

Regulating Remote Sensing in National Space Legislation to Increase Legal Certainty on an International Level

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Abstract

Whether it is for environmental purposes, by monitoring the Earth's forests, oceans or the Arctic, or military purposes, such as target selection or troop movements, our modern society has become increasingly dependent on remote sensing activities by satellite; one of the most extensively practised space activities. In addition to these scientific and military uses, a significant commercial remote sensing market has developed predicted to be worth between US\$8 and US\$15 billion by 2026. Moreover, the technological capabilities of remote sensing satellites are ever improving; for example, with the Airbus Spot 6 and Spot 7 satellites that boast a 70 cm resolution or BlackSky's Global satellite that boasts a 1 m resolution.

However, these developments occur against a backdrop of meagre legal regulation of the activity, especially considering how commonplace remote sensing is and the fast-paced technological developments. On an international level, remote sensing activities are primarily addressed through the Remote Sensing Principles under UNGA Resolution 41/65. Yet, the Principles hardly address private entities, the scope is very limited, and the status of the Principles is contentious. In contrast, national space legislation is binding and more apt at keeping up with the developments because it is less complicated to adopt and amend such legislation than to reach consensus within the international community. Nevertheless, few states have actually addressed remote sensing in their national space legislation.

This paper examines whether the best approach towards creating a stronger framework for regulating remote sensing activities, even on an international level, would be a bottom-up approach through national space legislation. First, it will examine the regulation of remote sensing under international law. Thereafter, this paper will discuss the regulation of remote sensing activities in a selected number of national space legislations, namely France, Germany, and the United States. Third, it will discuss, briefly, the bottom-up approach to international law-making. Finally, in light of the aforementioned considerations this paper will argue that more states

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should regulate remote sensing activities in their national space legislation, and that this could contribute to create more certainty about remote sensing activities on an international level but will also signal the challenges that such a bottom-up approach will bring with it.

Keywords: Space, Law, National, Earth Observation, Remote Sensing

Acronyms/Abbreviations

ARRA	Rescue Agreement
COPUOS	Committee on the Peaceful Uses of Outer Space
FASO	French Act on Space Operations
LIAB	Liability Convention
OST	Outer Space Treaty
REG	Registration Convention
US	United States of America
UNGA	United Nations General Assembly
UN	United Nations

1. Introduction

Remote sensing, *i.e.* collecting information about an object from a distance, is one of the most common activities in outer space.¹ In particular, the remote sensing of the Earth, also called Earth Observation, which has created a booming market in the last decades, with the prediction that the market will be worth US\$8 to US\$15 billion by 2026.² This market is predicted to evolve and expand even further, for example through the consolidation of private companies, the rise of Artificial Intelligence, and the commercialisation of Earth Observation systems for institutional needs.³ In addition, the

1 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553.

2 Staff Writers, Earth Observation market worth \$8-15B by 2026, 27 October 2017, http://www.spacedaily.com/reports/Earth_Observation_Data_and_Services_Market_In_2026_8_5_Billion_With_Potential_To_Reach_15_Billion_999.html, (accessed 07.09.18) | PRNewswire, Global Satellite-based Earth Observation Market Prospects 2017-2026 – Data and Services Market to Reach \$8.5 Billion, 20 December 2017, <https://www.prnewswire.com/news-releases/global-satellite-based-earth-observation-market-prospects-2017-2026---data-and-services-market-to-reach-85-billion-300573786.html>, (accessed 07.09.18).

