Sovereign Privacy and the Evolution of Earth Observation Technology

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Abstract

In 1986 the UN General Assembly adopted the Remote Sensing Principles, a set of voluntary guidelines aimed to govern a newly established field of space activities. In the discussions that preceded the adoption of the Principles, States expressed their concerns about the new technology that enabled the continuous observation of the Earth from outer space. The concern that Earth observation would provide unfair advantage to the few States that were able to procure remote sensing satellites, combined with an effort to secure their corresponding national interests, prompted States to agree to conduct remote sensing activities on the basis of "respect for the principle of full and permanent sovereignty of all States over their wealth and resources and with regard to the rights and interests of other States and entities under their jurisdiction".

This paper will examine how the principle of respect to State sovereignty functions in light of the advancements in Earth observation applications, namely the improving resolution of satellite imagery, the capabilities of high-throughput satellites to store and disseminate data, as well as the growing convergence of space technology in non-space applications. In particular, it will examine the extent to which countries can exercise their sovereign right over information regarding territories under their jurisdiction, when this information is gathered by satellites. To this end, it will focus on the concept of sovereignty as it was formulated in the UN Remote Sensing Principles, by comparison to equivalent regimes for monitoring from the air and from the sea. Whereas space law establishes the freedom of exploration and use of outer space, an area outside the sovereignty of any State, air law, law of the sea and other fields of international law limit the freedom of conduct of other States within the territory under a State's jurisdiction without that State's explicit permission.

The paper will also assess the benefits and drawbacks of the rapid development of Earth observation technology and the effects of the regulatory limitations in this

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regard. Ultimately, it will support that the current legal regime should not be interpreted as hindering the evolution of remote sensing, but as encouraging the identification and overcoming of the rising challenges, in order to enhance the benefits from Earth observation technology and its applications.

1. Introduction

This paper delves into the fundamentals of the regulation of remote sensing activities, as seen in the Principles relating to remote sensing of the Earth from outer space.[1] The UN Remote Sensing Principles are based on freedom of exploration and use of outer space enshrined in the Outer Space Treaty,[2] and call for the conduct of remote sensing activities with respect to the sovereignty of all States and people.[3] In particular, the paper assesses whether the concerns regarding the sovereignty of sensed States that were raised during the negotiation of the Principles are still valid in light of the advancements in the field of Earth observation. Specifically, it discusses whether the improving capabilities of remote sensing technology may prevent States from exercising sovereignty over areas under their jurisdiction and assesses the extent to which the freedom of exploration and use of outer space overpowers it. The first part focuses on the negotiating history and content of the relevant UN Remote Sensing Principles, and comments on the concept of State sovereignty as it is treated in their text. The second part introduces the hypothesis of a sovereign right to privacy, meaning the right of States to determine the way in which information regarding areas under their jurisdiction is handled. It also questions whether sovereign privacy can be justified within the scope of current advances in Earth observation technology. The third part deals with the issue of balance between the distinctive provisions of international space law regarding the freedom of exploration and use of outer space and the roots of public international law funded upon the sovereign authority of States.
In the end, the paper aims to determine whether the de facto assumption of the freedoms of outer space is sufficient to challenge fundamental international law principles such as State sovereignty.

2. The UN Remote Sensing Principles

The UN Remote Sensing Principles were adopted in 1986, following a

1 UN General Assembly Resolution 41/65. Principles Relating to Remote Sensing of the Earth from Outer Space, A/RES/41/65 (3 December 1986, hereinafter UN Remote Sensing Principles).
2 Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies, U.N.T.S. 610, 1967 (hereinafter Outer Space Treaty).
3 Principle IV, UN Remote Sensing Principles.

decade-long negotiation period. During the drafting procedure, several views were presented by States parties to the UN Committee on the Peaceful Uses of Outer Space.[4] Their position regarding this new field of space activities was divided into two distinct approaches. On the one hand, countries that possessed remote sensing capabilities opted for a liberal regime that would facilitate their conduct with the least possible restrictions. On the other hand, countries that did not possess such technology expressed concerns regarding the monitoring of their territory by other States. The final text of the Remote Sensing Principles comprises fifteen provisions on matters related to definitions, cooperation among States and access to remote sensing data. This section focuses on the issue of sovereignty, as appears in the Principles, and assesses its relevance vis-à-vis the current developments in Earth observation technology.

