

The Current Practice of the European Space Agency in Registering Its Space Objects Launched into Earth Orbit or Beyond

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Abstract

In 1978, the European Space Agency (ESA) declared acceptance of the rights and obligations provided for in the Convention on Registration of Objects Launched into Outer Space. In doing so, ESA became the first international intergovernmental organisation to respond to the registration requirements established under international space law. In 2014, based on more than three decades of best practice, ESA established a policy for the registration and notification to the UN Secretary-General of its space objects, complemented in 2015 by a comprehensive, multi-functional ESA Space Object Register. This Register, representing the “national registry” which ESA is obliged to establish and maintain under Article II para. 1 Registration Convention, marks a milestone development by being linked to ESA’s state-of-the-art technical space object database, DISCOS. The Agency’s new registration policy and the ESA Space Object Register have the potential to serve as a model of registration practice in the context of a dynamically developing space debris environment, the augmentation and diversification of space actors, the necessity of international cooperation in the peaceful uses of outer space and the concept of space traffic management. They represent a practical example of responding to the considerations of the ‘registration practice’ resolution A/RES/62/101 and a contribution to the responsible use of outer space by ESA and its Member States.

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I. **The European Space Agency: Introductory Remarks on Its Structure and Functioning¹**

The European Space Agency (ESA) is an international intergovernmental organisation of regional, technical character founded in 1975 as successor to the earlier European Space Research Organisation (ESRO) and the European Organisation for the Development and Construction of Space Vehicle Launchers (ELDO).² ESA is vested with legal personality (Article XV ESA Convention) distinct from that of its Member States; it is a derived subject of public international law. It functions through its two legal organs (Articles X-XII ESA Convention), the Council, ESA's ruling organ, i.e. the assembly of Member States, and the Director General, ESA's executive organ, assisted by staff. As a result of its legal personality, both under public international law and various domestic jurisdictions, ESA can assume rights and obligations and therefore participate in a wide variety of legal acts; it can conclude international agreements and enter into contracts governed by private law.

The purpose of ESA is to provide for and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, inter alia by elaborating and implementing activities and programmes in the space field (Article II ESA Convention). As of November 2015, ESA has 22 Member States.

II. **ESA'S Response to Obligations Rooted in International Space Law**

As part of its mandate, ESA takes part in space activities in their entirety, including the launch and operation of a large number of space objects, be it in various Earth orbits including the geostationary orbit, and some *Lagrangian* points³ or beyond. Consequently, ESA applies international space law in the widest appropriate form, taking into account its status as international intergovernmental organisation and the common will of its Member States as expressed through unanimous resolutions and decisions of the Council.

The Outer Space Treaty does not open the possibility for international intergovernmental organisations to declare acceptance of the rights and obligations

1 Parts of this paper are based on the Conference Room Paper "Space Object Registration by the European Space Agency: current policy and practice", prepared by the first author on behalf of ESA for the 54th session of the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space, 2015 (A/AC.105/C.2/2015/CRP.18).

2 Although conducting its activities under the name of ESA since 31st May 1975, it was not until 1980 that the ESA Convention actually entered into force. The period of five years between 1975 and 1980 was thus an 'interregnum' during which, from a formal point of view, ESRO continued to exist.

3 Recent examples are the *Herschel*, *Planck* and *Gaia* missions at *Lagrange Point 2* (Sun-Earth); note that at the end of its nominal mission, *Herschel* and *Planck* were moved into a heliocentric orbit.

contained therein; in contrast, the subsequent four space treaties allow for this opportunity. However, the respective articles⁴ establish that three conditions must be met in order for treaty provisions to apply to international organisations: (i) the organisation must conduct space activities; (ii) it must declare its acceptance of the rights and obligations provided for in the respective agreement; and (iii) a majority of the States members of the organisation must be States Parties to the respective agreement *and* to the Outer Space Treaty. In the case of ESRO/ESA, these conditions were (and still are) met in respect to the Rescue Agreement, Liability Convention and Registration Convention.

