



# General Assembly

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## Committee on the Peaceful Uses of Outer Space

### International cooperation in the peaceful uses of outer space: activities of Member States

#### Note by the Secretariat

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## I. Introduction

1. At its fifty-sixth session in 2019, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space recommended that the Secretariat continue to invite Member States to submit annual reports on their space activities ([A/AC.105/1202](#), para. 41).
2. In a note verbale dated 15 July 2019, the Office for Outer Space Affairs of the Secretariat invited Member States to submit their reports by 21 October 2019. The present note was prepared by the Secretariat on the basis of replies received in response to that invitation.

## II. Replies received from Member States

### Australia

[Original: English]  
[30 October 2019]

The Government of Australia established the Australian Space Agency on 1 July 2018. The purpose of the Agency is to transform and grow a globally respected Australian space industry, underpinned by strong international and national engagement, that will lift the broader economy, inspire Australians and improve their lives.

Recent activities carried out by Australia in the space sector include:

- Publishing the Australian Civil Space Strategy 2019–2028 in April 2019, which outlines the Government’s plan to transform and grow the Australian space industry over 10 years
- Modernizing and streamlining the Australian legal framework for space launches and returns with the Space (Launches and Returns) Act 2018, which amended the Space Activities Act 1998 and entered into force on 31 August 2019
- Announcing a new A\$150 million partnership over five years between the Agency and the National Aeronautics and Space Administration (NASA), as part of the NASA Moon to Mars activities
- Announcing the Space Infrastructure Fund in April 2019, providing A\$19.5 million in investment over three years in seven projects to address gaps in space infrastructure
- Releasing the grant guidelines for the International Space Investment initiative and opening the first grant round

The establishment of the Agency is accompanied by an investment of some A\$629.2 million in space-related activities by the Australian Government, comprising:

- A\$150 million to support Australian participation in the NASA plan to return to the Moon and on to Mars
- A\$19.5 million for the Space Infrastructure Fund
- A\$6 million towards the Space Discovery Centre in South Australia
- A\$15 million for international partnerships through the International Space Investment initiative
- A\$32.75 million for the ongoing operations of the Agency
- More than A\$325 million for Geoscience Australia to develop world-leading satellite infrastructure and technologies

- A\$26 million to the Commonwealth Scientific and Industrial Research Organisation to support space science in Australia (including A\$16 million for Future Science Platforms investment in space)
- A\$55 million to support the development of new technologies for space through the SmartSat Cooperative Research Centre

To date, the Agency has entered into memorandums of understanding with the space agencies of France, Canada, the United Kingdom of Great Britain and Northern Ireland, the United Arab Emirates and Italy, a joint statement of intent with NASA, the European Space Agency and the German Aerospace Centre and an arrangement with the New Zealand Space Agency. These arrangements create a basis for further collaborative activities between countries in mutually agreed priority areas.

### **Australian Civil Space Strategy 2019–2028**

The Australian Civil Space Strategy 2019–2028 is the Government’s plan to grow the Australian space industry from 10,000 jobs and a market size of A\$3.9 billion to 30,000 jobs and A\$12 billion by 2030. In order to achieve the vision of a space industry that lifts the broader economy, inspires Australians and improves their lives, the Strategy contains seven national civil space priority areas, namely:

- *Position, navigation and timing.* Position, navigation and timing are critical for many areas of the Australian economy, including agriculture and mining. While Australia does not have its own global navigation satellite system, Australia’s position, navigation and timing infrastructure needs to be world-class to underpin the growth of the broader economy. To advance this goal, the Australian Government, through Geoscience Australia, is supporting the development of an Australian satellite-based augmentation system, which will improve the accuracy of global navigation satellite system signals, such as the Global Positioning System.
- *Earth observation.* Earth observation has untapped potential to grow the economy of Australia, for example, by improving agricultural monitoring, water management and monitoring shipping routes. Through the Digital Earth Australia initiative of Geoscience Australia, Australia is world-leading in this field.
- *Communications technologies and services.* Australia can play a lead role in emerging technologies, such as lasers for data communication, quantum technologies for secure communications, hybrid radio and optical communications.
- *Space situational awareness and debris monitoring.* Collisions with debris in space pose a risk to assets and life. The geographical position of Australia makes it an ideal location for space debris tracking and space traffic management activities.
- *Leapfrog research and development.* Australia can encourage and support research that inspires, identify areas to develop and commercialize research and development that would grow and transform the space sector. Areas of opportunity include new rocket technology, new high-tech materials, space medicine, synthetic biology, quantum communications, in-orbit servicing and optical wireless communication technologies.
- *Robotics and automation on Earth and in space.* Australia is a world leader in remote asset management in industries, including mining, oil and gas, transport, agriculture and fisheries. Australia can leverage its expertise in robotics technology and systems for remote operation and exploration in space.
- *Access to space.* There are emerging opportunities for Australia to leverage international space missions and commercial launch activities from Australian territory in order to support industry growth.