2.1. Sovereignty and the Legitimacy of Remote Sensing

At the time of the negotiation of the UN Remote Sensing Principles, Earth observation was in its infancy. Only a handful of countries had developed remote sensing capabilities and the resolution of remote sensing images was very low compared to the current standards. Nevertheless, Earth observation was not only a new technology that required regulation, but a disruptive one as well, given that it allowed the monitoring of any part of the Earth; something that had not been previously feasible to such extent. This prompted some countries to question the legitimacy of remote sensing, arguing that each country should be able to control information regarding the territory under its jurisdiction. This understanding of sovereignty formed the basis for the subsequent debate. The States that possessed remote sensing capabilities claimed that the exploration and use of outer space, as established in the Outer Space Treaty, entitled them to the operation of Earth observation satellites. The States that did not have such technological capacity, as well as the less developed States, considered the collection of information regarding their territory an interference with their internal matters.[5] The debate leading up to the adoption of the UN Remote Sensing Principles was influenced by the contrast between sovereignty and cooperation among States, and the rights of the sensed and the sensing States.[6]

As a way to reconcile the conflicting views, it was suggested that permission should be required by the sensed State prior to the collection of information

4 V. Vereschetin, *Responsibility of states for remote sensing activities, Proceedings of the International Institute of Space Law*, 1985, 247. More on the drafting history of the UN Remote Sensing Principles in E. Galloway, *Present status of remote sensing in the United Nations*, Proceedings of the International Institute of Space Law, 1977, 499-509.

5 B. Cheng, Studies in International Space Law, 2004, 578-580.

6 C.Q. Christol, *Remote sensing and international space law*, *16 Journal of Space Law, 21,* 1988, 23-24.

regarding its territory.[7] It was also proposed that remote sensing data would be divided into those of global scale, with low resolution that did not raise any sovereignty concerns and would be openly accessible, and those of local scale, with higher resolution for which the prior consent of the sensed State was required.[8] In practice though, such a limitation would render Earth observation impractical and exceedingly complicated. In order to overcome this barrier, it was proposed that sensed States would have access to any information regarding their territory. This aimed to balance the lack of consent and offer the sensed States the opportunity to become aware of the information that has been collected.

In the final text of the Remote Sensing Principles, these issues were settled in an arbitrary manner. Similar to Article I of the Outer Space Treaty, Principle II, called for States to carry out their remote sensing activities for the benefit and in the interest of all countries. On this ground, States without remote sensing capabilities and developing States would not be excluded from partaking on the benefits from remote sensing activities. Principle IV makes specific mention to sovereignty, setting it as a basis for remote sensing activities. However, it only partially addresses the aforementioned concerns, by calling for respect to the "*full and permanent sovereignty of all States and peoples over their own wealth and natural resources*", hence not for sovereignty over other type of information regarding a State's territory. The Principle continues by specifying that remote sensing should be carried out with "*due regard to the rights and interests*" of States and entities under their jurisdiction and in a manner that is not detrimental to the legitimate rights and interests of the sensed State. The latter part of Principle IV could serve as concession between the limited scope of sovereignty and the expressed concerns. Further guidance regarding the rights of the sensed States is provided in Principle XII, according to which, primary data, processed data and analyzed information will be made accessible by the sensed State as soon as they are available, on a non-discriminatory basis and on reasonable costs terms. Although this Principle is favorable toward the sensed State, it does not establish open access nor does it facilitate in general the access of the sensed State to data regarding its territory.[9] First, to the extent that no discrimination occurs, the sensing State is not obliged to share such data, as

7 V. Kopal, *Principles relating to remote sensing of the Earth from outer space: A significant outcome of international cooperation in the progressive development of space law*, Proceedings of the International Institute of Space Law, 1987, 325.

