dioxide and methane at high spatial resolution.

**CNES** reported on their missions:

Kinéis:

The launch of the first 2 batches of 5 satellites each of the Kinéis constellation by Rocket Lab's Electron rocket in New Zealand went perfectly well on June and September. The 10 nanosatellites (out of 25), each weighing 28 kg, are now at an altitude of 635 km where the Kinéis technical teams were able to take charge

of them. 3 other launches of the Electron rocket are planned between end 2024 and early 2025 to deploy all of the 25 satellites in the constellation.

These first launches are the culmination of 4 intense years of work by the CNES teams, in close collaboration with those at Kinéis. CNES has developed the Control Center and the Flight Dynamics Facility, to imagine new operational concepts and then prepare the deployment and routine operations of the Kinéis constellation.

Kinéis is a satellite operator and global connectivity provider. The company, created in 2018 in Toulouse, inherits 40 years of expertise from the Argos system, founded by CNES and historically operated by CLS (Collecte & Localisation par Satellites), to develop reliable technology providing easy access to useful satellite data. Kinéis will locate and connect objects wherever they are on the planet. In doing so, it deploys all its technological innovation capabilities to bring together New Space and IoT.

The satellites are derived from ANGELS, the first French industrial nano-satellite designed by the company Hemeria in collaboration with CNES and put into orbit in 2019. The lifespan of the Kinéis constellation is 8 years.



#### SVOM:

The Franco-Chinese mission dedicated to gamma bursts observations, was successfully launched on June 22, 2024 by a Chinese Longue Marche 2C.

SVOM (Space Variable Objects Monitor) is a joint mission of the China National Space Administration (CNSA) and CNES that is set to observe gamma-ray bursts (GRBs) from a 625-km Earth orbit. GRBs are some of the highest-energy phenomena known in the universe, generated from the explosion of massive stars more than 20 times the mass of our Sun, and from the merger of compact objects like neutron stars or black holes.

The SVOM satellite is carrying four instruments, two of which were designed and built in France: ECLAIRs, a wide-field X-ray and gamma-ray camera; and MXT, a Microchannel X-ray Telescope. When ECLAIRs detects a GRB, the satellite will be repointed within minutes to precisely target the event so that instruments with a narrower field of view (MXT and VT) can observe it.

Alerts are relayed to ground in less than one minute whenever a burst is detected, via an alert network of 55 VHF stations deployed by CNES all along the tropical belt, indicating the location of the GRB in the celestial vault to cue large ground telescopes.

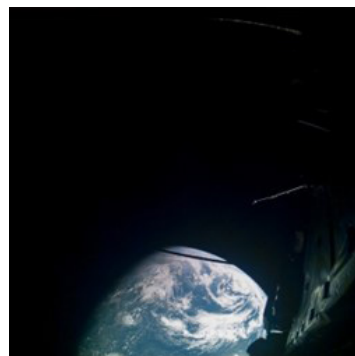
This synergy between ground and space systems, allied to the multi-wavelength observations, is what makes the SVOM mission so special for scientists.

It is a cooperation between the Chinese National Space Agency (CNSA), the Chinese Academy of Sciences (CAS), and the French space agency (CNES) which is in charge of the development of the French payload (the ECLAIRs and MXT instruments), the antenna network (alert system) and the French science center (located in Saclay). The French contribution is being developed in partnership with research laboratories at the IRFU research institute at CEA, the French atomic energy and alternative energies commission, and at INSU, the national institute of universe science, and IN2P3, the national institute of nuclear and particle physics, both attached to the national scientific research centre CNRS.



#### **Highlights**

ESA's mission to Jupiter and its icy moons (JUICE) which was launched in Apr-2023 on the second but last Ariane 5 flight performed a lunar and shortly afterwards earth fly-by (first of its kind) successfully on 19/20-Aug-2024:



*Figure 2 Picture taken by one of the JUICE monitoring cameras during the earth fly-by*

## Future Outlook

- The SpaceOps community is preparing for the upcoming **18<sup>th</sup> SpaceOps conference (Space Ops 2025)** taking place from 26-30-May-2025, in Montreal, Quebec, Canada.
- Several of the members are looking forward to launches of new missions:
- ESA's Hera mission (planetary defence) to the near-earth binary asteroid system Didymoos in Oct-2024. Back in 2022 NASA's DART mission performed an Asteroid redirection test by colliding with the smaller Dimorphos asteroid in this binary system.
- The EU/ESA Sentinel-1C mission (earth observation) is planned to be launched in Dec- 2024.

## Committee Activities

The IAF's Space Operations Committee pursues activities to encourage and strengthen collaboration between organisations globally on the subject of Space Operations and to highlight the challenges and opportunities of Operations across all lifecycle phases of space missions.