Remote Sensing Data Access Policy, Data Products Regulatory Framework and Intellectual Property Rights

Challenges in an Era of Environmental Protection Urgency

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Abstract

Earth Observation (EO) data products are the result of significant financial investments, resources and time, as well as the outcome of complex activities operated by a plethora of actors that follow different interests. The high "cost factor" of establishing and maintaining a space remote sensing system has led satellite operators to distribute data on a commercial basis, becoming a profitable industry. Private data owners aim to safeguard their profit interests implementing different kinds of "protection" on data products by putting a higher burden of cost on the users. Primary areas of investigation regarding the protection of generated data are data access policies, the articulate terms and conditions as well as restrictions of supply and use of data under which the operator is licensed, and the applicable Intellectual Property (IP) law regime. In the European context of copyright law, a step further is accomplished through the *sui generis* right for database (Database Directive 96/9/EC). The inconsistencies among the different practices of EO data generators concerning access policy and the applicable legal frameworks of IP rights leads to a lack of uniformity, a high level of vagueness and affect the legal interoperability of data. As a result of the fast-moving changes in the EO data supply sector, a comprehensive legal framework is highly requested. This paper will address the priorities which should be undertaken in its delineation. Among those, the rationalization of data access and the choice of open data access for applications beneficial to the society (e.g., climate protection) will be used as guiding principles.

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1. Introduction

Specific mankind's capabilities have been developed to satisfy the human desire of broader knowledge and reach a deep and comprehensive understanding several phenomena occurring on Earth. Albeit only a large minority of states in the world are space-faring nations with the capability to build and launch their satellites, more than thirty nations have remote sensing satellite capabilities.[1] Each advancement on Earth Observation technologies represents an effective means for gathering information useful to support and facilitate environmental protection and to effectively manage disasters. As a matter of fact, remote sensing satellites have experienced a rapid technological development throughout the years, reaching a leading role on mitigating the degradation of the terrestrial environment, tracking the evolution of natural and manmade disasters, assessing the disaster's impact on the regional and global level, as well as generating data exploitable as legal evidence. Therefore, it is suitable for supporting policymakers, governments, researchers, and other relevant potential users in their proposition of implementing more effective solutions and, subsequently, in assessing the results of these applications.[2]

The worldwide fast-moving technological transformation of the field gained over the last decade – new space-based systems, cutting-edge data collection, storage capabilities and so on – have dramatically changed the circumstances surrounding EO data supply and its usage. Besides, the high-cost factor of establishing and maintaining a space remote sensing system has led satellite operators to distribute data on a commercial basis, becoming a more profitable industry. Indeed, the global market for remote sensing is expected to increase from $11.3 billion in 2018 to $18.9 billion in 2023 (CAGR of 10.7%).[3]

In addition, data products are increasingly generated for both governmental and private economic purposes. Since digital data sets are expensive in their generation, but effortlessly subject to copy and propagation, the private data generators are reluctant on investing an abundant amount of money unless there is a certainty for profits.[4] Therefore, private data owners aim to safeguard their profit margin implementing different kinds of "protection" on data products by putting a higher burden of cost on the users. The general purpose of the paper is to present and analyse part of the relevant typology of

1 A. Florini, "The Opening Skies: Third-Party Imaging Satellites and US Security" (1998), 13:2 Int'l Soc. Sec. Rev, at 94-95.

2 A. Ito, *Legal Aspects of Satellite Remote Sensing*, (Leiden, Boston; Martinus Nijhoff Publisher, 2011) at 14 [Ito 2011].