8 USSR proposal in STSC, A/AC.105/170 in 1976. More in T. Kosuge, *Remote sensing and international law*, Proceedings of the International Institute of Space Law, 1977, 317.

9 T. Zwaan, W. W. C. de Vries, *Regulating remote sensing of the Earth from outer space, taking into account the present trend of privatisation of this activity*, Proceedings of the International Institute of Space Law, 1987, 414.

would be the case where this data is not disseminated to any other State or data becomes available to every State. This does not support the sovereignty argument projected by some States, since by virtue of this Principle they would not be able to control information about territories under their jurisdiction. Second, as long as the meaning of reasonable cost basis is not described in Principle XII, it is not guaranteed that the sensed State will be able to afford access to data concerning its territory, especially given the rate at which such data is collected.

Overall, the UN Remote Sensing Principles do not adequately address the concerns voiced by countries unsettled about the matter sovereignty. States remain free to perform remote sensing activities without prior consent and to make data available on terms that primarily favor their own interests.[10] However, in order to fulfill the purpose of remote sensing activities, as it is expressed in Principle I, namely to improve the management of natural resources and the use of land and to protect the environment, Principles X and XI respectively call for the States that participate to remote sensing activities and have information capable to avert a phenomenon harmful to the environment or a natural disaster, to share this information with the States concerned.

In the decades that followed the adoption of the UN Remote Sensing Principles, the legitimacy of remote sensing on the grounds of sovereignty has not been contested. The benefits from a technology that was initially seen as threatening to the interests of some States have solidified, although the balance between sovereignty and remote sensing has not been fully settled. The following section examines the relationship between sovereignty and remote sensing in the present setting.

2.2. The Current State of Earth Observation

Earth observation is one of the most dynamic fields of space activities, with continuous growth in terms of technology and applications. The rising number of remote sensing satellites, combined with their high- throughput features, result to the generation of large amounts of data regarding the Earth's landscape and atmosphere, which subsequently give rise to a broad variety of applications. Among the many civil applications, remote sensing is used for environmental and marine monitoring, urban planning, and disaster response. In recent years, thanks to the availability of remote sensing data, commercial remote sensing applications have emerged as well. The main advancements in Earth observation since the adoption of the UN Remote Sensing Principles are the wider distribution of remote sensing data, the privatization of large part of the Earth observation market and the

10 M. Hofmann, *International legal framework of remote sensing in the year 2005: Changed conditions and changed needs*, Proceedings of the International Institute of Space Law, 2005, 499.

improvement of remote sensing resolution. Nowadays, many more States have their own sensing capabilities or are able to access remote sensing data from public and commercial suppliers. This eliminates some of the sovereignty concerns tied to the exclusivity of access to information regarding a State's territory. At the same time, commercial Earth observation companies have a large share of the market, supplying users with remote sensing data under varying pricing policies. Furthermore, the resolution of Earth observation data is constantly increasing, which enables the monitoring of every place around the world at any point thanks to the high revisiting times as a result of the large number of launched satellites and their improved capacity.[11]

Against this background, it is worth reviewing the scope of sovereignty according to the UN Remote Sensing Principles. As far as access to data is concerned, the abundance of primary and analyzed information allows States to gain much better insight into areas within their territory. Although open access is the norm for data from publicly-funded missions, such as Landsat[12] and Copernicus,[13] the Principles do not apply to commercial remote sensing activities, hence the non-discriminatory access on reasonable cost terms does not extend to commercial data supply.[14] This may prevent States from being able to access specific data, especially given that high and very high resolutions are mainly available through commercial satellites. Moreover, the wealth of remote sensing data and their improving quality allow the monitoring of terrestrial landscape, including areas under the jurisdiction of States, in such scale that is not achievable by other means. On the one hand, these advancements bring changes to the legal extensions of remote sensing, as they may revive the sovereignty concerns that countries presented when remote sensing was at its dawn. On the other hand, it is thanks to these advancements that data users, especially States, are able to benefit from remote sensing applications.