The national civil space priority areas inform the development of the Australian Government's policy in relation to space activities. The Space Infrastructure Fund and the International Space Investment initiative will contribute to achieving the goals of the Australian Civil Space Strategy 2019–2028.

### **Modernizing the legal framework in Australia with the Space (Launches and Returns) Act 2018**

The Space (Launches and Returns) Act 2018 came into effect on 31 August 2019, amending and renaming the previous Space Activities Act 1998. The new Act supports the space sector by removing barriers to participation in space activities and encouraging innovation and entrepreneurship, while ensuring the safety of space activities. The Act expands the regulatory framework to include arrangements for launches from aircraft in flight and launches of high-power rockets, requires applications for Australian launch permits and overseas payload permits to contain space debris mitigation strategies and streamlines approval processes and insurance requirements for launches and returns.

### **Partnering with the National Aeronautics and Space Administration**

On 21 September 2019, the Prime Minister launched a new A\$150 million partnership over five years between the Agency and NASA, as part of the NASA Moon to Mars activities. The focus is on integrating Australian businesses into international space supply chains. The investment will support activities in Australia and includes three integrated elements:

- Demonstrator and pilot projects that showcase investment-ready Australian capabilities to NASA and international space supply chains
- Working with NASA to identify how Australia can support a significant part of the NASA programme to return to the Moon and on to Mars, leveraging key strengths of Australia
- Supporting access to international space supply chains that support NASA, including capability-building to help the Australian space sector to meet the requirements for supplying products and services in the global space industry

Funding for the initiative will commence in the 2020/21 financial year.

### **Space Infrastructure Fund**

The Space Infrastructure Fund is a A\$19.5 million investment into seven infrastructure projects, located around Australia, that will increase the capabilities of the space sector to support industries, including finance, agriculture, mining, health, tourism and manufacturing.

The following projects are planned:

- *Space manufacturing facilities – New South Wales (A\$2 million)*. Supporting the delivery of future space manufacturing capability and development of high-tech skills and new space objects
- *Mission control – South Australia (A\$6 million)*. A platform for small and medium enterprises and researchers to control small satellite missions, enabling real-time testing and the accelerated improvement of satellite technology
- *Tracking facilities upgrade – Tasmania (A\$1.2 million)*. Upgrading infrastructure to support the precision tracking of satellites and spacecraft
- *Robotics, automation and artificial intelligence command and control – Western Australia (A\$4.5 million)*. Allowing small and medium enterprises and researchers to control autonomous operations in space; and building capability in space technologies

- *Space data analysis facilities – Western Australia (A\$1.5 million)*. Providing small and medium enterprises and researchers with space data analysis capability for agriculture, mining, emergency services and maritime surveillance
- *Space payload qualification facilities – A\$2.5 million*. Providing capability for small and medium enterprises and researchers to test space equipment and have it mission-ready in Australia
- *Pathway to launch – A\$0.9 million*. Undertake work to support the active interest and growing readiness in industry for launch in Australia, while ensuring safety on Earth and in space

### **International Space Investment initiative**

The International Space Investment initiative will provide A\$15 million over three years to strategic space projects between the Australian space sector and international space agencies. The initiative will grow the Australian space industry and build collaboration with international space agencies, providing benefits to all participants.

The Agency will issue International Space Investment funds as grants to eligible projects that support the civil space priority areas and are aligned with the programme's investment principles. Grant guidelines have been published for the competitive open grants, with applications due by 17 December 2019.

## **Philippines**

[Original: English]  
[4 November 2019]

### **Background**

The Philippines, with its own microsatellites (Diwata-1 and Diwata-2) and nanosatellite (Maya-1) launched into low Earth orbit, continues its pursuit of a sustainable and thriving space ecosystem in the country. Through various space initiatives led by the Department of Science and Technology, the Philippines is persistent in developing its nascent space sector by actively collaborating and engaging with various stakeholders, locally and internationally. In addition to orbiting satellites, the Department is investing in training people and building infrastructure on the ground to support research, development, innovation and academic activities relevant to space technology and applications.

