6 April 2018

English only

Committee on the Peaceful Uses of Outer Space
Legal Subcommittee
Fifty-seventh session
Vienna, 9–20 April 2018
Item 6 of the provisional agenda*
Status and application of the five United Nations treaties on outer space

Responses to the questionnaire on the application of international law to small-satellite activities

Note by the Secretariat

At its fifty-sixth session, in 2017, the Working Group of the Legal Subcommittee on the Status and Application of the Five United Nations Treaties of Outer Space recommended (A/AC.105/1122, Annex I, para.15) that States members and permanent observers of the Committee provide the Subcommittee, at its fifty-seventh session, comments and responses to the "Questionnaire on the application of international law to small satellite activities" (A/AC.105/1122, Annex I, Appendix II).

The present conference room paper contains replies received from Austria, Germany and UNISEC-Global to the questionnaire.

* A/AC.105/C.2/L.303.

Austria

[Original: English]
[Received on 17 January 2018]

1. Overview of small-satellite activities

1.1 Are small satellites serving the needs of your society? Has your country determined whether small satellites could serve an identified technological or development need?

There is no national policy or regulation expressly determining that small satellites serve a specific technological or development need. However, in Austria small satellite activities have so far been carried out for education, research and scientific purposes. In particular in the field of education and research small satellite projects are undertaken to give students the possibility to gain hands-on experience and develop practical skills in aerospace engineering, satellite communication and similar fields. Small satellite activities are thus serving the need for enhanced education in the space area.

1.2 Is your country involved in small-satellite activities such as designing, manufacturing, launching and operating? If so, please list projects, as appropriate. If not, are there future plans to do so?

So far three Austrian national satellites have been launched. All three are nanosatellites:

• “BRITE-Austria/TUGSAT-1” and “UniBRITE”:

The two satellites were launched in February 2013 by the Indian Space Research Organization (ISRO) from Sriharikota, India. They form part of the “BRITE Constellation” together with one Canadian and two Polish satellites. Both satellites were developed in a collaboration between the Institute of Communication Networks and Satellite Communications (IKS) at the Technical University of Graz (TUG), the Institute for Astronomy of the University of Vienna and the Space Flight Lab (SFL) at the University of Toronto Institute of Aerospace Studies (UTIAS). They are both operated by the IKS at the Technical University of Graz. The mission’s objective is to collect in-orbit data on variations in the brightness of massive luminous stars by using the two Austrian nanosatellites, each observing in a different wavelength. Observation of the subtle pulsation of stars over a long period of time allows for conclusions about their structure, their chemical composition and their age. The scientists attempt to clarify contradictions in the origin of stars and to gain further insights about the origin of the universe.

• “PEGASUS”:

The satellite was launched in June 2017 by the Indian Space Research Organization (ISRO) from Sriharikota, India. It was developed in Austria by a team consisting of the University of Applied Sciences Wiener Neustadt, the Space Team of the Technical University Vienna, and the Space Tech Group. PEGASUS is part of the QB50 project, which aims at conducting atmospheric research in the thermosphere using a network of 36 nanosatellites built by universities and research institutions from 23 different countries. PEGASUS is equipped with a set of Langmuir probes to perform plasma measurements and provide information about essential properties of the plasma in the thermosphere, such as the temperature and density of electrons. The results will allow improving atmospheric models which are inter alia used for weather forecasting and assessments of phenomena such as the depletion of the ozone layer. The communication with the satellite is conducted via four ground stations in Austria.

1.3 Which kind of entity in your country is carrying out small-satellite activities?

In Austria small satellite activities have so far been carried out by universities and research institutions. However, projects that are currently under development also involve industry.

1.4 Is there a focal point in your country responsible for coordinating small-satellite activities as part of your national space activities?

No focal point specifically responsible for small satellite activities exists in Austria.

1.5 Are small-satellite activities carried out in the framework of international cooperation agreements? If so, what type of provisions specific to small-satellite activities are included in such cooperation agreements?

