

Legal and Regulatory Framework of Small Satellites in Latin America: Current State and Perspectives

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Abstract

The purpose of this paper is to analyze the legal and regulatory framework that must be applied for small satellites in Latin American countries. It is expected that the number of small satellites will significantly increase in the next years. They will possibly be endangering the safety of other space missions and sustainability of space activities in general. And it is possible that they may be launched without following proper legal and regulatory procedures, especially in countries that do not have appropriate regulatory systems. The study aims to show that to the international law, small satellites are space objects like any other, and must be authorized, supervised to comply with States treaty obligations. Regardless of their size, type and scope of missions, small satellites are considered space objects that are subject to the general regulatory framework that governs outer space activities. It is for that reason important to assess the effectiveness of current regulatory regime governing satellites.

1. Introduction

Advancing technology and decreasing cost has enabled improvements in satellite and launch technologies, there is a growing trend towards building and launching satellites that are smaller, faster, better and cheaper. Universities, start-up companies and governments, are amongst the rising number of actors involved in small satellite activities in the region. This new paradigm in the

satellite industry represents opportunities for Latin America and a chance for international cooperation.

The rather low costs for their development, launch, and operation make small satellites attractive for experiments and innovative ways of exploration and use of outer space and lower barriers to entry new space actors, addresses technology gaps between developed and developing countries. This opens a new era in the sector, which will undoubtedly guarantee the democratization of access, use and exploration of the outer space. However, it is relevant to recognize in this context that they are subject to the regulatory requirements specified in the international space treaties, as well as other instruments and national legislation.

Small satellites are grouped into categories based on their mass. Although there is currently no international consensus on the definition of the term 'small satellite', the International Academy of Astronautics (IAA) Study Group on 'Cost-Effective Earth Observation Missions' proposed a nomenclature in 2005[1]. The IAA Study Group planned a simplified subset of small satellites: 'minisatellites' <1000 kg, 'microsatellites' <100 kg, 'nanosatellites' <10 kg, and 'picosatellites' <1 kg.

As an example of the increase in the development of small satellites in recent years, we take into account the CubeSat platform. To date, 613 CubeSat-class missions identified [2].

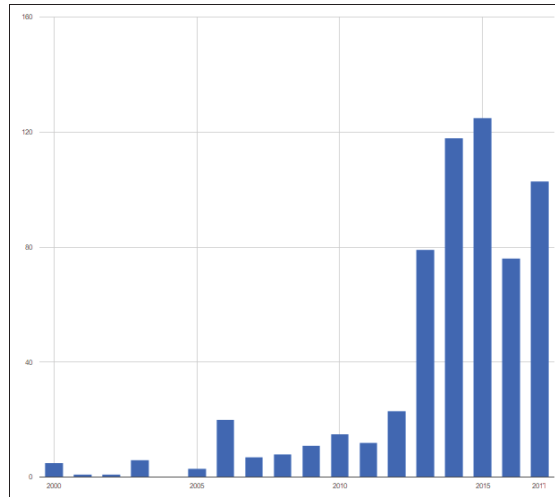


Figure 1.1 CubeSat Launches 2003–2017[3]

It is expected that the number of small satellites will significantly increase in the next years. The industry is on the cusp of a major revolution for the space ecosystem, according to recent studies [4], as more than 3,600 small satellites are expected to be launched over the next ten years, a significant increase from the previous decade. The total market value of these satellites is anticipated to be \$22 billion (manufacture and launch), a 76 percent increase over that of 2006–2015.

This rate of growth will bring about fundamental changes as both new and established industry players and they will possibly be endangering the safety of other space missions and sustainability of space activities in general. And it is possible that they may be launched without following proper legal and regulatory procedures, especially in countries that do not have appropriate regulatory systems. In particular, those established by the UN General Assembly, the UN Committee on the Peaceful Uses of Outer Space (COPUOS) and International Telecommunication Union (ITU) in respect to registration of objects launched into outer space, radiofrequency coordination and registration of satellite network frequency assignments, and compliance with the space debris mitigation guidelines.

2. International legal regime to which the small satellites are subject

According to international law, small satellites are space objects like any other, and must be authorized and supervised to comply with the state's treaty obligations. With independence of their size, type, weight and scope of missions, small satellites are considered space objects that are subject to the general regulatory framework that governs outer space activities. In addition, the launching and/or operation of such satellites constitute space activities, thus they are subject to such legal regime. It is for that reason important to assess the effectiveness of current domestic and international regulatory regime governing satellites.