3 J. Foust, Is the Earth-observation industry consolidating, or just evolving?, 14 June 2017, <https://spacenews.com/is-the-earth-observation-industry-consolidating-or-just-evolving/>, (accessed 07.09.18) | V. Komissarov, How will the Earth-observation market evolve with the rise of AI?, 7 February 2018, <https://spacenews.com/op-ed-how-will-the-earth-observation-market-evolve-with-the-rise-of-ai/>, (accessed 07.09.18) | G. Denis, A. Claverie, X. Pasco, J.-P. Darnis, B. de Maupeou, M. Lafaye, E. Morel, Towards disruptions in Earth Observation? New

technology in the field is constantly improving, especially when it comes to the resolution of the images.⁴ Furthermore, Earth Observation is not just a commercial market. Earth Observation data is also used for civilian and scientific use, for example through the observation of wetlands and mangroves, and the monitoring of these areas for international treaties.⁵ Lastly, Earth Observation has, and always has had, a very significant military component.⁶

However, these developments occur against a backdrop of meagre legal regulation of the activity, especially considering how commonplace remote sensing is and its fast-paced technological developments. On an international level, remote sensing activities are primarily addressed through the remote sensing principles under the United Nations General Assembly (UNGA) Resolution 41/65. However, the Principles are not without issues. They hardly address private entities, the scope is very limited, and the legal status of the Principles is contentious. In contrast, national space legislation is legally binding and is more apt at keeping up with the developments because it is less complicated to adopt and amend such legislation than to reach consensus within the international community. Nevertheless, few states have actually addressed remote sensing in their national space legislation.

Earth Observation systems and markets evolution: Possible scenarios and impacts, *Acta Astronautica* 137 (2017) 415-433.

- 4 G. Denis, A. Claverie, X. Pasco, J.-P. Darnis, B. de Maupeou, M. Lafaye, E. Morel, Towards disruptions in Earth Observation? New Earth Observation systems and markets evolution: Possible scenarios and impacts, *Acta Astronautica* 137 (2017) 415-433 | P.B. de Selding, Airbus Sells In-orbit Spot 7 Imaging Satellite to Azerbaijan, 4 December 2014, <https://spacenews.com/42840airbus-sells-in-orbit-spot-7-imaging-satellite-to-azerbaijan/>, (accessed 07.09.18) | C. Henry, BlackSky Global Details Plans for 60 Satellite Earth Observation Constellation, 16 June 2015, <https://www.satellitetoday.com/innovation/2015/06/16/blacksky-global-details-plans-for-60-satellite-earth-observation-constellation/>, (accessed 07.09.18).
- 5 K. Jones, Y. Lanthier, P. van der Voet, E. van Valkengoed, D. Taylor, D. Fernández-Prieto, Monitoring and assessment of wetlands using Earth Observation: The Globwetland Project, *Journal of Environmental Management* 90 (2009) 2154-2169 | C. Giri, E. Ochieng, L. L. Tieszen, Z. Zhu, A. Singh, T. Loveland, J. Maesk, N. Duke, Status and distribution of mangrove forests of the world using earth observation satellite data, *Global Ecology and Biogeography* 20 (2011) 154-159 | H. MacKay, C.M. Finlayson, D. Fernández-Prieto, N. Davidson, D. Pritchard, L.-M. Rebelo, The role of Earth Observation (EO) technologies in supporting implementation of the Ramsar Convention on Wetlands, *Journal of Environmental Management* 90 (2009) 2234-2242.
- 6 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | A. S. Belward, J. O. Skøien, Who launched what, when and why; trends in global land-cover observation capacity from civilian earth observation satellites, *ISPRS Journal of Photogrammetry and Remote Sensing* 103 (2015) 115-128.

This paper examines whether the best approach towards creating a stronger framework for regulating remote sensing activities, even on an international level, would be a bottom-up approach through national space legislation. First, it will examine the regulation of remote sensing under international law. Thereafter, this paper will discuss the regulation of remote sensing activities in a selected number of national space legislations, namely France, Germany, and the United States. Third, it will discuss, briefly, the bottom-up approach to international law-making. Finally, in light of the aforementioned considerations this paper will argue that more states should regulate remote sensing activities in their national space legislation, and that this could contribute to create more certainty about remote sensing activities on an international level but will also signal the challenges that such a bottom-up approach will bring with it.