For that reason, in 1975, the ESRO Council declared acceptance of the Rescue Agreement. In December 1977, the Council adopted a resolution on the Agency's legal liability by virtue of which it not only declared ESA's acceptance of the Liability Convention but also laid down main principles applicable to the external and internal settlement of third party liability. Finally, in December 1978, the ESRO Council declared acceptance of the Registration Convention (see section III below). The Agency was therefore bound to some of the most fundamental obligations of international space law even before the ESA Convention had actually entered into force in 1980. It shall be added that such declarations do not place international organisations like ESA "on an equal footing" with States; only the latter are contracting parties of the respective treaties.⁵

ESA's active role in space law goes beyond the declaration of acceptance of space law treaties. ESRO/ESA has been an observer to the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) since 1973 and a permanent observer since 1975. The Agency actively promotes the rule of law with regard to the conduct of space activities, supports its Member States, on their request, in the elaboration or implementation of domestic space legislation and promotes international cooperation in space activities as well as their long-term sustainability. ESA has taken an active role in the creation of international space debris mitigation mechanisms, guidelines and standards; it co-founded the Inter-Agency Space Debris Coordination Committee (IADC) and applies the European Code of Conduct for Space Debris Mitigation (2004). The Director General's instruction "Space Debris Mitigation for Agency Projects" (2014) aligns ESA's space debris mitigation policy to the European Cooperation for Space Standardization (ECSS) adoption notice of the International Organization for Standardization (ISO) standard 24113 "Space Systems – Space Debris Mitigation Requirements" and establishes the technical requirements for space

4 Article 6 Rescue Agreement; Article XXII Liability Convention; Article VII Registration Convention; Article 16 Moon Agreement.

5 Tronchetti, F., Smith, L., and Kerrest, A., Article XXII LIAB (International Intergovernmental Organizations), in: Hobe, S., Schmidt-Tedd, B., Schrogl, K.U., Cologne Commentary on Space Law, Vol. II, Cologne 2013, p. 204.

debris mitigation for Agency projects, sets out the principles governing its implementation and the definition of internal responsibilities.

Finally, as a space agency developing and implementing a wide range of space missions, ESA applies a comprehensive internal procedure for frequency requests and allocations, in line with international instruments and practice established under the International Telecommunications Union (ITU). ESA contributes to the deliberations of the ITU and promotes the space interests in the European coordination process for the World Radio Conferences. ESA also co-established the inter-agency Space Frequency Coordination Group, to which it provides the permanent Executive Secretary, and concluded bilateral agreements on the use and protection of radio frequencies for its *Estrack* network of ground stations.

III. ESA's Former Practice in Registering Its Space Objects (1980-2013)

2015 marks the 40th anniversary of the launch of ESA's 'first' satellite, COS-B.⁶ On 9th August 1975, Europe's first gamma ray observatory was lifted into low Earth orbit on-board a Thor Delta launch vehicle from the Western Test Range in California, USA. The mission had been approved by the ESRO Council in 1969; at the time of its arrival in orbit, the ESA Convention had been signed for a few months only but not yet entered into force. The situation looked similar with regard to the Registration Convention, which had equally been opened for signature in 1975 but would not enter into force until a year later. Consequently, COS-B was not subject to registration; it re-entered in 1986.⁷

A few years later, the situation had evolved. In December 1978, the ESRO Council declared acceptance of the Registration Convention by virtue of the "Council Decision on the Declaration of Acceptance of the Convention on the Registration of Space Objects" of 12th December 1978. This decision was based on the provisions provided for in Article VII Registration Convention and was subsequently attributed to ESA after the entry into force of the Convention. Through this legal act, which it lodged on 2nd December 1979, ESRO became the first international intergovernmental organisation to accept the rights and obligations provided for in the Registration Convention.⁸ ESA began the practice of registering its space objects and notifying the UN Secretary-General of the related launch and orbital parameters in 1980, the year of the entry into force of the Convention. Some space objects launched in

6 For further details, See the project details and history of COS-B, available under: www.esa.int/About_Us/Welcome_to_ESA/ESA_history/ESA_s_first_satellite_COS-B (August 2015).

7 COS-B had consequently never been formally registered, until it was entered into the Annex section of ESA's newly established ESA Space Object Register in 2015.

8 ESA, Space Object Registration by the European Space Agency, UNCOPUOS Legal Subcommittee, 2015.

the timeframe between 1976 (entry into force of the Registration Convention) and 1980 (entry into force of the ESA Convention), such as the first European meteorological satellite, *Meteosat-1*, and *OTS-2*, one of the first geostationary communication satellites, were registered by France on behalf of ESRO/ESA. Among the first space objects registered by ESA itself were some early *Ariane-1* upper stages, a series of technological capsules used for launch vehicle flight parameter verification purposes, the second European meteorological satellite, *Meteosat-2*, and *Marecs-A*, the first member of a group of geostationary maritime communication satellites used in the Inmarsat system. As of 2015, all of these early upper stages and payloads in low Earth orbit have de-orbited, and all early geostationary objects or those on LEO-MEO crossing orbits are inactive, though still in outer space.