3. Can a State Request its Privacy?

Seeing as the current remote sensing technology facilitates the high-grade monitoring of the territory of States, the sovereignty concern expressed

11 C. Q. Christol, *Remote sensing and international law, 5 Annals of Air and Space Law*, *375,* 1980, 380.

12 Land Remote Sensing Policy Act, Public Law 102-555, 102nd Congress, H.R. 6133, 28 October 1992.

13 EU Regulation 377/2014 of 3 April 2014 establishing the Copernicus Programme and repealing EU Regulation no 911/2010, OJ L 122, 24.4.2014, 44–66.

14 K.R. Sridhara Murthi, *Commercial availability of high quality remote sensing imageries: Legal issues, 5 Singapore Journal or International and Comparative Law, 149,* 2001, 153.

during the negotiations for the UN Remote Sensing Principles resurfaces. On the level of States, the right to have control over information regarding areas under their jurisdiction can be construed under the concept of sovereign privacy. This section questions whether this argument can find legal reasoning, by analyzing the essence of sovereignty in international law and by comparing remote sensing from outer space to other fact-gathering technologies.

3.1. State Sovereignty in International Law

Sovereignty, a right attributed to States, refers to their authority to exercise control over their internal matters and are only bound by international obligations to which they have chosen to commit.[15] Internally, sovereignty gives the power to a State to determine the conditions under which individuals and entities, nationals and non-nationals alike, can perform under its jurisdiction.[16] Externally, it grants States independence from the authority and actions of other States.[17] Apart from a matter of international legal order, sovereignty is a social structure as well, since it enables States to coexist and interact peacefully among them.[18]

Sovereignty is a central concept in international law,[19] particularly with regard to drawing boundaries between countries. In air law, sovereignty dictates whether foreign aircraft can enter a State's airspace,[20] whereas in the law of the sea, a State has similar authority over its territorial waters.[21] The following paragraphs attempt to determine whether sovereignty entitles the State to similar power when monitoring takes place in outer space.

3.2. Privacy as Exercise of Sovereign Power

The right to privacy of individuals prevents States from interfering with the personal affairs of their citizens.[22] It also forms the basis for national and regional data protection regulations that dictate the conditions under which

15 P. Daniel, *Sovereignty: An introduction and brief history, 48.2, Journal of International Affairs, 353,* 1995, 357; J. Klabbers, International law, 2013, 69.

16 J. Crawford, *Sovereignty as a legal value* in J. Crawford, M. Koskenniemi (eds.), The Cambridge companion to international law, 2012, 118 and 121; H. J. Morgenthau, Politics among nations: The struggle for power and peace, 1967, 299.

17 Island of Palmas (Netherlands v. USA), Award of 4 April 1928, 11 R.I.A.A., 831, 838

18 C. Weber, *State sovereignty as a social construct* in T. J. Biersteker, C. Weber (eds.), The social construction of state sovereignty, 2011, 1-2.

19 H. Kelsen, *Sovereignty and international law, 48.4 Georgetown Law Review, 627*, 1960, 627; Military and Paramilitary Activities (Nicaragua v. U.S.A.), ICJ reports 1986, 14, 135.

20 L.F. Fiallos Pazmino, The International civil operations of unmanned aircraft systems under air law, 2020, 51; *Supra note* 19 Military and paramilitary activities, 128.