Current international space law regime consists of five major international treaties negotiated through the COPUOS: *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* (Outer Space Treaty) Adopted by the General Assembly in its resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967; *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space* (Rescue Agreement) Adopted by the General Assembly in its resolution 2345 (XXII), opened for signature on 22

April 1968, entered into force on 3 December 1968; *Convention on International Liability for Damage Caused by Space Objects* (Liability Convention) General Assembly resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972; *Convention on Registration of Objects Launched into Outer Space* (Registration Convention) Adopted by the General Assembly in its resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976; and *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (Moon Agreement) Adopted by the General Assembly in its resolution 34/68, opened for signature on 18 December 1979, entered into force on 11 July 1984.

2.1 Outer Space Treaty

This international document is of vital importance, since it establishes the basis of the international regulation of space activities, therefore creating the current legal regime of outer space and celestial bodies and was constituted in the Magna Carta of Space. So far, it has been ratified by 105 states and signed by other 25 states [5].

The Outer Space Treaty (OST) provides a series of important principles which rule the space activities and are currently valid.

- The exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind;
- Outer space, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
- International law, including the Charter of the United Nations, is applicable to outer space;
- The outer space, including Moon and other celestial bodies shall be used exclusively for peaceful purposes;

- The State registering the space object shall retain its jurisdiction and control, as well as the personnel on board;
- No Weapons of Mass Destruction are permitted in outer space;
- States shall be responsible for their national activities in outer space, whether carried on by governmental or non-governmental entities;
- The activities of non-governmental entities in outer space shall require the authorization and continuing supervision by the appropriate State;
- States shall be liable for damage caused by their space objects; and
- States shall avoid the harmful contamination of outer space.

2.2 Liability Convention

This convention complements and develops two important articles from the OST: articles VI and VII.

The first one established that the States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. At the same time points out that “the activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty”.

Article VII, meanwhile, says that Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its compo-

ment parts on the Earth, in air or in outer space, including the moon and other celestial bodies.

The Liability Convention recognises that despite the caution measures that need to be taken while executing space activities, the objects launched may cause damage. That is the reason why the States resolved to establish some effective international rules and procedures so that a "full and fair compensation" can be paid to the victims quickly. Article I in the treaty establishes the definition of "damage" and both personal as well as material damage is included, and Article II points out that "the launching State has absolute liability and will take responsibility for the damage caused by their space object on the Earth or on flying aircrafts".

In any case, according to what has been ordered in the OST, the international responsibility passes to the launching State and not to the private entities that may carry out or promote the launch. This idea of state responsibility is reinforced in the Convention, whose article IX puts forth that the complaints for damage compensation should be presented before the launching State through diplomatic channels, although other articles in this Treaty contemplate the possibility to follow diverse procedures even before justice court or governmental administrative bodies of the launching State.

In relation to the amount of the compensation, the Treaty is limited to regulate that it should be set according to international law and to the principles of justice and fairness so that the entity that issues the complaint is able to return to the "condition in which it would have been had the damages not been caused".

2.3 Registration Convention

Since its execution, two main objectives have been suggested. On the one hand, to implement a centralized and detailed registry of objects launched into outer space, so that there is a link between the launching State and the space object and so that the UN General Secretary is kept informed.

On the other hand, the Convention intends to provide the State Parties with the means and ad-

ditional procedures to help identify space objects. And, at the same time, to provide the necessary information for the implementation of other Treaties.

This registry has its basis on the 1967 OST, which puts forth that the States are internationally responsible for the national activities carried out in the outer space, and reference is made to the State which has an object launched into outer space enrolled in its registry. That is to say, to make a State responsible for an activity carried out in space, its prior identification is essential.

For the purposes of the Convention, the expression "space object" refers both to the parts that make up a space object and the thruster together with its parts. Therefore, every physical object launched into space, whether it is manned or not, must be enrolled.

What is more, Article IV of the Convention States the information that the State Parties must provide to the General Secretary about each space object: a) Name of launching State or States; b) an appropriate designator of the space object or its registration number; c) date and territory or location of launch; d) basic orbital parameters, including: i) nodal period, ii) inclination, iii) apogee, iv) perigee; e) general function of the space object.