ESA further consolidated its registration practice during the 1980s and 1990s. Despite the Agency being highly committed to the accurate registration of its space objects, it can be observed that the notification of space object launches to the UN Secretary-General pursuant to Article IV Registration Convention was, at times, carried out in an irregular manner; there is evidence of several ‘grouped notifications’, i.e. letters submitted pertaining to a list of objects launched within a certain timeframe, sometimes spanning several years.

IV. ESA’s New Space Object Registration Policy (2014)

End of 2013, after more than thirty years of space object registration based on best practice, the ESA Director General decided to formalise this practice and to issue, to this end, a space object registration policy applicable to all future ESA missions. ESA’s Legal Services Department was tasked to elaborate the basis for such policy, based on the best practice of the Agency and developing the latter carefully further to meet the goals of guaranteeing, at any time, up-to-date, centralised information about all ESA space objects and giving a “guiding example in space object registration”.⁹ Within the ESA legal system, the Director General’s administrative instructions and policies are a way of implementing tasks that the ESA Convention, Rules and Regulations assign to the internal competence of ESA. They are binding for ESA staff, who, in applicable cases, have to ensure the correct implementation of such acts also in ESA’s relation with third parties.¹⁰ The Director General’s administrative instruction termed *ESA Space Object Registration Policy* (in the following: the Registration Policy) entered into force on 28th March 2014. The Registration Policy is applicable to all ESA missions and establishes the principles for the registration and notification of ESA space objects. To that end, it reiterates that it is the Agency’s policy that (a) all ESA space objects

⁹ Ibid.

¹⁰ See the Compendium on Space Debris Mitigation Standards adopted by States and International Organizations, UN document A/AC.105/2014/CRP.13.

shall be registered in an ESA-internal register maintained by the ESA department in charge of legal affairs and that (b) registration-relevant information is to be provided for that purpose by the respective programme / project / mission manager in accordance with a structured process that is further detailed in a technical annex to the instruction (forming an integral part of it). Furthermore, the instruction establishes that (c) ESA will continue to notify the UN Secretary-General of ESA space objects in conformity with the Agency's international obligations, and that (d) such notification shall be furnished to the UN in reasonable time after the launch or status change of an ESA space object, but not later than one month after the launch or status change. Letter (d) contains significant novelties in respect to ESA's registration and notification practice until 2014: First, it explicitly lays down that the policy does not only apply to the launch (i.e. "bringing into orbit") of space objects but also to status changes of space objects that already *are* in Earth orbit or beyond. Second, it introduces a timeframe for the notification to the UN Secretary-General. The one-month-limit may not be as ambitious as early proposals made during the negotiation and drafting history of the Registration Convention¹¹ but represents a rare example of a binding commitment to effectuate space objects notifications in a timely manner. The rationale for not opting for an even faster notification limit is based on a careful balancing of administrative and spacecraft operation realities (space objects during the so-called *Launch and Early Orbit Phase* (LEOP) often need a period of a few hours up to a few weeks before they arrive at their destined orbital position). The Registration Policy assigns several internal responsibilities for its implementation and execution. Such, the ESA Director in charge of legal affairs is responsible for ensuring the overall implementation of the policy; the Department in charge of legal affairs is responsible for maintaining the ESA-internal register (see section VI below) and for notifying the UN Secretary-General in accordance with the Agency's international obligations, while the programme / project / mission managers are responsible for furnishing in time the relevant (technical) information to the Department in charge of legal affairs. It is only through that last responsibility that the chain of information provision is actually initiated and kept up-to-date. In its technical annex, the Registration Policy sets out the implementation requirements. It obliges the respective programme / project / mission managers to provide:

11 Some proposals suggested that notifications should be effectuated simultaneously to the launch of a space object, or even *prior* to it; See: Schmidt-Tedd, B., Malysheva, N., and Stelmakh, O., Article IV (Information by Each State of Registry), in: Hobe, S., Schmidt-Tedd, B., Schrogl, K.U., *Cologne Commentary on Space Law*, Vol. II, Cologne 2013, p. 300.