The first two Austrian satellites BRITE-Austria and UniBRITE are part of the BRITE constellation together with one Canadian and two Polish satellites. No binding international agreement exists regulating the mission and the cooperation between the participating institutions. Rather, the non-binding Bylaws of the BRITE Executive Science Team, which is composed of scientists from Austria, Poland, Canada, Germany and France, determine the publication strategy, the decision-making process regarding the selection of stars for observation by the constellation as well as the use and publication of data obtained from the observations.

The most recent Austrian satellite PEGASUS is part of the QB50 project, which is coordinated by the Belgian von Karman Institute for Fluid Dynamics. For the participation of the satellite in the QB50 project the “Agreement on the Facilitation of the “QB50 Project”” was concluded between the von Karman Institute as coordinating institution and the University of Applied Sciences Wiener Neustadt as participating institution and operator of PEGASUS. This binding agreement regulates the responsibilities and obligations of the coordinating and participating institution as well as questions regarding financing, liability and intellectual property. In addition, an agreement was concluded at government level between Austria and Belgium regarding the registration of the satellite based on Article II (2) of the Registration Convention, which determines that in case there are two or more launching states in for a space object, they should jointly determine which one of them will register the object. The agreement between Austria and Belgium also covers the authorization and supervision of the satellite.

From the Austrian point of view these binding and non-binding agreements are not necessarily specific to small satellite activities and include issues that would also require agreement between scientists, institutions and states if the projects involved larger satellites. However, international cooperation is particularly important for small and emerging space faring nations like Austria.

2. Licensing and authorization

2. Do you have a legal or regulatory framework to supervise any aspect of small-satellite activities in your country? If so, are they general acts or specific rules?

The Austrian Outer Space Act[1] and the Austrian Outer Space Regulations[2] form the legal framework for space activities carried out on Austrian territory, on board of

[1] Austrian Federal Law on the Authorization of Space Activities and the Establishment of a National Space Registry (Bundesgesetz über die Genehmigung von Weltraumaktivitäten und die Einrichtung eines Weltraumregisters – Weltraumgesetz, BGBl. I Nr. 132/2011) entered into force on 28 December 2011 (Austrian Outer Space Act), https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2011_I_132/BGBLA_2011_I_132.pdf.

[2] Regulation of the Austrian Federal Minister for Transport, Innovation and Technology for the Implementation of the Austrian Federal Law on the Authorisation of Space Activities and the Establishment of a National Space Registry (Verordnung der Bundesministerin/des Bundesministers für Verkehr, Innovation und Technologie zur Durchführung des Bundesgesetzes über die Genehmigung von Weltraumaktivitäten und die Einrichtung eines Weltraumregisters – Weltraumverordnung, BGBl. II Nr. 36/2015) entered into force on 27 February 2015 (Austrian Outer Space Regulation),

vessels or airplanes registered in Austria or by natural persons with Austrian citizenship or legal persons seated in Austria (Article 1, paragraph 1 Austrian Outer Space Act). All activities that fall under this description, irrespective of the size of the space objects involved, need to fulfil the provisions and requirements of the Austrian space legislation. This includes in particular the authorization and continuing supervision and control of national space activities by the Austrian Minister for Transport, Innovation and Technology (Articles 3, 4, 7 and 13 Outer Space Act and Articles 2, 5 and 9 Outer Space Regulation).

3. Responsibility and liability

3.1 Are there new challenges for responsibility and liability in view of small-satellite activities?

The Austrian experience has shown that there is a risk that the government is not informed about national small satellite activities, in particular if they are carried out by new actors in the space field, such as start-ups, universities or research institutions. If no national space legislation exists, there is no obligation for non-governmental entities to inform the state about planned or ongoing space activities. Even when national space legislation exists, non-governmental entities may not be aware that their activity falls under the national legislation and requires authorization by the competent authorities. In both cases, however, the state could be liable and responsible for the small satellite activity. Yet, if the state has no knowledge of the small satellite activity, it is not in the position to mitigate liability and responsibility as it has no possibility to authorize and supervise the activity or to establish requirements for insurance that could cover possible damage.

An additional challenge arises for the state, if no national legislation exists that provides for a right to recourse against the operator, if the state has payed compensation for damage. On the other hand, the operator may face a challenge, if a right of recourse of the state against the operator exists, but the operator has not taken out insurance.