2.4 Radio Frequencies Management

Radio frequencies are limited international nature resource to be used by all countries on equitable basis and they do not respect national borders. In order to avoid possible harmful interference, radio frequencies are heavily regulated both at international and national levels. Therefore, international community has devised an extensive international regulatory system through the International Telecommunication Union (ITU). The ITU regulatory requirements are applicable to big and small satellites.

In the recent years, two international documents are proposed as guidance for developers and operators of small satellites and highlight the need for small satellite projects to stand by existing international regulations and procedures on au-

thorization, registration, radiofrequency management. The first one is the Prague Declaration on Small Satellite Regulation and Communication Systems adopted at the ITU Symposium on Small Satellites held in Prague, Czech Republic, in March 2015[6]. The second, is the Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites developed by the United Nations Office for Outer Space Affairs together with the ITU in 2015[7].

2.5 Space Debris Mitigation and Remediation

Because of substantial advantages of small satellites, there will be an exponential increase in their number and consequently the pieces of debris in orbit. Through several efforts at international levels, some technical standards and guidelines have been adopted to mitigate the generation of space debris. The Inter-Agency Space Debris Coordination Committee (IADC) is an international forum of governmental bodies for the coordination of activities related to the issues of man-made and natural debris in space. A set of mitigation guidelines has been developed by the IADC, reflecting the fundamental mitigation elements of a series of existing practices, standards, codes and handbooks developed by a number of national and international organizations. The Space Debris Mitigation Guidelines of COPUOS are based on the IADC mitigation guidelines (A/62/20, paras. 117 & 118 and Annex, endorsed by the General Assembly in A/RES/62/217).

These guidelines were created to be considered for the mission planning, design, manufacture and operational (launch, mission and disposal) phases of spacecraft and launch vehicle orbital stages:

- Limit debris released during normal operations;
- Minimize potential for break-ups during operational phases;
- Limit the probability of accidental collision in orbit;

- Avoid international destruction and other harmful activities;
- Minimize potential for post-mission break-ups resulting from stored energy;
- Limit the long-term presence of spacecraft and launch vehicle orbital stages in LEO after the end of their mission;
- Limit the long-term interference of spacecraft and launch vehicle orbital stages with GEO region after the end of their mission.
- It is important to note that these guidelines are not legally binding under international law and are to be implemented through national mechanisms.

2 Latin american context

A common denominator in Latin America is its long-term commitment to space law, which is reflected in the ratifications and signatures that the countries of the region made of the international treaties in connection to the regulation of the outer space. According to the United Nations Office for Outer Space Affairs (UNOOSA) "Status of International Agreements relating to activities in outer space" as on 1 January 2016, four States have ratified all the five treaties (Chile, Mexico, Peru and Uruguay), and three have ratified four of them (Argentina, Brazil and Cuba).

At the political integration level, there is the Union of South American Nations (UNASUR), which is an intergovernmental organization targeted to better integrate the South American region. The Union joins two already established customs unions: the Mercado Común del Sur (Mercosur) and the Andean Community of Nations (CAN) [8].

UNASUR seeks to strengthen regional cooperation and integration mechanisms, embracing strategic topics for sustainable development, including energy production, agriculture, health, education, financial resources, biodiversity protection, sustainable development, the use of natural resources and space activities.

An important development that confirms Latin America's space aspirations occurred during the Defense Council of UNASUR in November 2011, where the defense ministers of Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru, Surinam, Venezuela and the deputy-minister of Uruguay agreed on the creation of a South American Space Agency [9]. The objective for this regional agency is to focus efforts in order to place satellites into orbit using a regional launch vehicle so that costs are reduced and technological capabilities increased.

Another important landmark in the region were the Space Conference of the Americas (SCA) events. It is a regional and multilateral forum for the promotion and development of space activities of Latin America and the Caribbean. This forum has been held six times, at which diverse issues were discussed such as space technology, the environment, distance education, health, disaster prevention and mitigation and space law, among others.

3 National space law

Each State adopts its national space laws and regulations that may establish a legal/regulatory framework for how space activities are to be conducted (e.g. liability issues, insurance requirements, licensing, registration). Its nature, scope and timing is essential on the basis of its political and economic priorities.

This means that, initially, not only should international regulations be considered, but also the regulations of the country from which the satellite comes from, those of the country from which it is launched and those of the countries which obtain information sent by the satellite.