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- a) 6 months before a scheduled launch: the notification of the upcoming launch including planned dates and orbital parameters;
- b) immediately upon launch and orbit injection: the name and COSPAR denominator of the space object;¹² all launch details, the main orbital parameters to be notified to the UN, as well as additional information as deemed appropriate or necessary;
- c) at any later point, without delay: information on the change in the status of an ESA space object;
- d) 6 months before a foreseen space object re-entry, whether controlled or uncontrolled: the notification of the re-entry including information such as the calculated re-entry time window or information about the expected object fragmentation;
- e) immediately after re-entry: the confirmation of the re-entry.

V. Definitions and Clarifications Established by the Registration Policy

It is difficult to judge whether it should be called a strength or a weakness that the Registration Convention remains vague in various aspects. Such, it calls upon States Parties to establish an “appropriate” registry (Article II para. 1), to furnish to the UN Secretary-General space object-related information “as soon as practicable” (Article IV para. 1 Registration Convention) or to voluntarily provide “additional” information “from time to time” (Article IV para. 2 Registration Convention). Moreover, the Convention reiterates the definition of the term ‘space object’ as established by the Outer Space Treaty, namely that the term ‘space object’ “includes component parts of a space object as well as its launch vehicle and parts thereof” (Article I para. (b) Registration Convention), which has led to diverse academic interpretations.

To allow for an accurate implementation of the Registration Convention, the Registration Policy establishes several working definitions, including of the term ‘ESA space object’.¹³ Also, it introduces innovative terminology with the description of ‘*status change*’ of an ESA space object as comprising: (i) significant, permanent changes of orbital parameters of a space object and (ii) permanent changes of the space object’s status and functionality. From a practical (and pragmatic) point of view, it was important to interpret the meaning of the term ‘additional information’ in the Registration Convention while at the same time excluding station keeping and collision avoidance manoeuvres, the natural decay of space objects and other more general perturbations. Such ‘everyday’ manoeuvres alter a space object’s orbit at frequent

12 In practice, the launch and COSPAR details are usually provided by the ESA Space Debris Office which maintains the actual Agency interface to COSPAR in that respect.

13 ESA space objects are: (a) ESA assets embarked on an ESA or non-ESA launch, entering an orbit around Earth; (b) launcher stages for launches under an ESA development programme, entering an orbit around Earth; (c) adaptors, fairings and other elements associated to a) or b). ESA space objects being launched beyond Earth orbit are also registered and notified accordingly.

intervals, in addition to the permanent influence of natural forces such as Earth's gravity or atmospheric drag. The exact orbital parameters of any space object as notified to the UN may thus be inaccurate right from the time of reception of the notification letter by the UN.

Lastly, and as described under Chapter IV above, the Registration Policy provides for a pragmatic interpretation of the term 'as soon as practicable' as comprising not more than one calendar month.

VI. The ESA Space Object Register

A central element for implementing the Registration Policy was the establishment of a multi-functional *ESA Space Object Register*. This register represents the "national registry" required under Article II Registration Convention. Its implementation is based on the fact that the Registration Convention leaves ample room for determining the contents of each registry and the conditions under which it is maintained ("[...] shall be determined by the State of registry concerned", Article II para. 3 Registration Convention). For decades, the ESA registry was maintained in the form of a simplified, serially numbered list of entries in paper, word or excel formats, containing precisely the parameters required under Article IV para. 1 Registration Convention. The introduction of the Registration Policy offered an opportunity for enhancing that practice.

The ESA Space Object Register was developed over the course of 2014 and released in March 2015 as an internal administrative tool maintained by the Legal Services Department. It represents the authoritative list of all ESA space objects that currently are or ever have been in Earth orbit or beyond.¹⁴ It is divided in a *Main Section* listing all ESA space objects which have been registered and duly notified to the UN Secretary-General in response to the Agency's obligations under the Registration Convention and an *Annex Section* listing additional, non-functional ESA space objects, in particular operational debris. For each listed ESA space object,¹⁵ an associated fact sheet section contains the following groups of technical and other parameters:

1. the space object name and international (COSPAR) designator;
2. physical,¹⁶ launch and orbit information;¹⁷
3. registration, notification and, where applicable, additional legal information.

The list of ESA space objects registered in accordance with the Registration Convention is open to the public via the respective notifications submitted by

14 ESA, The ESA Space Object Register: introductory remarks, in: ESA Space Object Register, rev.2015-09-23, p. 3.

15 For debris objects (fragments), the physical properties are not always available.

16 including the space object type, mass and even geometrical shape.