21 M. Shaw, International law, 2003, 493 and 506-507

22 Article 17, International Covenant on Civil and Political Rights, 1976; Article 8, European Convention on Human Rights, 1950.

personal data can be collected and processed. Applied to States, this concept translates to the right of States to maintain information regarding matters under their jurisdiction either undisclosed or within controlled distribution.[23] In the framework of Earth observation, concerns over the privacy of individuals have already been raised, given the interfering character of remote sensing that allows the collection of personal data, such as high-resolution images and location information.[24] Data protection laws include specific conditions regarding the permissibility of collection of personal data and the legitimacy of their uses. As far as sovereign privacy or the privacy of a State is concerned, Christol refers to an international right to privacy as the sovereign right to be left entirely alone.[25] In the context of the UN Remote Sensing Principles, to the extent that there is no requirement prior consent of the State, in order for its territory to be monitored from outer space, an area in which the State cannot exercise any of its sovereign right, the concept of sovereign privacy could be refuted as improper transposition of private law into international matters.[26] In the context of international law though, the right of a State to privacy can also be seen as application of its sovereign powers. This is supported by theories related to group privacy, as well as by the interpretation of territorial sovereignty by reference to information sovereignty.

Group privacy initially appeared as an attribute of individuals in association to each other within a group.[27] It has recently emerged in connection with new technologies that enable large-scale collection of information, which are in turn used to categorise people as parts of a group and identify patterns in groups' behaviour.[28] Group privacy goes beyond the cumulative protection of the privacy of the individuals that comprise the group[29] and aims to protect

23 L. Floridi, *Group privacy: A defence and an interpretation* in L. Taylor, L. Floridi, B. van der Sloot (eds.), Group privacy: New challenges of data technologies, 2017, 94.

24 F. von der Dunk, *Outer space law principles and privacy* in R. Purdy, D. Leung (eds.), Evidence from Earth Observation Satellites, 2013.

25 C.Q. Christol, *1986 Remote Sensing Principles: Emerging or existing Law*, Proceedings of the International Institute of Space Law, 1987, 270-271.

26 D. Zanoni, Disaster management and international space law, 2019, 165-168. Briefly on the matter of a State's right to privacy as a concern raised by remote sensing technology, see: I. Emanuilov, https://www.law.kuleuven.be/citip/blog/from-space-big-data-to-big-space-brother-do-states-have-a-right-to-privacy-part-i/ (all links in this article have been last accessed on 14 January 2021).

27 E.J. Bloustein, Individual and group privacy, 1978, 123.

28 B. Mittelstadt, *From individual to group privacy in big data analytics, 30 Philosophy and Technology, 475*, 2017, 476; A. Mantelero, From group privacy to collective privacy: towards a new dimension of privacy and data protection in the big data era in L. Taylor, L. Floridi, B. van der Sloot (eds.), Group privacy, 2017, 140.

29 L. Taylor, B. van der Sloot, L. Floridi, *Conclusion: What do we know about group privacy?* in L. Taylor, L. Floridi, B. van der Sloot (eds.), Group privacy, 2017, 231.

the group as one entity.[30] This way, the privacy of information within a group and about a group obtains a collective dimension that protects the group as a whole from the use of its information in a manner that could harm its interests.[31] Regardless of whether a State can qualify as a group whose privacy should be maintained, the value of privacy for individuals and groups alike[32] can give rise to an interpretation that is favourable to the legitimate rights of States as collective entities.

Information sovereignty, namely the exclusivity of a State over information regarding certain territory,[33] is different to territorial sovereignty in that, unlike the latter, the former can be shared among several States. In order to resolve potential conflicts among States, information sovereignty should be viewed through the spectrum of international law, particularly the legitimate interests of States and their substantial connection to the subject of the information.[34]

In the framework of sovereign privacy, the benefits from the use of Earth observation can justify the concerns over the monitoring of the territory of States. Nevertheless, these concerns may be founded in the provision of Principle IV of the UN Remote Sensing Principles that prevents remote sensing from being conducted in a matter detrimental to the legitimate rights and interests of the sensed State. Given that information regarding a State's territory is constantly available to any interested party and that it can be used for matters that affect the interests of States,[35] it can be argued that the current status of remote sensing technology may in certain occasions contradict the purpose of Principle IV. For instance, the rejection of the request of Belgium to withhold from Google Maps satellite images picturing nuclear stations in its territory,[36] could be seen as contrary to the exercise of sovereignty over a States wealth and natural resources, according to Principle IV. In a similar vein, releasing satellite images from damages to oil plants in

30 J.J. Suh, M. J. Metzger, S. A. Reid, A. El Abbadi, *Distinguishing group privacy from personal privacy: the effect of group inference technologies on privacy perceptions and behaviors*, Proceedings of the ACM on Human-Computer Interaction, vol. 2, No CSCW, Article 168, November 2018, 168:2.