3 BCC Research, "Remote Sensing Technologies and Global Markets (2018), IAS022F.

4 Chen and M. Yang, "Legal protection and data access of remote sensing and GIS database" (2006), Conference: IEEE International Geoscience & Remote Sensing Symposium, IGARSS 2007, July 23-28, 2007, Barcelona, Spain, Proceedings.

protection of generated data: they are an open or restrict data access policy set by the different entities, the articulate terms and condition as well as restrictions of supply and use of data under which the operator is licensed, and the applicable Intellectual Property (IP) law regime.[5]

In this sense, the paper will firstly provide a general understanding of the remote sensing industry and the phenomenon of commercialization of EO activities. Secondly, policies, laws and regulations on the area of data availability and accessibility associated with satellite images and derived products for commercial and non-commercial distribution purposes will be analysed. The paper will focus on the capabilities of IP Rights to protect data and derived products. Attention will be also given to the *sui generis* institute provided by the European legislation as a side typology capable to protect database. Finally, the need for a more adequate and comprehensive legal framework able to address issues such as data access limitations, data accuracy and authenticity, data suppliers' responsibilities will become clearer. Indeed, while international space law has to address new concerns, especially regarding the new space-based systems, an urgent need for the new generation of national policy, regulations and laws are being embraced. It is still unclear which direction the new regulations and policies are taking: is a high level of data protection and access restriction necessary to foster the development of the EO data industry or factors such as the environmental protection urgency will push for other kinds of solutions? This paper will address the priorities which should be undertaken in its delineation.

2. EO Industry Achievements and the Era of Commercialization of Remote Sensing Data

Generally speaking, remote sensing is a process of measurement or acquisition of information about objects or phenomena made through a recording device that is not physically or intimately attached to the considered objects.[6] The sensor is typically on board of the satellite, on an aircraft or a drone, thus being distinguished by measurements taken in place, or *in situ*.[7] Focusing on the process of EO data generation through satellites, the data supply chain involves various entities, namely data generators, image-processing wholesalers, value-added providers, and data distributors.[8] COPUOS has divided the operational flow of remote sensing into several

5 A. Ito, "Improvement to the legal regime for the effective use of satellite remote sensing data for disaster management and protection of the environment" (2008), 34, J. Space L., at 54 [Ito 2008].

6 P.S. Srinivasa, *Remote Sensing Handbook – Three Volume Set* (CRC Press: 2015).

7 NPA Group, Final Report BNSC Sectors Studies Programme Applications of Earth Observation to Legal Sector, BNSC, London, 2001, at 25 [*Final Report BNSC*].

8 Ito 2011, *supra* note 2, at 13.

phases: data acquisition, data reception, data pre-processing, data storage, data analysis and information utilization.[9] During the processing stage, raw data are made available to the operators at the ground station where can be ready for distribution, archived, or further processed, being subject to correction, classification and interpretation in accordance with the users and use which data is applicable.[10] The interpretation of processed data and integration with other non-EO sources converts EO data into analysed information. Concerning the last phase of the data supply chain (data analysis and information utilization), as a widespread practice particularly amongst private entities, data owners usually use agreements (license) instead of regular contracts of sale, licensing distributors to sell data in the different regions, mostly leaning towards the establishment of networks of distributors.

In addition, from the EO data user's perspective, the main obstacles for an effective access and share of the data are restrictive policies, the time and resources required to search for existing data, the eventual risk of damage arising from incorrect or incomplete data, and the lack of rationalization of the data use.[11] EO data have a diversified range of applications. Those include but are not limited to Earth Science disciplines (e.g., geography, oceanography, geology), military intelligence usage (surveillance and reconnaissance), commercial and humanitarian applications. Among the others, the remote sensing technique has been depleted for the production of EO data in the areas of disaster management, environmental protection, verification of claim as well as a tool for mapmaking, urban planning and so on.

A worldwide rapid increase in the production of remote sensing data was experienced in the last decade: it was pushed by advances in technology and market development as well as paradigm shifts on the policy-maker level. In an ongoing process of commercialization of space activities, from the late 1990s remote sensing actors have changed from being only governmental agencies of spacefaring nations (for instance, US with Landsat) to a wider community of states, private entities (for instance, the European Space Imaging, American Digital Globe and OrbImage) and public-private partnerships (for instance, Canadian RADARSAT-2 or German TerraSAR-X). Even non-spacefaring nations became owners of remote sensing data manufactured by foreign commercial entities (e.g., SatReci for development

9 Report of the Scientific and Technical Sub-Committee on the Work of its Thirteenth Session (UN Doc. A/AC/.105/170, 12 April 1976), at 8.