17 including the current status, predicted re-entry date and orbit classification.

ESA to the UN Secretary-General and can be accessed under the *Online Index of Objects Launched into Outer Space* maintained by the *Office for Outer Space Affairs*. The peculiarities of the ESA Space Object Register, in particular in contrast to a more ‘conventional’ implementation approach, are its structural subtleties and its technical link to the Agency’s state-of-the-art technical space object database maintained by the ESA Space Debris Office, as further described in section VII below. Such, the ESA Space Object Register is not only a comprehensive legal database but allows for full visibility and traceability, at all times, of relevant information related to the entirety of catalogued ESA space objects. Owed to this novel approach, it has become an inter-disciplinary database of highest functionality.

VII. The ESA ‘DISCOS’ Database

In order to facilitate operational, engineering, support and academic activities related to space debris, ESA is maintaining a *Database and Information System Characterising Objects in Space* (DISCOS). DISCOS is located at the *European Space Operations Centre* (ESOC) in Darmstadt, Germany. The DISCOS system is maintained and further developed by ESA’s Space Debris Office. It has been in operation since 1990 and undergoes continuous maintenance and upgrades to keep its valuable dataset up to date since then. Reference 18 gives an introduction to the DISCOS development and outlines the main functionalities and related applications through selected examples.¹⁸

ESA’s DISCOS database assembles launch information, object registration details, launch vehicle descriptions, spacecraft information (e.g. size, mass, shape, mission objectives, owner), as well as orbital data histories for all trackable, unclassified objects, which today sums up to more than 40,000 objects. To maintain these data records DISCOS relies on various sources from which information is automatically retrieved and ingested into the database, such as: (i) ‘Two Line Elements’ received by the US Strategic Command (USSTRATCOM); (ii) Satellite Situation Report; (iii) the ESA¹⁹ Table of Earth Satellites; (iii) the NASA History of On-Orbit Satellite Fragmentations; (iv) launch information provided under ESA contracts; and (v) own and contracted research at ESA. Today, DISCOS is a central tool for supporting the daily activities at the Space Debris Office. As such, it is the basis for:

- a) operational processes for the purposes of collision avoidance, re-entry analyses and for spacecraft contingency support;
- b) launch data supplied to the Committee on Space Research (COSPAR);

18 T. Flohrer, S. Lemmens, B. Bastida Virgili, H. Krag, H. Klinkrad, E. Parrilla, N. Sanchez, J. Oliveira, F. Pina, ‘DISCOS – current status and future developments’, in: Proceedings of the 6th European Conference on Space Debris, SP-723, Darmstadt, April 2013.

19 From 1957 to 1980: RAE Table of Earth Satellites.

- c) a re-entry events database to support internationally coordinated re-entry prediction campaigns of so-called 'risk objects';
- d) different reporting capabilities, e.g. on the achieved compliance of a given mission with international space debris mitigation guidelines.

Part of the data is available for registered users in agencies, industry, academia and governments worldwide through a web front-end.²⁰ The functional architecture of the DISCOS system comprises a back-end database, and a front-end webserver. The organisation of DISCOS data in a relational database management system combines information sources into a set of related tables with a minimum of duplication.

VIII. Linking the Esa Space Object Register with 'Discos': The Creation of a Multi-Functional Legal Database

In order to implement the new ESA Space Object Register, the DISCOS database is extended with a specific schema to host legal information, such as the UN notification and registration details, related document references, an owner/operator change history and additional legal information. This dataset is administered by ESA's Legal Services Department and can be used in combination with orbit information and physical characteristics of the objects, maintained by the Space Debris Office through DISCOS. This relational-database oriented approach enables convenient and up-to-date retrieval of the following general statistics:

- a) the amount of current, or former, ESA payloads, rocket bodies, and debris pieces in orbit, or decayed;
- b) the initial and current orbital distribution of ESA payloads, rocket bodies, and debris pieces;
- c) comprehensive listings of current and former ESA objects, on-orbit/decayed /inter-planetary ESA objects, and non-payload/rocket body ESA objects.

Together with the following object specific information:

- a) launch information such as launch date, launcher, and launch provider;
- b) UN registration and associated legal acts, including ownership transfers, identified by associated dates and document numbers and an assigned ESA register number;
- c) physical characteristics such as mass and area, and an international identification designator (COSPAR) number;
- d) initial and current orbit characteristics, including a re-entry date (confirmed for past ones and predicted otherwise);
- e) operational history of a given space object.