31 A. Mantelero, *Supra note* 28, 142-144 and 148.

32 P.M. Regan, *Privacy and the common good: revisited*, in B. Roessler, D. Mokrosinska, Social Dimenstions of Privacy, 2015, 50.

33 T. Endicott, *The logic of freedom and power* in S. Besson, J. Tasioulas (eds.), The philosophy of international law, 2010, 245.

34 R. Polcak, D. J. B. Svantesson, Information sovereignty – Data privacy, sovereign powers and the rule of law, 2017, 142.

35 S. Mostert, L. de Witt, *Technical capabilities of remote sensing satellites: The potential for human scale development or abuse*, Proceedings of the International Institute of Space Law, 2014, 617- 619.

36 Google refuses to blur nuclear facilities on Google Maps, The Brussels Times, 8 February 2019, https://www.brusselstimes.com/news/belgium-all-news/science/53603/google-refuses-to-blur-nuclear-facilities-on-google-maps/.

the territory under a State's jurisdiction,[37] albeit for informational purposes, could be interpreted the same way. On the contrary, the use of satellite images against States in a manner that does not contravene with sovereignty as described in Principle IV can help identify and take actions against infringements of international law on behalf of States.[38] Except from seen as violating the right to privacy of a state, these events can also be considered as interference with a State's exercise of sovereignty, since they allow for another State to affect their essential interests, namely how to distribute information about their territory.[39]

Adding to this argument, Earth observation enables fact-gathering in a manner that is not possible by other technologies. Without limitations to the collection of data from public and private entities or conditions regarding the use of and access to this data, the control of a State over information regarding its territory is diminished. Whether a State is entitled to such control on the basis of its sovereignty can be seen by reference to the examples of national airspace and territorial waters, areas where monitoring requires the prior permission of the monitored State.

3.3. Sovereignty and Monitoring by Air and by Sea

In order for a foreign aircraft to enter the territory of a State, the explicit permission of that State should be granted.[40] This condition is an exercise of the sovereignty of States over the airspace above their territory. State sovereignty is the basis of the Chicago Convention, which governs international civil aviation.[41] Photography via aerial means is not only subject to the aforementioned restriction regarding overflight. Most recently, the operation of unmanned aerial vehicles with remote sensing means has also come under scrutiny. It has been pointed out that, similar to remote sensing by satellites, UAVs enable collection of information in a potentially

37 Satellite images of Aramco plants released by the U.S. government and DigitalGlobe, N. Turak, Detailed satellite photos show extent of 'surgical' attack damage to Saudi Aramco oil facilities, CNBC, 17 September 2019, https://www.cnbc.com/2019/09/17/satellite-photos-show-extent-of-damage-to-saudi-aramco-plants.html; B. Hubbard, B. Karasz, S. Reed, *Two Major Saudi Oil* Installations Hit by Drone Strike, and U.S. Blames Iran, The New York Times, 15 September 2019, https://www.nytimes.com/2019/09/14/world/middleeast/saudi-arabia-refineries-drone-attack.html.

38 High-resolution satellite imagery and the conflict in Ogaden, Ethiopia, https://www.aaas.org/resources/high-resolution-satellite-imagery-and-conflict-ogaden-ethiopia.

39 D.J. Gerber, *Beyond balancing: International law restraints on the reach of national laws, 10 Yale Journal of International Law 185*, 1984, 212.

40 S. Hobe, *Sovereignty as a basic concept of international law and a core principle of air law*, in P. Mendes de Leon, N. Buissing (eds.), Behind and beyond the Chicago Convention: The evolution of aerial sovereignty, 2019.