10 Raber, G. et al, "Remote Sensing Data Acquisition and Initial Processing" (2005) XIV Earth Observation Magazine, at 5.

11 C. Doldirina, "The Case of Opening Up Access to and Use of Earth Observation Data Through the Global Earth Observation System of Systems" (2015), 6, JIPITEC, at 74 [Doldirina].

of X-Sat for Singapore). EO data from both the governmental space systems and private companies are widely disseminated on a commercial and non-commercial basis, distinguishing themselves for the diversified nature of EO data purpose. Furthermore, since EO systems are considered a dual-use technology, being allowed to serve both military reconnaissance and civilian remote sensing, further concerns complicate the analyses of the phenomenon under a legal perspective.[12]

EO data products are the outcome of complex activity operated by a plethora of actors that follow different interests. Additionally, they are the result of significant financial investments, resources and time. On one hand, competitivity between remote sensing systems was incentivised by the goal of private data generators to return investments. On the other hand, data provisions via single satellite have been frequently replaced by data provisions via integrated system throughout international collaboration efforts. The result is a coordination of services based on satellites' constellation or independent-operating satellites. In accordance with the rise of private actors and commercial remote sensing satellites, countries such as the US, Canada, Germany, and France have established specific policies, legislation and regulations devoted to remote sensing addressing practical matters such as data policies as well as measures of protection to maintain the competitiveness of domestic actors. Meanwhile, the U.S. has opted for an "open access policy" with free or marginal costs pricing (cost of fulfilling users request) – 1992 Land Remote Sensing Policy Act;[13] the non-US approach favours access policies with the distribution of data to the end-users on a commercial basis (except for those categorized as "public" and, thus, provided at marginal cost or free of charge).[14]

Intending to incentivize this new process of commercialization commenced by the US through the 1984 US Land Remote Sensing Commercialization Act,[15] in 1986, the discussion in the UNCOPUOS forum have led up in 1986 to the negotiation of the resulting UN General Assembly Resolution, named "*Principles Relating to Remote Sensing of the Earth from Outer Space*" [UN Remote Sensing Principles]. It is a non-binding document, recommendatory in nature to UN members, and it set forth a general framework for data collection, data availability, and state responsibilities in conducting EO

12 R.A. Williamson, *Dual-Purpose Space Technologies: Opportunities and Challenges for U.S. Policymaking*. (Washington, D.C, Space Policy Institute, George Washington University, 2001).

13 The U.S., *Land Remote Sensing Policy Act*, Pub. L. No. 102-555, 106 Stat. 4163, 15 U.S.C. § 5601, § 5615 (28 October 1992) [*Land Remote Sensing Policy Act*]. It has been amended and codified as *Land Remote Sensing Policy*; 51 USC 60101.

14 Ito 2008, *supra* note 5, at 53.

15 The U.S., *Land Remote-Sensing Commercialization Act*, Pub L. No. 98-365, 98 Stat. 451(1984).

activities (Principle I.e). In details, the embedded rules reiterate general concepts of international law confirming features of legitimacy in the collection of data from space already incorporated in the 1968 Outer Space Treaty[16] and formalize existing customary practices concerning data access and availability internationally applicable.[17] In its negotiation, the codification of the interests of the spacefaring nations – in particular, the US proposals – in safeguarding their right to freely gather information from space was amply embraced. The US managed to codify the freedom to carry out remote sensing by satellite and the unregulated dissemination of data were consistent with the Open Skies Policy and OST.