2. Remote Sensing under International Law

Although the UNGA has adopted principles pertaining to remote sensing of the Earth from outer space, any analysis of an activity in outer space demands an examination of the five United Nations (UN) space treaties.⁷ The five UN space treaties, and especially the widely ratified Outer Space Treaty (OST), Rescue Agreement (ARRA), Liability Convention (LIAB), and Registration Convention (REG),⁸ do not address specific activities. Rather, the provisions contained within these treaties stipulate general principles which are applicable to any activity in outer space. For example, the provisions on responsibility, liability and registration are applicable to all space activities (as long as they adhere to the stipulated criteria); remote sensing, telecommunications, and exploration alike. Therefore, these provisions do not have an immediate effect on the substantive regulation of remote sensing specifically.⁹ However, some provisions do affect the substantive regulation of remote sensing, albeit not in a precise manner.

7 UNGA Res 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, UN Doc A/RES/41/65 (3 December 1986).

8 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 19 December 1966, entered into force 10 October 1967) 610 UNTS 205 | Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched Into Outer Space (adopted 22 April 1968, entered into force 3 December 1968) 672 UNTS 119 | Convention on the International Liability for Damage Caused by Space Objects (adopted 29 March 1972, entered into force 1 September 1972) 961 UNTS 187 | Convention on Registration of Objects Launched into Outer Space (adopted 12 November 1974, entered into force 15 September 1976) 1023 UNTS 15.

9 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), Handbook of Space Law, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553.

First, Article I OST stipulates the essential principle that the exploration and use of outer space shall be free for all. With respect to remote sensing this means that states have the freedom to conduct remote sensing activities, and that states have the freedom to authorise remote sensing activities by their nationals through Article VI OST. Furthermore, Article I OST specifies that the “use of outer space, (...), shall be carried out for the benefit and in the interests of all countries”.¹⁰ Obviously, this provision does not address remote sensing specifically, but it does inform the manner in which the activity will need to be conducted. Namely, that remote sensing activities, like all other space activities,¹¹ should not disadvantage all other countries nor impair their interests. However, military remote sensing, which realistically is not in the interest of all states, is commonplace without any claims that Article I OST has been breached by conducting such activities. Therefore, state practice indicates that the obligation is merely a moral obligation to cooperate. This is affirmed in UNGA Resolution 51/122, which specifies that the so-called “benefit and interests” clause is not a positive obligation.¹² Of course, with respect to the scientific and civilian remote sensing activities, it would be hard to argue that such activities contravene Article I OST. After all, scientific remote sensing serves the international community by expanding human knowledge about our planet, while other types of civilian remote sensing serve society, for example through meteorology or informing farmers about the status of their crops. The same can be said for commercial civilian remote sensing. Although it has a commercial component, it still serves society. In addition, Article I OST provides for the freedom of scientific investigation, which puts emphasis on the principle that scientific remote sensing activities should not be impeded.

Second, Article III OST stipulates the applicability of international law, including the UN Charter, to activities conducted in outer space. Once more, this article does not refer to remote sensing explicitly nor does it contain a hard obligation applicable to remote sensing activities. Nevertheless, remote sensing activities conducted from outer space will have to adhere to international law.

Last, and perhaps the provision with the most explicit obligation, Article XI OST stipulates the need to “inform the Secretary-General of the United

10 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 19 December 1966, entered into force 10 October 1967) 610 UNTS 205.

11 F. von der Dunk, *International Space Law*, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 29-126.

12 UNGA Res 51/122, *Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interests of all States, Taking into Particular Account the Needs of Developing Countries*, UN Doc A/RES/51/122 (13 December 1996).

Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities”.¹³ Unlike the other provisions, Article XI OST is quite clear and straightforward in what it demands from states, namely to inform the rest of the world about their, and their nationals’ (through Article VI OST), space activities. However, the language of the provision weakens the obligation because the provision states that “States Parties (...) agree to inform” instead of using “shall” or “will”.¹⁴ Moreover, the provision stipulates that states agree to inform “to the greatest extent feasible or practicable”, which also tempers the obligation. In light of the aforementioned it is obvious that the UN space treaties do not constitute a comprehensive legal framework for the regulation of remote sensing activities.

UNGA Resolution 41/65 only partially amends this void. Although the Resolution does specifically pertain to remote sensing activities from outer space, it does not apply to an internal UN situation and thus has no legally binding effect.¹⁵ It has been argued that the principles, or at least some of the principles, contained within UNGA Resolution 41/65 constitute customary international law.¹⁶ This notion is supported by state practice since the adoption of Resolution 41/65.¹⁷ However, the customary international law status of these principles has only every been established in scholarly publications. Therefore, it is still contentious whether they actually are custom.

Moreover, even if the principles are custom, they are limited in application, both in scope and substance. The scope of the Remote Sensing Principles is

13 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 19 December 1966, entered into force 10 October 1967) 610 UNTS 205.

14 *Ibid.*

15 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | M. D. Öberg, The Legal Effects of Resolutions of the UN Security Council and General Assembly in the Jurisprudence of the ICJ, *The European Journal of International Law* 16(5) (2006) 879-906.

16 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | B. Cheng, United Nations Resolutions on Outer Space: ‘Instant’ International Customary Law?, in: B. Cheng, *Studies in International Space Law*, Clarendon Press, Oxford, UK, 1997, 126-149 | S. Marchisio, Remote Sensing for Sustainable Development in International Law, in: G. Laffranderie, D. Crowther (Eds.), *Outlook on Space Law over the Next 30 Years*, Kluwer Law International, The Hague / London / Boston, 1997, 335-350.

17 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553.

defined through Principle I, which deals with the relevant definitions. The definition of the term “remote sensing activities” is quite broad as it encompasses not just the operation of remote sensing space systems and collecting of so-called “primary data”, but also the storage, processing, interpreting and disseminating.¹⁸ However, turning to the definition of “remote sensing” itself, the Principles are very restrictive. The Principles solely pertain to remote sensing “for the purpose of improving natural resource management, land use and the protection of the environment”.¹⁹ While it is natural that a resolution negotiated in the UN Committee on the Peaceful Uses of Outer Space (COPUOS) does not regulate the military use of outer space,²⁰ the aforementioned definition reduces the scope of the Principles further than just excluding military remote sensing; excluding, for example, remote sensing for the purpose of weather forecasts, autonomous driving cars, or market analysis.²¹ Furthermore, the Remote Sensing Principles do not specifically regulate remote sensing activities by non-governmental entities. Principle XIV does reiterate the obligation upon states to bear international responsibility for activities conducted by non-governmental entities as stipulated in Article VI OST, but non-governmental entities are not addressed otherwise. Taking into consideration the commercial remote sensing market and the predictions that the market will grow, it is flawed not to address these entities in the resolution. In the end, outer space is an area outside of national jurisdiction; thus, to leave the regulation of activities conducted by private entities to the individual states would contravene the international dimension of outer space. However, the reality is that the resolution does not address private entities sufficiently. Therefore, the international community should turn to the bottom-up approach to properly regulate the remote sensing activities of private entities. In terms of the content of the Principles, they mostly repeat the aforementioned Articles I, III and XI OST. For example, Principles II, IV, and V together repeat Article I OST. Likewise, Principle III repeats Article III OST and a part of Principle IX repeats Article XI OST. Considering that Principles VI, VII, VIII and XIII expand on the concept of international co-operation and Principles IX and XIV repeat Article IV REG and Article XI OST, and Article VI OST respectively, there are few principles in UNGA Resolution 41/65 that actually expand the international regulation of remote sensing

18 UNGA Res 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, UN Doc A/RES/41/65 (3 December 1986).

19 *Ibid.*

20 R. P. Rajagopalan, *Beyond Outer Space Treaty – Time for New Mechanisms?*, A. Lele, 50 Years of the Outer Space Treaty: Tracing the Journey, Pentagon Press, New Delhi, India, 2017, 172-185.