3.2 How are liability and insurance requirements enforced on an operator in your country, for a small satellite under your country's responsibility, in the event that "damage" occurs on the surface of Earth, to aircraft in flight or to another space object in orbit?

Under Austrian space legislation, insurance is one of the requirements for authorization by the competent Ministry. According to Article 4 (4) Outer Space Act, the operator is obliged to take out an insurance covering a minimum amount of € 60 000 000 per insurance claim in order to cover liability for damage caused to persons and property. However, if a space activity is in the public interest, i.e. if it serves science, research or education, the competent Minister may determine a lower sum or release the operator from the insurance requirement. All Austrian nanosatellites currently in orbit are exempted from the insurance obligation.

Article 11 Outer Space Act determines that in the case that Austria has compensated damage caused by a space activity under international law, the government has the right of recourse against the operator. For damage caused on the surface of the Earth or to aircraft in flight, the right of recourse comprises an amount up to the sum of the insured risk, but no less than the minimum amount of insurance set out under Article 4. This limitation does not apply if the damage is due to fault by the operator or his agents or if the operator has infringed the provisions of Article 3 or Article 4 regarding the authorization of the space activity.

According to Article 14 of the Outer Space Act, any infringement of the provisions of the Act constitutes an administrative offence and will be fined up to € 100 000, unless the action represents a criminal offence falling within the competence of the courts. If a space activity is carried out without the necessary authorization a minimum fine of € 20 000 is imposed.

https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2015_II_36/BGBLA_2015_II_36.pdf.

4. Launching State and liability

4.1 Since small satellites are not always deployed into orbit with dedicated rockets as in the case of larger satellites, there is a need for clarification in the understanding of the definition of "launch".

When a launch of a small satellite requires two steps —first, launching from a site to an orbit and, second, deploying the small satellite to another orbit —in your view, would the first step be regarded as the "launch" within the meaning of the United Nations treaties on outer space?

If the small satellite is launched on board another space object from a site to an orbit and then deployed from that object to another orbit, the first step would be regarded as "launch" within the meaning of the United Nations treaties on outer space, because it brings the object from Earth to outer space/an orbit around the Earth. The second step would not be a launch, but only a change of orbits. However, since it is possible that there is more than one launching State (see Article 1 (c) Liability Convention and Article 1 (a) Registration Convention), the "home" state of the small satellite may be a co-launching state, if it has "launched" or "procured the launch" of the satellite. Questions of registration, responsibility and liability can and shall be arranged in agreements between the launching states. Information on the two steps of the launch (first, launching from a site to an orbit and, second, deploying the small satellite to another orbit) could be transmitted to the United Nations Office for Outer Space Affairs for entry into the United Nations Register of Objects Launched into Outer Space.

4.2 Do you think that the current international regulatory regime is sufficient to regulate operators of small satellites or that there should be a new or different international regulatory approach to address operations of small satellites?

If implemented efficiently at the national level, the existing international legal framework is sufficient to regulate the operation of small satellite activities. Thus, there seems to be no need for a new or different international regulatory framework for small satellite activities.

5. Registration

5. Does your country have a practice of registering small satellites? If so, does your country have a practice of updating the status of small satellites? Is there any legislation or regulation in your country that requires non-governmental entities to submit to the Government information for the purpose of registration, including updating of the status of small satellites they operate?

In accordance with the Registration Convention as well as the Austrian national space legislation, all three Austrian nanosatellites have been registered in the Austrian national registry as well as in the United Nations register.
According to Article 9 Outer Space Act, all space objects, irrespective of their size, for which Austria is the launching state according to Article I of the Registration Convention must be entered into a national registry. The Austrian Minister for Transport, Innovation and Technology is responsible for maintaining the national registry (Article 9, paragraph 1 Outer Space Act and Article 9 Outer Space Regulation) as well as for communicating to the Secretary General of the United Nations the registration information for the space objects for which Austria is the launching state as well as all modifications relevant to this information (Article 10 Outer Space Act).