A precise, but not binding identification of data in three different categories is provided by the UN Remote Sensing Principles. The identification is based on the degree of processing applied to them and it comprises "primary data" (raw data – Principle I (b) of the UN Remote Sensing Principles), "processed data" (enhanced data) and "analysed information" (value-added product).[18]

At the national level, the differentiation among EO data and its nature is framed by some established regulations devoted to remote sensing. Similar to the UN Remote Sensing Principle, in the Land Remote Sensing Policy Act (1992) – now, 51 U.S.C. 60101 – data and information can be distinguished due to the applied process. It defines raw data as "land remote sensing signals or imagery products that are unprocessed or subject only to data pre-processing". Canadian Remote Sensing Space Systems Act (2005)[19] categorizes data in "raw data" and "remote sensing product" based on the underpinning process. While European Space Agency Earth Observation Data Policy (2010)[20] frequently refers to the UN Remote Sensing Principles, the classification of data switches to the availability or accessibility criteria, which produces a distinction between free datasets (largely available online) and restrained datasets (which include sets not available online). German

16 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 610 U.N.S.T. 205 (entered into force Oct. 10, 1967) [Hereinafter OST]. In particular, Principles II and III reiterate the provisions of the OST.

17 H.L. van Traa-Engelman, *Commercial Utilization of Outer Space,* (Utrecht, S.I Publisher,1989), at 21.

18 While under Principle I (c) of the UN Remote Sensing Principles, processed data are "the products resulting from the processing of the primary data, needed to make such data usable"; under Principle I (d) of the UN Remote Sensing Principles, analyzed data are "the information resulting from the interpretation of processed data, inputs of data and knowledge from other source."

19 Canada, *Remote Sensing Space Systems Act*, SC 2005, c. 45, 25 November 2005, §2 "Definitions".

20 *ESA Data Policy*, 2010, online: https://earth.esa.int/documents/10174/296006/Revised_Simplified_EO_Data_policy_03102012.pdf/7df6dcc0-fe19-428c-bbf3-4335dee70fe4?version=1.0.

Satellite Data Security Law[21] defines EO data as "signals of satellite sensors and all products derived from them", excluding any relevance of a division based on the level of processing (raw and processed data or information) and the mode of their storage or presentation.

As a fair criticism, the present-day international law regime on satellite remote sensing is not completely effective and, on the contrary, it is presented as rather ambiguous and inadequate, failing to address critical areas such guidelines for accuracy validation and data authentication, liability matters as well as IP rights. Indeed, the UN Remote Sensing Principles are silent on the IP data generators rights creating blurredness about the applicability of copyright law to different types of products.[22] The topic has to be further developed through an analysis of the regulatory frameworks of access to government-held or produced data and information, as well as the copyright protection regime in different jurisdictions.[23] As the conclusion will show, the regulatory shortcoming is represented by the provision concerning data availability, accessibility and pricing which are not sufficiently addressed as well as matters such as, distribution, and use of data allow for a flexible margin of interpretation.

3. Data Access Policy Associated with Satellite Images and Derived Products

The adequacy and appropriateness of the data policy applicable to a remote sensing system and, in particular, the delimitation of data access and data sharing beyond a single programme is a significant and challenging choice. It addresses the overall framework related to public benefit, commercial distribution, and IP rights leading to similar fundamental principles: allowing access to sensed imagery remotely for scientific, social, and economic benefit, and restrain access to protect national security.[24] Features concerning terms and conditions of data supply and use for users' community (e.g., availability, accessibility, pricing and accuracy) are also established through data policies.

As mentioned above, the UN Remote Sensing Principles establish features of legitimacy in the collection of data deriving from portions of space already incorporated in the OST, as well as practical rules concerning data access and

21 Germany, *Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Quality Earth Remote Sensing Data*, Satellite Data Security BGBl. I S. 2590 [2007], §2[*SatDSiG*].

22 Ito 2011, *supra* note 2, at 53.

23 R. Purdy and D. Leung, *Evidence from Earth Observation Satellites* (Leiden, Boston: Martinus Nijhoff Publisher, 2013), at 293 [*Purdy*].