21 GISGeography, 100 Earth Shattering Remote Sensing Applications & Uses, Updated: 17 February 2018, <https://gisgeography.com/100-earth-remote-sensing-applications-uses/>, (accessed 07.09.18).

activities compared to the UN space treaties. The importance of Principle IV cannot be underestimated as it reaffirms the “the principle of freedom of exploration and use of outer space on a basis of equality” and further explicates that remote sensing activities “shall not be conducted in a manner detrimental to the legitimate rights and interests of the sensed state”.²² However, in essence, it is Principle X, Principle XI, and Principle XII that truly expand the regulation of remote sensing activities. Principle X promotes the protection of the Earth’s environment and stipulates the specific obligation that any data gathered through remote sensing which “can be used to avert any phenomenon harmful to the Earth’s natural environment” should be disclosed to states concerned.²³ Likewise, Principle XI promotes the use of remote sensing to protect humankind against natural disasters and contains the obligation that information about (impending) natural disasters should be furnished to states affected by such natural disasters. Finally, Principle XII stipulates the right of the sensed state, *i.e.* the state whose territory got sensed, to have access to remote sensing data about its territory “on a non-discriminatory basis and on reasonable cost terms”.²⁴ Accordingly, the Remote Sensing Principles hardly increase the level of regulation of the activity; the status of the principles is ambiguous, the scope is limited, and the content is meagre.

It is not the purpose of this paper to delve into the principles, their content, or the obligations they prescribe in a comprehensive manner, rather, this overview illustrates that the UN space treaties merely contain general principles, and that UNGA Resolution 41/65 takes a similar approach by mostly repeating the general principles and only expanding the regulation of remote sensing activities slightly. Therefore, with respect to remote sensing activities, the amount of regulation of such activities on an international level is meagre and one could state that there is a void in the regulation of remote sensing activities on an international level.

3. Remote Sensing in National Space Legislation

Turning to the regulation of remote sensing activities under national space legislation, this paper once more does not intend to give a comprehensive or

22 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | UNGA Res 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, UN Doc A/RES/41/65 (3 December 1986).

23 UNGA Res 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, UN Doc A/RES/41/65 (3 December 1986).

24 UNGA Res 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, UN Doc A/RES/41/65 (3 December 1986) | C. Q. Christol, Remote Sensing and International Space Law, *Journal of Space Law* 16 (1988) 21-44.

comparative examination of the various national space legislation that deal with remote sensing. Instead, this section will illustrate that national space legislation regulates remote sensing activities more comprehensively.

The regulation of remote sensing activities in France consists of two components. First, there is the French Act on Space Operations (FASO).²⁵ Similar to the general rationale underlying national space legislation, chapter VII of the Act, which deals with remote sensing activities, is based on the obligation under Article VI OST, namely the obligation on states to authorise space activities conducted by their nationals.²⁶ Chapter VII determines that operators that conduct remote sensing activities that adhere to technical requirements set out in a further Conseil d'Etat decree need to inform the French government about their activities.²⁷ Furthermore, the Act determines that measures can be bestowed upon remote sensing activities that affect the fundamental interests of the nation, including national defence, foreign policy and international commitments of France.²⁸ The second component is the Decree implementing chapter VII FASO.²⁹ Article I of this Decree expands on the technical requirements that necessitate informing the French government, namely when remote sensing data is collected through panchromatic optics, multi-spectral optical sensors, stereoscopic optical sensors, infrared sensors and radar sensors with a high enough resolution and precision that is determined by decree.³⁰ Article 5 of the Decree expands on the measures that can be taken if the remote sensing activity conflicts with the fundamental interests of the French state. These measures can be the suspension, postponement, or prohibition of the activity, or the enforcement of limitations on the remote sensing activity, either by limiting the technical quality of the images or by limiting the geographical area that can be sensed.