Although some Latin American countries have recently adopted certain kind of space law or regulation, most countries do not have effective national laws that could regulate space activities, including the launch and use of small satellites. For that reason, it is important to consider that international law is essentially applicable to States.

The Latin American countries with a higher development of space law are:

Argentina: National Decree No. 995/91 Creation of the National Commission on Space Activities (1991); National Decree No. 125/95 Establishment of the National Registry of Space Objects Launched into Outer Space (1995); National Decree N° 532/05 which establish as a State and National Priority policy the development of space activity and establishes the National Space Plan 2004-2015; Law 27.208 of Development of the Satellite Industry (2015).

Brazil: Law 8.854 Law Establishing the Brazilian Space Agency (1994); Law 9.112 (1995); Decree 1.953 (1996); Administrative Edict n. 27 (2001); Administrative Edit n.5 (2002); Resolution No. 51 (2001); Administrative Edict n. 96 of (2011).

Chile: Supreme Decree No. 338, Establishment of a Presidential Advisory Committee known as Chilean Space Agency, amended by Supreme Decree No. 0144 (2008), being now the Chilean Space Agency presided by the undersecretary of Economy.

Colombia: Decree 2442 on the creation of the Colombian Commission of Space (CCE) (2006).

Venezuela: Law 38.796 on the Establishment of the Bolivarian Agency for Space Activities (2007); Decree number 3.389 (2004); Decree No. 4.114 (2005).

4 Conclusion

Small satellites are space objects like any other, and must be authorized, supervised to comply with international treaties obligations (UN Space Treaties, UNGA Resolutions and ITU Radio Regulations), to the possible extent with established best practices and guidelines (space debris mitigation guidelines), and to national laws if there are any.

Regardless of their size, type and scope of missions, small satellites are considered space objects that are subject to the general regulatory framework that governs outer space activities. It is for that reason important to assess the effectiveness of current regulatory regime governing satellites. Knowing and understanding the space regulations, laws, and treaties will help public and pri-

vate space projects be more successful, avoid endangering the safety of other space missions and will reduce small satellite investment risk.

References

- [1] R. Sandau (ed), International Study on Cost-Effective Earth Observation Missions, Taylor & Francis (2006).
- [2] Cube Sats database by Michael Swartwout, St. Louis University, <https://sites.google.com/a/slu.edu/swartwout/home/cubesat-database>
- [3] *Ibíd.*
- [4] Euroconsult, Executive Report Brochure on Prospects for the Small Satellite Market (2015) Available from: <http://www.euroconsult-ec.com/research/smallsats-2015-brochure.pdf> Access in: 2017, March 5; E. Buchen and D. DePasquale, Nano/Microsatellite Market Assessment, SpaceWorks Enterprises (2014). <http://www.sei.aero/eng/papers/uploads/archive/Space-Works Nano Microsatellite Market Assessment January 2014.pdf>.
- [5] United Nation Treaties Database. Available from: http://disarmament.un.org/treaties/t/outer_space Access in: 2017, March 5.
- [6] Prague Declaration on Small Satellite Regulation and Communication Systems (International Telecommunication Union Symposium and Workshop on Small Satellite Regulation and Communication Systems, Prague, Czech Republic, March 2015) Available from: <http://www.itu.int/en/ITU-R/space/workshops/2015-prague-small-sat/Documents/Prague%20Declaration.pdf> Access in: 2017, March 5.
- [7] International Telecommunication Union and United Nations Office for Outer Space Affairs, Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites (A/AC.105/C.2/2015/CRP.17, 2015).
- [8] UNASUR, South American Union of Nations Constitutive Treaty, 1 April 2009. Available: <http://studentorgs.law.smu.edu/getattachment/International-Law-Review-Association/Resources/LBRA-Archive/15-2/SMB213.pdf.aspx> Access in: 2017, March. 3.
- [9] B. V., Sarli; M. A. C., Zabalaga; A. L., Telgie; J. C., Santos; B. D. R., Mesquita; D. M., Jiménez; A., Roman-Gonzalez; G. V., Cruz; N. I. V., Cuentas; F., Perazzo. South American Space Era. In: 66TH International Astronautical Congress, Jerusalem, Israel. Proceedings... p. 1-16. (2015). Available from: <http://https://iafastro.directory/iac/paper/id/29718/summary>