The past year has been characterized by continuing activities related to nanosatellite and microsatellite development carried out in the country with a view to designing key modules locally and increasing the involvement of national industries. This has been done in the University Laboratory for Small Satellites and Space Engineering Systems, or "ULyS3ES" (pronounced "Ulysses"), which serves as a pioneering academic hub for collaboration and multidisciplinary space initiatives. Meanwhile, in support of downstream activities, a second ground station has been established in the southern part of Mindanao to complement that on Luzon island. These activities are detailed below, together with the adoption of Republic Act No. 11363, also known as the Philippine Space Act.

### **Small satellite development and launch**

With funding support from the Department of Science and Technology, the Space Technology and Applications Mastery, Innovation and Advancement (STAMINA4Space) Programme leads the ongoing efforts to develop key technologies for nanosatellites and microsatellites in the Philippines. The programme builds on a local industrial base and enhances local space science and engineering expertise,

predominantly to aid in sustaining the momentum for small satellite development and in preparing for future missions.

In parallel to the localization activities, the country continues to contribute to the international space community by fostering partnerships and collaboration. In particular, the Philippines is participating in the Joint Global Multi-Nation Birds Satellite project of the Kyushu Institute of Technology in Japan, along with countries such as Nepal, Paraguay and Turkey. In addition, the country is also participating in the Intelligent Remote-Sensing and Internet Satellite programme of the National Cheng Kung University of Taiwan.

The STAMINA4Space Programme is jointly implemented by the Advanced Science and Technology Institute of the Department of Science and Technology and the University of the Philippines Diliman. It follows the success of the programme for the Development of Philippine Scientific Earth Observation Microsatellite (PHL-Microsat), under which the Diwata microsattellites and Maya cube satellite were built and launched.

### **Satellite operation, data products and utilization**

Downstream, the Advanced Science and Technology Institute houses several infrastructures and support facilities for satellite operation, data product development and data management. The Philippine Earth Data Resource and Observation Centre, established in 2016, serves as a multi-mission ground receiving station facility for operating the Philippine small satellites and data acquisition from commercial satellites. For redundancy purposes, a second ground receiving station was established in June 2019 in the southern Mindanao region as an additional infrastructure to support satellite operations, thereby increasing coverage and enabling robust and responsive observation over the country. The satellite data are used by the Remote Sensing and Data Science (DATOS) Help Desk. DATOS produces information useful and complementary to the current efforts of government agencies and key end users, especially in terms of generating maps and radar data to aid in disaster response and the detection of high-value crops.

In general terms, satellite data in the Philippines are expected to provide relevant actionable information for added or complementing support for the country's decision-making and policy formulation towards more coherent and systematic governance, socioeconomic development, poverty alleviation and environmental, natural resources and disaster management.

The downstream activities are further supported by the Computing and Archiving Research Environment for data management and the Philippine Research, Education and Government Information Network for high-capacity interconnectivity, which is also the country's dedicated network for national research and education. In March 2019, the Network started hosting access for every Filipino to near real-time information from the Himawari-8 satellite of the Japan Meteorological Agency through a web portal developed by the National Institute of Information and Communications Technology of Japan.

In addition to Earth observation, Diwata-2 carries an operating amateur radio. This amateur radio was developed, built and designed in the Philippines for voice and data messaging services for use in times of emergencies and disasters, should regular telecommunications infrastructure become inoperative or inaccessible. The amateur radio on Diwata-2 is recognized internationally by the designation Philippines-OSCAR 101 (PO-101) and is accessed by licensed amateur radio users worldwide.

### **Space activities at the University**

ULyS3ES, located in the University of the Philippines Diliman, was inaugurated in August 2019. It is an interdisciplinary facility that serves as a pioneering academic hub for research and development and instruction innovations in space technology in the Philippines. ULyS3ES is a home for the STAMINA4Space Programme and other

future academe-based space initiatives. The first graduate programme in the Philippines with a specialization in nanosatellite engineering is nurtured through ULyS3ES with scholarships from the Science Education Institute of the Department of Science and Technology and research grants for CubeSats development and launch supported by the Department.