25 Loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales, NOR: ESRX0700048L.

26 A. Froehlich, V. Seffinga, Rationale for the Enactment of National Space Legislation, in: A. Froehlich, V. Seffinga, National Space Legislation: A Comparative and Evaluative Analysis, Springer International Publishing, 2018, 5-13.

27 Loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales, NOR: ESRX0700048L | A. Froehlich, V. Seffinga, National Space Legislation, in: A. Froehlich, V. Seffinga, National Space Legislation: A Comparative and Evaluative Analysis, Springer International Publishing, 2018, 15-124.

28 *Ibid.*

29 Décret n° 2009-640 du 9 juin 2009 portant application des dispositions prévues au titre VII de la loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales, NOR: PRMX0830126D.

30 A. Froehlich, V. Seffinga, National Space Legislation, in: A. Froehlich, V. Seffinga, National Space Legislation: A Comparative and Evaluative Analysis, Springer International Publishing, 2018, 15-124 | Décret n° 2009-640 du 9 juin 2009 portant application des dispositions prévues au titre VII de la loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales, NOR: PRMX0830126D.

Likewise, the German regulation of remote sensing activities also consists of two pieces of legislation. The Satellitendatensicherheitsgesetz, or the Act on Satellite Data Security, is the main law.³¹ This Act limits its scope to the regulation of remote sensing activities which collect high resolution data and the distribution thereof.³² Article 2 of the Act defines the relevant definitions, including the definition of “data”, “high quality Earth observation systems”, and “sensor”. The Act differentiates between operating a high-quality Earth observation system (under part 2) and distributing the data acquired by operating such a system (under part 3).³³ Focusing on the regulation of operating an Earth observation system, the operator needs to gain approval from the German government in accordance with Article 3 and adhere to the safety, security and documentation requirements in Articles 4 and 5. Similar to the French Act, Article 9 allows the German government to take measures to ensure the operator keeps to its obligations, by temporarily prohibiting the transmission of data or ordering the operation to be assigned to the appropriate representative. Likewise, the distribution of remote sensing data requires a licence, with similar requirements and obligations stipulated in Articles 12 and 13, and measures to suspend the activity and adapt the distribution of data to state-of-the-art technology in Article 16. The more novel and unique part of the German Act, however, is Article 17, which stipulates that the distribution of sensitive data needs additional approval when the data has the possibility of impeding the national security of Germany, the peaceful coexistence of the peoples, or Germany’s foreign policy.³⁴ The concept of sensitive remote sensing data is expanded upon in the Satellitendatensicherheitsverordnung, which includes a list of ground stations which would make the data automatically sensitive and a list of areas

31 Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von Hochwertigen Erdfernerkundungsdaten (Satellitendatensicherheitsgesetz – SatDSiG) vom 23. November 2007, Bundesgesetzblatt Jahrgang 2007 Teil I Nr. 58, ausgegeben zu Bonn am 28. November 2007.

32 E. Wins-Seemann, Das Satellitendatensicherheitsgesetz aus Industrieller Sicht – Angemessener Rahmen für die Kommerzielle Nutzung von Weltraumgestutzten Fernerkundungssystemen, *Zeitschrift für Luft- und Weltraumrecht* 57 (2008) 55-67.

33 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | E. Wins-Seemann, Das Satellitendatensicherheitsgesetz aus Industrieller Sicht – Angemessener Rahmen für die Kommerzielle Nutzung von Weltraumgestutzten Fernerkundungssystemen, *Zeitschrift für Luft- und Weltraumrecht* 57 (2008) 55-67.