²⁰ <https://discosweb.esoc.esa.int>.

A further distinction can be made on the level of involvement of ESA or other agencies / organisations in the design, development, launching or operation of space objects. This facilitates the identification of the respective launching state, in line with the space treaties.

The technical implementation of ESA Space Object Register also provides a reporting capability for the automated, scheduled or on-demand generation of a print-ready report on the complete registration status of all ESA space objects. That report is a single compact PDF document generated through the *LaTeX* typesetting language with convenient links and indexes to ease browsing the document, very similar to other available DISCOS reporting capabilities. The document includes different listings of all ESA objects, sorted by the COSPAR identifier and by the actual or predicted re-entry date, and the detailed object-specific fact sheets. The report closes with a concise summary of core statistics at the reporting epoch, and a set of figures, such as a classification per object type and by orbital regime.

Further possible extensions of the technical capacities involve the definition of a web-based interface, enabling authorised access to the underlying data via a user-friendly, easy-to-access, front-end with daily refreshed content.

IX. Examples of ESA's Registration Practice since 2014

Since the entry into force of its Registration Policy, ESA registered several newly launched space objects²¹ and submitted the corresponding notification letters to the UN Secretary-General; these registrations were effectuated within one month after the launch of the respective mission.

One of these space objects was ESA's ATV-5 cargo spacecraft "*Georges Lemaître*", launched to the *International Space Station (ISS)* on 29th July 2014 using an *Ariane 5ES* carrier launch vehicle.²² That ISS supply mission lasted for a nominal period of six and a half months. Due to the unusually short orbital lifetime of the ATV supply ships, during most of which they remained coupled with ISS, some of the earlier ATV spacecraft had not been notified to the UN. However, the Registration Convention does neither set any minimum orbital lifetime requirement nor is its function that of providing for space surveillance data; the assignment of jurisdiction and control (see Article VIII Outer Space Treaty) over a space object is necessary even for times of short presence in outer space, in particular for venturous missions like the ATV, docking with and un-docking from ISS and re-entering Earth in a controlled manner. Independent from the expected or actual orbital lifetime, space objects must therefore be duly registered and notified under the regime established by the Registration Convention.

21 Including Sentinel-1A, the 5th Automated Transfer Vehicle (ATV) "*Georges Lemaître*", Sentinel-2A and Sentinel-3A.

22 Registered under UN document ST/SG/SER.E/733.

Upon the return of a space object to Earth, Article IV para. 3 Registration Convention takes effect, obliging each State of registry to notify the UN Secretary-General, “to the greatest extent feasible and as soon as practicable”, of space objects concerning which it has previously transmitted information and which have been but no longer are in Earth orbit. Although mandatory in nature (“shall”), the de-orbiting information practice by States is not uniform;²³ also ESA did not provide such information in a consistent manner in the past. As explained above, the Registration Policy explicitly foresees to furnish notifications to the UN not later than one month after the launch *or status change* of an ESA space object. To that effect, the respective programme / project / mission managers shall notify the department in charge of legal affairs six months before a foreseen controlled or un-controlled re-entry and provide additional information such as the predicted re-entry time window and the expected object fragmentation. Consequently, ESA commits to notify the UN of any re-entry within four weeks. ATV-5 re-entered the Earth’s atmosphere at around 19:00 CET on 15th February 2015; the corresponding notification letter was submitted to the UN Secretary-General four days later, on 19th February 2015.

Since the entry into force of its Registration Policy, ESA submitted voluntary information pursuant to Article IV para. 2 Registration Convention, which foresees that each State of registry may, from time to time, provide the UN Secretary-General with additional information concerning a space object carried on its registry. The Agency did so in order to confirm that the *Swarm* satellites, launched into Earth orbit in 2013, had arrived at their final orbital destination after several months of approach.

Furthermore, while the Registration Convention establishes that only those space objects shall be registered which are launched in Earth orbit or beyond, ESA informed the UN Secretary-General of the mission of a *sub-orbital* space object, the *Intermediate eXperimental Vehicle (IXV)*. This spacecraft was launched on 11th February 2015 at 14:40 CET from Europe’s Spaceport in *Kourou*, French Guiana, with a *Vega* launch vehicle. The *IXV* performed a sub-orbital flight of 100 minutes including its re-entry, descent and landing in the Pacific Ocean. ESA provided the information related to the *IXV* beyond the obligations and scope of the Registration Convention. However, the responsible exploration and use of outer space for exclusively peaceful purposes goes hand in hand with transparent and proactive information provision.