In addition to the activities conducted at the University of the Philippines, the Department of Science and Technology also supports space-related research and capacity-building in various universities across the country. The activities include studies relevant to urban planning and management, mitigation of flood hazards, environmental informatics and light pollution assessment, among others. Apart from research, some activities involve institutional and human resource development in those universities.

Lastly, to empower the space ecosystem in the country, in particular across academic institutions, a university consortium has been established following the framework of the University Space Engineering Consortium (UNISEC). UNISEC-Philippines will offer a central platform for student and faculty exchange, the provision of expertise on space science and engineering, and linking and fostering partnerships among member universities for the sharing of facilities available both locally and globally.

### **Conclusion**

The aforementioned ongoing efforts on space technology and applications have led to important achievements in the development of technological know-how and local infrastructure through manpower and institution building, which now serve as the foundation for furthering local innovation that will continue to bring the benefits of space technology to the country. The cadre of pioneering Filipino engineers and scientists who have gained valuable hands-on experience in small satellite technology through PHL-Microsat is now the workforce behind the country's first academic programme in nanosatellite development, the value-adding industry engagement through the local manufacture of satellite components and the operation of the country's first ground stations for tasking satellites and processing, archiving and distributing geospatial data from Earth observation satellites. Although much remains to be done in such an inherently long-term endeavour as space technology development, significant groundwork has been laid and great momentum has been created. These concrete advances and material progress on the ground have contributed fuel and substance to the proposal to establish a Philippine space agency and the solid footing for its passing into law on 8 August 2019 under Republic Act No. 11363. It is stipulated therein that the Philippine space development and utilization policy "will embody the country's central goal of becoming a space-capable and space-faring nation within the next decade" through the establishment of "capacity-building measure for human resources development".

### **Switzerland**

[Original: English]  
[28 October 2019]

The present report highlights the most important advancements of the past years in Swiss space science, space technologies, industry development, international cooperation and capacity-building. The Commission on Space Research of the Swiss Academy of Sciences regularly publishes reports about scientific space activities in Switzerland. All publications are available at [https://naturwissenschaften.ch/organisations/space\\_research/publications](https://naturwissenschaften.ch/organisations/space_research/publications).

## 1. The space sector in Switzerland

Switzerland performs the majority of its space activities through the European Space Agency (ESA), of which Switzerland is a founding member. Switzerland plays a crucial role in securing independent access to space by Europe by significantly contributing to the payload fairings for the Ariane and Vega launchers. Furthermore, many projects conducted at Swiss research institutions are financed through programmes of the European Commission. The scientific community and private industry in Switzerland are therefore well connected to European and international partners.

Switzerland gains access to space data and services through its memberships of the European Telecommunications Satellite Organization and the European Organisation for the Exploitation of Meteorological Satellites. Using meteorological satellite data, the Federal Office of Meteorology and Climatology provides the Swiss population and government agencies with precise forecasts and nowcasts, which are essential, inter alia, for certain economic activities, climate research and climate change mitigation activities.

In Switzerland, space policy is decided upon by the Federal Council on the basis of recommendations drafted by the Federal Commission for Space Affairs. The Swiss space policy was last revised in 2008. For its implementation, the various federal agencies involved need to cooperate in an efficient and coordinated way, which is guaranteed by the Interdepartmental Coordination Committee for Space Affairs. The Swiss Space Office, under the State Secretariat for Education, Research and Innovation, published the Swiss Space Implementation Plan within Education, Research and Innovation for 2018–2020,<sup>1</sup> which is a revision of the original document issued for the period 2014–2023. The Plan highlights the impressive growth of the space sector in Switzerland in recent years and is focused on strategic challenges and opportunities for the future, such as fostering a competitive and sustainable national space ecosystem, increasing the excellence and competitiveness of Swiss industry and science and promoting education and training initiatives. The Plan also underlines that ESA remains the most important partner for the implementation of the Swiss space policy.

Promoting interaction between the relevant stakeholders, the Swiss Space Centre, as mandated by the State Secretariat for Education, Research and Innovation, supports research institutions, academia and industry to implement space projects and space-based applications. The Centre also raises public awareness of space and provides education and training. An excellent example for cross-European education is project IGLUNA.<sup>2</sup> Coordinated by the Centre, and with support from the Swiss Space Office, as well as ESA through the ESA\_Lab initiative, this project brings together student teams from all over Europe to design a habitat for extreme environments, such as the Moon. Technology demonstrations for this project were carried out on a Swiss glacier in 2019 for simulation purposes.