41 Convention on Civil Aviation, 15 U.N.T.S. 295, 1944.

privacy-invasive manner and surveillance on a continuous basis.[42] On national level, U.S. courts rely on the criterion of reasonable expectation of privacy to determine whether an unlawful interference with the private life of a citizen has occurred.[43] On several occasions, it has been decided that monitoring from legally navigable airspace without permission is lawful, since the area beneath it is publicly exposed to the knowledge of the individuals that perform in them[44] and does not constitute search that would require warrant.[45] Although this jurisprudence of national courts does not specifically address sovereignty, it touches upon the privacy implications of a new remote sensing technology that may not be able to withstand the test of the reasonable expectation of privacy. UAV technology eliminates practical privacy safeguards and introduces an unknown level of interference, so that the monitored individuals may not expect that they are found in a non-private space.[46] Compared to satellite technology, it can be supported that it is not the performance of UAVs that raises privacy concerns, but their sensing capabilities, particularly data collection and processing.[47] Therefore, whereas the operation of UAVs as such remains, as the operation of satellites falls under the freedom of exploration and use of outer space, their capabilities raise concerns regarding the extent to which this freedom may conflict with other legitimate rights, such as privacy.

Likewise, States also exercise sovereignty in parts of the sea that are adjacent to their territory and in the airspace above it.[48] On the contrary, the high seas and the airspace above them are areas outside national sovereignty, where passage and monitoring do not require prior permission.[49] That is the main argument justifying the freedom of monitoring from areas outside sovereignty, such as outer space.[50] This argument though fails to acknowledge the difference in monitoring from the air and the sea, compared to the coverage and revisiting time of monitoring from outer space, as well as

42 T.T. Takahashi, *Drones and privacy*, *14 Columbia Science and Technology Law Review, 72,* 2012, 108-110.

43 Katz v. U.S., 389 U.S., 1967, 359.

44 California v. Ciraolo, 476 U.S. 207, 1986, 213-214.

45 Dow Chemical Co. v. U.S., 476 U.S., 227, 1986, 239.

46 B. Jenkins, *Watching the watchmen: drone privacy and the need for oversight, 102.1, Kentucky Law Journal, 161,* 2012, 171.

47 M.E. Stewart, *Privacy* in B. I. Scott, The law of unmanned aircraft systems: An introduction to the current and future regulation under national, regional and international law, 206, 153; R. M. Thompson II, Domestic drones and privacy: a primer, 2015, https://fas.org/sgp/crs/misc/R43965.pdf , 6-11.

48 Article 2, United Nations Convention on the Law of the Sea, 1833 U.N.T.S. 397, 1982.

49 E. Papastavridis, The interception of vessels on the high seas: contemporary challenges to the legal order of the oceans, 2013, 23.

50 D.S. Myers, *United Nations activity on remote sensing: Legal and political implications*, Proceedings of the International Institute of Space Law, 1987, 361.

the fact that remote sensing is carried out almost exclusively for use on the Earth, where sovereignty prevails.[51]

Although these limitations in aviation and law of the sea, unlike the UN Remote Sensing Principles, were not designed with monitoring in mind, they provide an equivalent comparison, given that they govern technologies that have similar characteristics, namely the ability to capture images of areas under State sovereignty and the freedom of conduct in areas outside such sovereignty. Whereas aviation and maritime activities enable monitoring on a much more limited scale compared to space-based monitoring, they can be conducted lawfully only in a restricted manner, according to the conditions based on sovereignty. By contrast, remote sensing activities can be carried out freely, even in a manner that would interfere with internal matters of States, hence contrary to their sovereignty, specifically on the ground of lack of sovereignty in outer space. The few imposed limitations, stemming from sovereignty concerns, are either not effective or not actionable. For instance, national laws that do not permit the collection of Earth observation images of certain territories do not have a practical effect, since users interested in accessing those images can resort to foreign companies. Furthermore, military reconnaissance has not been recognized as an unlawful use of space technology, even though it is prohibited in international law.[52]

Summing up, the freedom to conduct remote sensing activities grants the sensing State complete authority over the collected data, their processing and their distribution, unlike the sensed State that is only able to acquire them under the predefined conditions.