Another example of ESA’s current registration practice relates to Article II para. 2 Registration Convention, which establishes that where there are two or more launching States in respect of a space object, they shall jointly determine which one of them shall register the object. In 2014, ESA concluded an agreement with the European Union (EU), represented by the European

23 Schmidt-Tedd, Malysheva, Stelmakh, p. 303-304.

Commission, for the implementation of the European *Copernicus* programme.²⁴ The *Copernicus* programme is based on a comparatively large number of Earth observation satellites, including the *Sentinel* missions which are developed by ESA. The agreement reached between ESA and the EU foresees, inter alia, that ESA registers those *Sentinel* satellites for which it has procured the launch service (cf. Article I para. (a)(i) Registration Convention) and that, upon acquisition of ownership of the respective satellite by the EU, ESA shall provide the UN Secretary-General with appropriate information identifying the EU as the owner of the space object.

X. Conclusion

As of 15th September 2015, ESA has a total number of 59 registered space objects in outer space, i.e. in Earth orbits, in other planetary orbits or in voyage across the solar system, out of which 24 functional space objects and 35 space objects not any longer functional. Furthermore, ESA has 13 registered objects that once were but no longer are in outer space, either because they have re-entered the atmosphere of Earth, impacted on a celestial body or otherwise ceased to exist. This results in an overall total number of 72 historic and actual ESA space objects listed in the Main Section of the new ESA Space Object Register.

In addition, at the same reporting epoch, ESA has twelve designated and tracked objects in outer space which are listed in the Annex Section of the ESA Space Object Register; furthermore seven designated and tracked objects that once were but no longer are in outer space. This results in an overall total number of 19 historic and actual ESA space objects listed in the Annex Section of the ESA Space Object Register.

ESA will continue attaching importance to the accurate registration of its space objects. It does so sharing the views expressed in resolution A/RES/62/101, namely that it is desirable to achieve the most complete registration of space objects and enhance adherence to the Registration Convention. ESA's current practice of space object registration can be summarised by (i) an internal, binding policy to substantiate and develop modalities to satisfy the various obligations provided for by the Registration Convention; (ii) a new, multi-functional national registry according to Article II Registration Convention; and (iii) an internal interpretation of the terms "as soon as practicable" used in Article IV para. 1 Registration Convention and "additional information" used in Article IV para. 2 Registration Convention.

²⁴ Agreement between the European Union, represented by the European Commission, and the European Space Agency on the Implementation of the Copernicus Programme including the Transfer of Ownership of the Sentinels (Copernicus Agreement), entry into force on 28 October 2014.

The current ESA practice in registering its space objects launched into Earth orbit or beyond underlines ESA's on-going commitment to comply with obligations rooted in international space law. The sustainable use of outer space for peaceful purposes is key to ESA's self-concept and viewed by the Agency as a pre-requisite of responsible behaviour towards the international community.

References

- European Space Agency, Space Object Registration by the European Space Agency: current policy and practice, A/AC.105/C.2/2015/CRP.18, 2015.
- Convention for the Establishment of a European Space Agency, ESA publication SP-1317/EN, December 2010.
- Tronchetti, F., Smith, L., and Kerrest, A., Article XXII LIAB (International Intergovernmental Organizations), in: Hobe, S., Schmidt-Tedd, B., Schrogl, K.U., Cologne Commentary on Space Law, Vol. II, Cologne 2013.
- Compendium on Space Debris Mitigation Standards adopted by States and International Organizations, submitted by Canada, the Czech Republic and Germany, A/AC.105/2014/CRP.13, 2014.
- Schmidt-Tedd, B., Malysheva, N., and Stelmakh, O., Article IV (Information by Each State of Registry), in: Hobe, S., Schmidt-Tedd, B., Schrogl, K.U., Cologne Commentary on Space Law, Vol. II, Cologne 2013.
- European Space Agency, The ESA Space Object Register, rev.2015-09-23 (internal document).
- T. Flohrer, S. Lemmens, B. Bastida Virgili, H. Krag, H. Klinkrad, E. Parrilla, N. Sanchez, J. Oliveira, F. Pina, DISCOS – current status and future developments, in: Proceedings of the 6th European Conference on Space Debris, SP-723, Darmstadt, April 2013.