24 S. Khorram et al., *Principles of Applied Remote Sensing* (New York: Spinger, 2016), at 267 [Khorram].

availability that are internationally applicable. But aside from this soft-law instrument, remote sensing policy is set up by different data generators, lacking a unified and comprehensive set of norms on the area. Some of the issues that arise from this problematic situation are coherence, validation and authentication.

On one hand, the policies of commercial EO satellite operators and data processing companies (data owner) may provide for limitations in the data collection and/or data dissemination and require the purchase of data from the space technology company or a commercial reseller for commercial purpose.[25] EO data policy with orientation on restricted access comprises pricing policy such as marginal cost price for all user, the market-driven price for users, full cost price, two-tier pricing, information content pricing, access key pricing. An instance is Airbus Defence & Space, which distinguishes between sensors and products.[26] On the other hand, data owners can opt for open data policy where data are shared freely among researchers, resource managers and even commercial companies that can furtherly process them and sell as value-added products (according to the licensing terms and conditions). Examples of the latter are the world-wide freely available Landsat 7[27] data and imagery, as well as the European instance provided by Copernicus. In both cases, governments controlling EO activities forced commercial remote sensing satellite system to protect national security by denying or restricting access to sensitive information and to guarantee that the government on the matter has a priority access to the system's capabilities during times of crisis.[28]

Focusing on the European examples, under a clear understanding of the constant growth of the space industry and the importance of investment in this cutting-edge area, EU has committed itself in different programmes, among which the EO programme, named Copernicus. The Programme has two main goals: to provide European policy-decision-makers with critical geo-information; and to promote growth and competitiveness in the EU.[29] Following the path of the US example provided by US Landsat data policy,

25 Purdy, *supra* note 23, at 12.

26 *Intelligence Airbusds*, online: http://www.geo-airbusds.com/en/886-legal-documents-and-supply-conditions. See also Doldirina, *supra* note 11.

27 See R. Harris, "Legal approaches: contractual and regulatory; the European commission directive, proceedings of the international conference; satellite remote sensing in aid of development: legal considerations" (26–27 September 2002), Tunis, ECSL.

28 D. Clarke, "Access Control of Remote Sensing Satellites" in *Commercial Satellite Imagery and United Nations Peacekeeping*, (London: Ashgate Publisher, 2003), at 173.

29 See G. Aloisio, Privacy and Data Protection Issues of the European Union Copernicus Border Surveillance Service (Ph.D. Thesis, Universitè du Luxemburg).

the Copernicus Data Policy established by the Copernicus Regulation,[30] as defined in more detail in the Copernicus Delegated Regulation,[31] opts for a full, free and open (FFO) data policy. The FFO provides for a free access for the vast majority of its data, thus contributing to the "development of new innovative applications and service".[32] It is a strategy that permits the support of national, regional and international effort on facing nowadays challenges and boosts the development of new, value-added applications and services (known as the "downstream" sector). As a clarification, the key elements of the data policy, settled in Article 23 and following, are "that there are no restrictions on the use (commercial and non-commercial) nor on users (European and non-European); and a free of charge version of any data set is always available on the Copernicus dissemination platform".[33] However, the access to data is restricted, under Articles 13 and 14, in those situations where an acceptable degree of risk to the security interests is recognizable (e.g. border surveillance) and, under Article 3, if it is subject to the general policy approach to restrictions as laid down in Articles 11 to 16. It can also be limited in the presence of a conflict between the full access to the data and a right such as IP rights, international agreements, or any of the rights recognized in the Charter of Fundamental Rights of the EU,[34] such as the right for private life or the protection of personal data. Moreover, the U.S., French and German companies have been active actors on the commercial market for optical imagery for a long time (e.g., the German TerraSAR-X satellite system).[35]

4. Intellectual Property Rights in EO Data and the European Sui Generis Right as a Parallel Typology of Database Protection

Data generators have interests in protecting their products since they are the result of meaningful economic cost and technical research and achievements.