The operator must submit the following information to the responsible Ministry:

> the name of the launching state or states; an appropriate designation of the space object, its registration number and the ITU frequency allocation number; the date and territory or location of launch; the main orbital parameters, including nodal period, inclination, apogee, perigee; the general function of the space object; the manufacturer of the space object; the owner and operator of the space object; the Committee on Space Research (COSPAR) international designator; the date and the Coordinated Universal Time (UTC) of the launch; the expected

date and Coordinated Universal Time (UTC) of the re-entry of the space object; the date and the Coordinated Universal Time (UTC) of moving the space object to a disposal orbit; a web link to official information on the space object; the spacecraft which is used to launch the space object; the celestial body the space object is orbiting; any further information, which the Minister for Transport, Innovation and Technology may determine, if necessary, in light of the technological state of the art, the international legal obligations or relevant decisions of international organizations (Article 10 Outer Space Act, Article 6 Outer Space Regulation).

In case of a change of operator the original operator must provide the following information:

the date and the Coordinated Universal Time (UTC) of the change of operator; the identification of the new operator; in case of a change of orbital position, the parameters of the original orbital position as well as the parameters of the new orbital position; any change of function of the space object (Article 6 Outer Space Regulation).

The operator must also submit all modifications relevant to the registration information without delay (Article 10 Outer Space Act). Moreover, the operator is under the obligation to notify immediately all incidents which delay or render impossible the carrying out of the space activity (Article 6 Outer Space Act).

6. Space debris mitigation in the context of small-satellite activities

6. How has your country incorporated specific requirements or guidelines into its national regulatory framework to take into account space debris mitigation?

According to the Austrian Outer Space Act, one of the conditions for the authorization of national space activities, including small satellite activities, by the Austrian Minister for Transport, Innovation and Technology is that “appropriate provision has been made for the mitigation of space debris” (Article 4, paragraph 1, letter 4, Outer Space Act). This provision must be made in accordance with the state of the art and in due consideration of the internationally recognized guidelines for the mitigation of space debris (Article 5 Outer Space Act). The IADC Space Debris Mitigation Guidelines, the ESA Requirements on Space Debris Mitigation and the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space are explicitly referred to in the Explanatory Report to the Outer Space Act, in order to specify what is meant by “internationally recognized guidelines for the mitigation of space debris” in Article 5 (As to Article 5 Explanatory Report to the Austrian Outer Space Act).

As evidence of appropriate provisions for the mitigation of space debris, the Austrian Outer Space Regulation requires the operator to submit a demonstration of measures adopted for the avoidance of space debris and mission residue released during normal operations, for the prevention of on-orbit collisions with other space objects, for the avoidance of on-orbit break-ups of the space object as well as for the removal of the space object from orbit at the end of mission, either by controlled re-entry or by moving the space object to a sufficiently high orbit. For non-maneuverable space objects an orbit must be chosen where their post-mission lifetime does not exceed 25 years (Article 2, paragraph 4 Outer Space Regulation).

Germany

[Original: English]
[Received on 18 January 2018]

1. Overview of small-satellite activities

German small satellite activities mainly take place in the framework of training aerospace students and engineers and serve primarily educational and technology

demonstration purposes. These activities therefore are located at the aerospace faculties of German universities.

The German Space Agency (DLR) has a dedicated small satellite programme supporting those university initiatives with financial means as well as administrative-legal advice.

The international cooperation efforts depend on the specific mission and are at the discretion of each university.

2. Licensing and authorization, and 6. Space debris mitigation in the context of small-satellite activities

Within the framework of the small satellite programme of the German Space Agency, there are several instruments (such as advice or funding requirements) to ensure compliance with the international obligations of Germany, including registration, frequency management and space debris mitigation.

3. Responsibility and liability

The risk assessment of a single small satellite mission is generally being evaluated by general criteria. The sum of all small satellite activities, however, requires continuous monitoring. Support to small satellite missions is based on scientific-technical criteria.

Federally funded university projects are based on the self-insurance principle of the public sector.