In 2016, an ESA business incubation centre (ESA BIC) was opened in Switzerland. In collaboration with the Federal Institute of Technology in Zurich (ETHZ), ESA BIC-Switzerland offers support packages to young space entrepreneurs. With 20 incubated start-ups, nine alumni, 200 newly created jobs, and 25 million euros secured in third-party finance, the first phase of ESA BIC – Switzerland (2016/2021) is already considered a success, and negotiations for a second phase (2021/2026) will start soon. In addition to the Centre, a number of other start-up accelerators support space-related young enterprises in Switzerland. Private companies offering solutions in the space technology field are pooled in the Swiss Space Industries Group of Swissmem, the largest Swiss association for companies

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<sup>1</sup> Available at [www.sbf.admin.ch/sbf/de/home/dienstleistungen/publikationen/publikationsdatenbank/swiss-space-implementation-plan.html](http://www.sbf.admin.ch/sbf/de/home/dienstleistungen/publikationen/publikationsdatenbank/swiss-space-implementation-plan.html).

<sup>2</sup> <https://www.spacecenter.ch/igluna/>.



dealing in mechanical engineering, electrical and metal industries. Many of them contribute in particular to space hardware.

## **2. International cooperation in the Committee on the Peaceful Uses of Outer Space level**

Under the leadership of the Federal Department of Foreign Affairs, Switzerland has been an active member of the Committee on the Peaceful Uses of Outer Space since 2008. In recognition of its consistent and dedicated participation, Switzerland has been selected to chair the Scientific and Technical Subcommittee in 2020 and 2021. In the past, Switzerland has been very much involved in the work on the long-term sustainability of outer space activities and has supported the continuation of work on this important topic. It will also continue to engage in efforts on the study of space weather, as well as in the Working Group on Space and Global Health, which is chaired by Mr. Antoine Geissbühler from Geneva University Hospitals.

## **3. Swiss research**

### **(a) Solar system studies and planetary science**

One of the main strengths of Switzerland in space science is the research of bodies in our solar system. The following, and non-exhaustive, overview lists projects that have benefited from major Swiss contribution.

Considered a milestone in space research at ESA, the Rosetta mission to comet 67P/Churyumov-Gerasimenko was launched in 2004. After a hibernation phase, the spacecraft released the Philae lander, which touched down on the comet in 2014 – the first ever soft landing on a comet nucleus. The Rosetta orbiter spectrometer for ion and neutral analysis (ROSINA) experiment on board the Rosetta orbiter was led by the University of Bern and determined the composition of the comet's atmosphere, ionosphere and outgassing. The University of Bern is also greatly involved in the ExoMars Trace Gas Orbiter, which was launched in 2016 and carries the high-resolution camera CaSSIS (colour and stereo surface imaging system). Developed in Bern, CaSSIS images and analyses surface features possibly related to trace gas sources and searches for new candidate landing sites. Two other experiments designed at the University of Bern are the laser altimeter BELA and the mass spectrometer STROFIO for BepiColombo, a joint mission of ESA and the Japan Aerospace Exploration Agency (JAXA) launched in 2018 to study Mercury's surface, gravitational field and atmosphere. Launched the same year, the InSight mission of the National Aeronautics and Space Administration (NASA) carries the seismometer SEIS, with important contributions by ETHZ. ETHZ was also involved in the ALTAIR (air launch space transportation system using an automated aircraft) test flight in Kourou, France, in September 2019, as part of a joint European project to develop the structural components of a lightweight innovative satellite launcher.

With regard to planets outside our solar system, Cheops (characterizing exoplanet satellite), the first small ESA mission, is scheduled to be launched in late 2019. Under the scientific leadership of the University of Bern, it will search for transits of planets across bright stars already known to host planets by means of ultra-high-precision photometry. To be launched in 2020, the ExoMars Rover is equipped with the miniaturized camera system CLUPI, which was developed by a Swiss-French consortium under the leadership of the Space Exploration Institute in Neuchâtel, Switzerland. Other Swiss institutions are involved in various future missions, such as the ESA Juice mission, scheduled for launching in 2022 to explore Jupiter and its moons, and the recently selected ESA Comet Interceptor, to be launched in 2028.

### **(b) Astrophysics**

Swiss research institutions have a long history of studying solar physics and astrophysics. Selected experiments developed in Switzerland are highlighted below.