34 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | E. Wins-Seemann, Das Satellitendatensicherheitsgesetz aus Industrieller Sicht – Angemessener Rahmen für die Kommerzielle Nutzung von Weltraumgestutzten Fernerkundungssystemen, *Zeitschrift für Luft- und Weltraumrecht* 57 (2008) 55-67.

which if the data would pertain to that area would make the data automatically sensitive if the resolution of the data is high enough.³⁵ Furthermore, the Verordnung specifies in Article 1 at what resolution remote sensing data has an extraordinarily high amount of information and in Article 2 that data can be considered sensitive from a resolution of 2.5 meters or higher.

Similar to the French and German laws, the US Land Remote Sensing Policy Act of 1992 has as its underlying rationale to protect US national security and its foreign policy, but also “maintaining international leadership in satellite remote sensing and in broadly promoting the beneficial use of remote sensing data”.³⁶ Section 5602 defines a number of terms used in the Act, including the term “land remote sensing” as the collection of data through the use of satellites that “can be processed into imagery of surface features of the Earth”.³⁷ A significant part of the Act deals with the regulation of the Landsat systems specifically (Title I) and the successor land remote sensing system (Title IV).³⁸ For any private remote sensing activities, however, the Act requires a licence under Section 201. This licence will only be granted if the remote sensing activities preserve the national security of the US and the US their international obligations.³⁹ Furthermore, Section 202(2) of the Act requires collected data of the territory of a sensed state to be made available to that state in accordance with Principle XII of UNGA Resolution 41/65. Moreover, Section 501(a) of the Act stipulates that unenhanced data from any US government land remote sensing system is available to all users on a non-discriminatory basis. Private remote sensing activities are further regulated through the Licensing of Private Land Remote Sensing Systems Regulations of 2006.⁴⁰ Under Section 960.1 the purpose of the Regulations is once more to ensure that remote sensing activities do not impede with the national security of the US. Therefore, the licensing regime is extensively

35 Verordnung zum Satellitendatensicherheitsgesetz (Satellitendatensicherheitsverordnung – SatDSiV) vom 26. März 2008, Bundesgesetzblatt Jahrgang 2008 Teil I Nr. 12, ausgegeben zu Bonn am 4. April 2008.

36 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553 | Land Remote Sensing Policy Act of 1992, Pub. L. 102-555, Sec. 2, Oct. 28, 1992, 106 Stat. 4163, 15 U.S.C. Sec. 5601-5641.

37 Land Remote Sensing Policy Act of 1992, Pub. L. 102-555, Sec. 2, Oct. 28, 1992, 106 Stat. 4163, 15 U.S.C. Sec. 5601-5641.

38 J. I. Gabrynowicz, The Perils from Grassroots to Globalization: A Comprehensive Review of US Remote Sensing Law with a Few Thoughts for the Future, *Chicago Journal of International Law* 6 (2005) 45-68

39 Land Remote Sensing Policy Act of 1992, Pub. L. 102-555, Sec. 2, Oct. 28, 1992, 106 Stat. 4163, 15 U.S.C. Sec. 5601-5641.

40 Licensing of Private Land Remote Sensing Systems Regulation of 2006, 71 FR 24481, April 25, 2006, 15 CFR Part 960.

regulated to prevent remote sensing activities to impede with national security.⁴¹ Once more, the UNGA principles are clearly evident with respect to the data policy; both the rights of the sensed state and the non-discriminatory access principle are stipulated in the Regulations.⁴²

In light of the aforementioned it is apparent that the regulation of remote sensing activities in national space legislation is primarily enacted so as to adhere to the obligation under Article VI OST to authorise and continually supervise activities by nationals and to secure the own national security and safety. However, it has also become evident that national space legislation does expand the substantive regulation of remote sensing activities. For example, by including definitions of terms related to remote sensing activities, by putting forward the requirements which an operator should satisfy to be allowed to conduct remote sensing activities, or by stipulating the resolution which is considered precise enough to be regulated. This expansion is partially visible in the French national space legislation, more apparent in the German national space legislation, and even more apparent in the US Act. Few other states have adopted either specific acts dealing with remote sensing activities or comprehensive national space legislation that also regulates remote sensing.⁴³ However, the increasing commercial market and the possibility of smallsats to collect higher quality data should lead to more states to consider regulating remote sensing activities. An increase in national space laws pertaining to remote sensing would then result in a further expansion of the regulation of remote sensing activities and could lead to further common principles arising.