4. Launching State and liability

In case of a two-step deployment of a space object to its intended orbit, the relevant connecting point for the definition of launch with regard to the launching State qualification, in our view, is the first step from Earth to outer space. An additional deployment from a space station/platform to the final orbit does not, in our view, qualify the States which are only involved in the secondary deployment as launching States. The responsibility of launching States is related to the risks of launching a space object from Earth to outer space.

The regulatory regime for individual small satellite missions follows in principle the same challenges as other satellites. Given the relation between the functional and non-functional amounts of time spent in orbit by small satellites, the 25-year rule might not be adequate enough. Megaconstellations pose new challenges, not due to the size of an individual satellite or its developer community, but due to the amount of satellites introduced into the space environment.

5. Registration

Small satellites are being registered in the German national registry like any other space object. For the purpose of registration, Germany does not make any difference between small satellites and other types of space objects.

UNISEC-Global

[Original: English]
[Received on 27 March 2018]

1. Overview of small-satellite activities

1.1 Are small satellites serving the needs of your society? Has your country determined whether small satellites could serve an identified technological or development need?

Yes. UNISEC-Global envisions a world where space science and technology are used by individuals and institutions in every country, rich or poor, and offers opportunities

across the whole structure of society–whether academic, industrial or educational for peaceful purposes and for the benefit of humankind.

UNISEC-Global believes that small satellite activities can have a range of positive effects on a country's development, including in the education and training of a skilled workforce, in providing opportunities for international space cooperation, in establishing small businesses and in fostering peaceful relations among nations.

1.2 Is your country involved in small-satellite activities such as designing, manufacturing, launching and operating? If so, please list projects, as appropriate. If not, are there future plans to do so?

Yes. UNISEC-Global provides hands-on training program, technical competitions and conferences such as CanSat Leader Training Program (http://cltp.info), Mission Idea Contest for Micro/Nano Satellite Utilization (http://www.spacemic.net/), and Debris Mitigation Competition (http://www.unisec-global.org/dmc/).

Also, UNISEC-Global facilitates collaboration and cooperation among its members to carry out small satellite activities. Most members carry out such activities. These activities are presented by each member during annual UNISEC-Global Meeting. To increase the success rate, UNISEC-Global has initiated a review process for satellite projects planned for launch.

1.3 Which kind of entity in your country is carrying out small-satellite activities?

UNISEC-Global consists of local chapters. The main players are universities.

As of March 2018, UNISEC-Global has 15 local chapters and 1 association of local chapters. They are as follows:

- UNISEC-Bangladesh(https://www.facebook.com/UNISEC-Bangladesh-1499317133653837/, www.unisec-bd.org),
- UNISEC-Bulgaria(https://www.facebook.com/UNISECbg),
- UNISEC-Egypt(https://www.facebook.com/groups/319375471589932/),
- UNISEC-Germany (included in UNISEC-Europe, http://unisec-europe.eu/),
- UNISEC-Italy (http://unisonitaly.eu/en/),
- UNISEC-Japan(http://unisec.jp/),
- UNISEC-Lithuania(http://space-lt.eu/en/lka-asociation/unisec-2/),
- UNISEC-Mexico(http://www.unisecmexico.com),
- UNISEC-Mongolia (under construction),
- UNISEC-Nigeria(http://unisecnigeria.org.ng),
- UNISEC-Peru(http://www.unisec-peru.uni.edu.pe),
- UNISEC-Samara (The Russian Federation) (http://unisecsamara.ssau.ru),
- UNISEC-SAR(SouthAfrica/Angola/Namibia(http://www0.sun.ac.za/UNISEC-SAR), UNISEC-Tunisia (https://www.facebook.com/UnisecTunisia/) and
- UNISEC-Turkey (http://usttl.itu.edu.tr)

1.4 Is there a focal point in UNISEC-Global responsible for coordinating small-satellite activities as part of your national space activities?

UNISEC-Global has 43 international Points of Contact. Through its 43 international point of contact throughout the world, UNSICE-Global is encouraging universities to contact their national authorities.

For the details on 43 points see http://unisec-global.org/pointofcontact.html

1.5 Are small-satellite activities carried out in the framework of international cooperation agreements? If so, what type of provisions specific to small-satellite activities are included in such cooperation agreements?