In 2015, the LISA Pathfinder was launched with significant contributions from ETHZ, the University of Zurich, and RUAG Space. It is a preparatory mission for the future LISA gravitational wave observatory to be launched by ESA in 2034.

The ISDC Data Centre for Astrophysics at the University of Geneva is involved in a variety of science missions, including the planned advanced telescope for high-energy astrophysics (Athena mission, the Chinese enhanced X-ray timing and polarimetry (eXTP) mission, the ESA X-ray imaging polarimetry explorer (XIPE), a joint NASA/JAXA X-Ray imaging spectroscopy mission (XRISM) and the Euclid mission to learn more about dark matter. The University of Geneva, together with the University of Zurich, also plays an important role in the star-mapping Gaia mission, which was launched in 2013 and is delivering outstanding data about our galaxy.

The Physikalisch-Meteorologisches Observatorium Davos/World Radiation Centre contributes to a number of missions with payloads, such as the compact lightweight absolute radiometer (CLARA), which has been measuring total solar irradiance since 2017 on board NorSat-1, or the digital absolute radiometer (DARA) on the ESA PROBA-3 mission, to be launched in 2020. It is also developing hardware for the Solar Orbiter, another ESA mission to be launched in 2020. This mission will also carry an X-ray telescope built by the University of Applied Sciences and Arts Northwestern Switzerland.

**(c) Earth observation**

Switzerland supports Earth observation missions mainly through its membership in ESA. Swiss academia and industry actors contribute to the development and data analyses of all Earth Explorer missions. This includes the operational missions on gravity field and steady-state ocean circulation explorer (GOCE, now de-orbited), soil moisture and ocean salinity (SMOS), CryoSat, Swarm and, launched most recently, Aeolus, as well as the missions that are in development, namely, EarthCare, Biomass, the fluorescence explorer (FLEX) and FORUM. Swiss actors are also substantially involved in the development of the Sentinel missions for the space component of the Copernicus programme of the European Union.

Furthermore, Swiss institutions contribute to the development of essential climate variables, including through the ESA Climate Change Initiative, which contributes to systematic observations of climate change, as requested under the United Nations Framework Convention on Climate Change.

**(d) Human exploration and space life science**

Alongside the other international partners, Switzerland contributes to the success of the International Space Station (ISS) through ESA, together with nine other ESA member States. In 2018, the intelligent crew-assisting robot Cimon, developed in Germany with support from the Lucerne University of Applied Sciences and Arts, was successfully tested on board ISS. The Swiss User Support and Operations Centre at the Lucerne University is operated on behalf of ESA. The Centre provides space biology services to assist scientists in developing and conducting experiments on ISS.

In 2018, the Lucerne University of Applied Sciences and Arts performed experiments to measure the growth rate and chemical composition of cells under microgravity and cosmic radiation conditions in space. To that end, experiment SpaceFab, a modular algal bioreactor for nanosatellites, was developed. The Lucerne University also performs experiments on sounding rockets and zero-gravity flights to better understand how muscle cells react under extreme conditions.

The Space Hub of the University of Zurich conducts various research projects in the field of space life sciences, such as gravitational biology, tissue regeneration, space medicine, fluid physiology and spinal health. The Space Hub is also involved in robotic research, in which Switzerland displays great expertise – mainly through the two federal institutes of technology, the Federal Polytechnic School of Lausanne (EPFL) and ETHZ, but also through other educational institutes.

**(e) Space debris and sustainability research**

In May 2018, the Swiss Optical Ground Station and Geodynamics Observatory at Zimmerwald inaugurated two new domes and now houses a total of six operational telescopes. One main focus area of the observatory and of the corresponding research group at the University of Bern is the tracking and characterization of space debris.

A new initiative launched in 2019 by eSpace, the space centre at EPFL, is dedicated to studying the future challenges of space logistics and space sustainability.

**(f) Capacity-building and outreach activities**

Swiss universities, ETHZ, EPFL and higher education institutions offer a variety of astronomy, astrophysics, planetary science and engineering classes. In the autumn semester of 2019, the Faculty of Law of the University of Bern held the first academic seminar on space law to be convened in Switzerland.

To commemorate the fiftieth anniversary of the Apollo 11 moon landing, as well as the special contribution that Switzerland made with the solar wind collector built at the University of Bern, various celebrations took place all over the country, including an extensive Moon festival organized in Bern and the international science communication festival Starmus, which held its fifth edition in Zurich.

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