4. Freedom of Exploration versus National Sovereignty

In essence, the question is whether the freedom of exploration and use of outer space, a core principle of international space law, can adequately justify deviance from national sovereignty, a concept upon which international law is built. On the one hand, Article I of the Outer Space Treaty establishes the freedom of exploration and use of outer space, including the freedom to launch and operate remote sensing satellites. On the other hand, a degree of consent on behalf of the sensed State is fundamental for the exercise of its sovereignty.[53]

51 S. Gorove, *Earth resources satellites and international law, 1 Journal of Space Law, 80,* 1973, 81.

52 G. Gal, *Some legal aspects of the uses of reconnaissance satellites*, Proceedings of the International Institute of Space Law, 1963, 4.

53 A.A. Cocca, *Remote sensing of natural resources by means of space technology: A Latin American point of view* in N. M. Matte, H. DeSaussure (eds.), Legal Implications of remote sensing from outer space, 1976, 66-67.

To address this issue, the ubiquitous nature of remote sensing should be juxtaposed against the benefits from the use of Earth observation. Privacy is counterbalanced by the consent of the subject and the purposes for which its data is collected and processed. While it is not feasible to require prior permission for sensing the territory of a State from outer space, raising awareness among States regarding the potential of Earth observation and the uses of data collected by public and private entities can partly satisfy the requirement for consent. Earth observation is a unique source of information that cannot be replicated by other conventional technologies. To the extent that the benefits from its use continue to outweigh the legitimate concerns, remote sensing falls under the freedom of exploration and use of outer space.[54] In the opposite scenario, the sovereign right of States to privacy should be taken into account. The UN Remote Sensing Principles are the result of a compromise between the rights of the sensed and the sensing States.[55] Whereas the balance is shifting in favor of the sensed State with more information and wider access available thanks to the evolution of Earth observation, some of the issues that were raised during the debate over the adoption of the UN Remote Sensing Principles have not yet been resolved.

5. Conclusions

Whether sovereign privacy is seen as direct consequence of the exercise of sovereignty on behalf of a State over the information regarding its territory or as extension of the legitimacy grounds of privacy in private law, in a way that would also protect States as groups or collective entities from having information collected and processed without prior authorization, is a rather theoretical quest. Its practical implications affect the way in which remote sensing activities are currently conducted. Some of the UN Remote Sensing Principles may be considered of customary character to the extent that they reflect other fundamental principles of international space law.[56] The rest, including the provisions regarding respect to national sovereignty, remain non-binding and in any case do not address the activities of private entities, which currently hold the lion's share in the collection and supply of the Earth observation images that raise privacy concerns in the first place. Seen in light of international law though, there are reasonable grounds for questioning the legitimacy of satellite remote sensing as currently developed.

54 C.Q. Christol, *supra note* 11, 390-391.

55 V. Kopal, *supra note* 7, 325.

56 S. Maureen-Williams, *Reflections and suggestions on remote sensing and international law, 50 German Journal of Air and Space Law, 409,* 2001, 409-410 and 418; L. J. Smith, C. Doldirina, *Remote Sensing: A case for moving space data towards the public good, 37 Space Policy, 162,* 2016, 164.

The purpose of this paper was to examine whether the sovereignty concerns that were raised during the negotiations on the UN Remote Sensing Principles reemerge due to the improving remote sensing capabilities. Whereas the advancement of Earth observation should not be limited, its role in today's information society should be acknowledged. The UN Remote Sensing Principles do not adequately settle the matter of sovereignty, but set the basis for an open and cooperative regime. A potential review or new regulatory initiative should exclude the existing reference to sovereignty, in favor of guidelines regarding methods for access to and sharing of remote sensing data. The legitimacy of remote sensing activities remains undisputed. However, overlooking potential legal issues from the wide use of Earth observation technology may lead to future challenges. The example of remote sensing shows that international space law should not be interpreted in a vacuum, but with specific regard to the concepts of international law.