4. Bottom up approach in International Law

The bottom-up approach to national law-making is the process of creating law through judicial decisions from the national courts, rather than the top-down process of creating law through legislation.⁴⁴ These processes can come to a different conclusion to the same question because of differences in political pressure, objectives, and authority.⁴⁵ Although the institutions responsible for the law-making process are different, a comparison can be made between the national process of bottom-up law-making and the international process of bottom-up law-making. Instead of a top-down approach where states create the law through international treaties, the

41 F. Tronchetti, Legal aspects of satellite remote sensing, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA, 2015, 501-553.

42 *Ibid.*

43 *Ibid.*

44 J. J. Rachlinski, Bottom-Up versus Top-Down Lawmaking, *The University of Chicago Law Review* 73 (2006) 933-964.

45 *Ibid.*

bottom-up approach creates international law through practices, national laws, or other national instruments.⁴⁶ Within international law the bottom-up process of law-making is in some ways similar to the development of customary international law.⁴⁷ However, where customary international law requires its two constitutive elements, *opinio iuris* and state practice, the bottom-up approach takes “on-the-ground practices” of a wide variety of actors to distil a common practice.⁴⁸ Furthermore, international law-making through a bottom-up process sets itself apart from the usual general formulations and principles that occur through the formation of customary international law, by having precise and technical regulations.⁴⁹ When this approach is then applied to the regulation of remote sensing activities, the definitions, requirements, and technical specifications detailed in national space legislation can create a common practice leading to international law-making. However, there do need to be certain prerequisites for such a bottom-up approach to be successful. First, the regulation in the separate jurisdictions needs to have some measure of a unified and harmonised approach, otherwise it might lead to fragmentation and divergence, which would create less certainty. This does not mean that the national regulations need to be completely unified, but that their subject matter and general approach should have some similarity. Second, the democratic deficit should be addressed.⁵⁰ When the international law-making is based solely on the national regulations of a few states it will lead to a narrow democratic basis, especially if these few states all have a similar political-economic system. Therefore, all states should be encouraged to adopt remote sensing regulations to broaden the perspectives on the regulation of remote sensing. Finally, to achieve the necessary degree of unification and resolve the democratic deficit, a certain measure of coordination should take place between states. Unlike the discussions and negotiations in COPUOS, the coordination should not be aimed at reaching consensus on the matter but should allow states to exchange ideas and approaches towards issues on remote sensing regulation.

5. Conclusion

In conclusion, the ideal situation would be to regulate remote sensing activities from outer space on an international level because outer space is an area outside of national jurisdiction regulated by the international

46 J. K. Levit, A Bottom-Up Approach to International Lawmaking: The Tale of Three Trade Finance Instruments, *The Yale Journal of International Law* 30 (2005) 126-209.

47 *Ibid.*

48 *Ibid.*

49 *Ibid.*

50 *Ibid.*

community. However, at the moment international space law regulates remote sensing insufficiently. Therefore, regulating remote sensing activities in national space legislation can create standards and practice that can, through a bottom-up approach, lead to international law-making and a better regulation of the activity. This will create more legal certainty about the manner in which remote sensing activities ought to be conducted. However, there are certain pitfalls to avoid, namely the fragmentation of the framework for regulating remote sensing and the creation of a democratic deficit. The activity would benefit from more coordinated national legislation so that a unified approach can arise, similar to how with respect to certain matters national space legislation has created dominant approaches.

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