UNISEC-Global promotes international cooperation and the use of small satellites in support of internationally agreed development goals, such as in the 2030 Agenda for Sustainable Agenda. For example, the Fifth Mission Idea Contest for Micro/Nano Satellite Utilization (http://www.spacemic.net) seeks solutions provided by small satellite missions to address the Sustainable Development Goals.

UNISEC-Global is also concerned with the issue of space debris and promotes small satellite activities that are in compliance with the existing voluntary debris frameworks. For example, it conducts an annual debris mitigation competition to encourage the small satellite community to develop solutions that mitigate/prevent the creation of debris resulting from small satellite missions.

2. Licensing and authorization

2. Do you have a legal or regulatory framework to supervise any aspect of small-satellite activities in UNISEC-Global? If so, are they general acts or specific rules?

UNISEC-Global encourages that all space activities should adhere to the existing regulatory and legal framework. As a permanent observer in the Committee, it contributes to the work of the Committee related to discussions on the existing legal framework as well as on present and future issues of concern, including the long-term sustainability of outer space activities.

3. Responsibility and liability

3.1 Are there new challenges for responsibility and liability in view of small-satellite activities?

Several UNISEC-Global members operate in countries that do not yet have a national legal framework for space activities. This can give rise to challenges, e.g. when it is unclear which entity in the country is responsible for the authorization and supervision of space activities, including when there are no pre-existing national procedures or rules for this.

3.2 How are liability and insurance requirements enforced on an operator in UNISEC-Global, for a small satellite under UNISEC-Global's responsibility, in the event that "damage" occurs on the surface of Earth, to aircraft in flight or to another space object in orbit?

UNISEC-Global encourages that all space activities should adhere to the existing regulatory and legal framework. According to the existing legal framework the responsibility lies with the launching State.

4. Launching State and liability

4.1 Since small satellites are not always deployed into orbit with dedicated rockets as in the case of larger satellites, there is a need for clarification in the understanding of the definition of "launch". When a launch of a small satellite requires two steps — first, launching from a site to an orbit and, second, deploying the small satellite to another orbit — in your view, would the first step be regarded as the "launch" within the meaning of the United Nations treaties on outer space?

Within the meaning of the United Nations treaties on outer space, the first step would be regarded as the launch.

4.2 Do you think that the current international regulatory regime is sufficient to regulate operators of small satellites or that there should be a new or different international regulatory approach to address operations of small satellites?

There should be no distinction between small and other satellites in international law. It is upon countries to provide a national framework that e.g. promotes space activities, including small satellite activities, of e.g. universities, small businesses. But in international law all space activities should be considered the same, without distinction.

5. Registration

5. Does UNISEC-Global have a practice of registering small satellites? If so, does UNISEC-Global have a practice of updating the status of small satellites? Is there any legislation or regulation in UNISEC-Global that requires non-governmental entities to submit to the Government information for the purpose of registration, including updating of the status of small satellites they operate?

UNISEC-Global encourages that all space activities should adhere to the existing regulatory and legal framework. It therefore expects that its members will register their satellites in line with the applicable national and international laws.

UNISEC-Global follows closely the discussions in the Committee and will keep its members informed and also provide the view of its members back to the Committee.

6. Space debris mitigation in the context of small-satellite activities

6. How has UNISEC-Global incorporated specific requirements or guidelines into its national regulatory framework to take into account space debris mitigation?

UNISEC-Global conducts a debris mitigation study competition which is in line with applicable voluntary frameworks and contributes to space debris mitigation. Also, it contributes to the International Academy of Astronautics (IAA)-Study Group “Post-Mission Disposal for Micro and Smaller Satellites” that launched in 2017 with the purpose to disseminate the research results to university satellite community worldwide.

UNISEC-Global encourages that all space activities should adhere to the internationally recognized space agency’s organizations’ guidelines, such as Inter-Agency Space Debris Coordination Committee guidelines, or industry standard standards, such as International Organization for Standardization (ISO) standards related to space debris (e.g. the so called “25 years rule”). In addition, UNISEC-Global encourages that all space activities should adhere to the national regulatory framework in those countries that developed their own national regulatory framework related to space debris mitigation.