30 EC, Commission, *Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010*, [2014] OJ L 122/44.

31 EC, *Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information*, [2013] OJ, L 309/1.

32 EC, *Copernicus – Europe's eye on Earth*, 2015, at 3.

33 R. Harris and I. Baumann, "Open data policies and satellite Earth observation" (2015), 32, *Space Policy*, at 47.

34 EU, *Charter of Fundamental Rights of the European Union*, [2000], OJ C 364/1.

35 See the Germany's Satellite Data Security Act and related law – See SatDSiG, *supra* note 21.

With the purpose to have an adequate profit margin and to partially recover the expenses of the remote sensing activity, data generators claim the right of copyright to remain the owner of the data. While access and pricing policies can be exercised largely at the discretion of data generators on a contractual basis, the safeguard of EO data and information through copyright rights depends on whether the IP legal regime is applicable to a specific data generator of a particular country permits or not.[36] Indeed, until the adoption of the Agreement on the Trade-Related Aspects of IP rights (1994),[37] and partially even today, IP is a field that can lead to different outcomes according to each single country's choice limiting the margin of discretion of the access policies exercisable from the entities in a contractual basis and leading to a broad lack of uniformity.

Furthermore, a critical question to address is whether or not the different type of EO data and derived products include content that has been modified to the extent that retains the original pattern and, as such, may be subject to protection under IP laws, and in particular copyright. It is arguable that features such as time, labour and investment experienced in the process of data collection of satellite images cannot be enough to recognize the requested degree of human creativity and, consequently, copyright protection. The similarity with the usual application of copyright appears clear in relation to the involvement of the subjective choice of the author in the intellectual input.[38] In fact, the condition for protection is the originality of the work that somebody has created, and it arises immediately by creation and without registration formalities. While civil law strictly links copyright with a meaning of creativity of the author, in common law the concept of originality is marginal.[39] In addition, under Art 3.2 of Berne Convention[40] and EU's copyright law, only a natural person (human being) can own copyrights and then, transfer them to a legal identity by choice, whereas in the US also the legal identity can.

36 In this sense, a paradigmatic change has been provided by the Agreement on Trade-Related Aspects of IP rights (1994); this was also possible through the WIPO Copyright (1996), the WIPO Performances and Phonograms Treaty (1996), and the Patent Law Treaty (2000).

37 *Agreement on Trade-Related Aspects of Intellectual Property Rights*, 15 April 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M 1997 [*TRIPS*].

38 See E. Back Impallomeni, "Legal protection through agreements, contracts of scientific information and data, proceedings of the international conference: satellite remote sensing in aid development: legal considerations", (26-27 September 2002), Tunis, ECSL, at 58.

39 *Feist Publications Inc v. Rural Telephone Service,* 499 US 340 (1991).

40 *Berne Convention for the Protection of Literary and Artistic Works of 1886*, 9 September 1886, UNTS 11850 vol. 828 [*Berne Convention*].

Analysing the data generation process, data received by the ground station in the data reception phase are already considered a certified product. Enhancement and value-adding (e.g., the creation of maps) are eventually produced in the pre-processing phase. Then, following the data analysis phase, data are converted in analysed and value-added products. On one hand, primary data (or raw data) are mere representations of facts without or with minimum human contributions and, thus, are hardly the object of protection under a copyright regime, especially reasoned by a lack of the "originality" element. On the other hand, derivate data (or enhanced data) are the result of a manual/human activity (e.g., colour assignment), especially if generated after a data handling operation (standardization, classification, visualization, correction of data and so on), more frequently covered under the IPRs regime. Additionally, derived products (analysed information and value-added products) are considered protective data under Article 2 of the Berne Convention being subject to intellectual activity and original actions to satisfy the exigence of the end-users. In other words, a certain degree of intellectual contribution and level of creativity could justify copyright protection. Further queries have been raised on the issue of joint authorship of two types of value-added products (e.g., map made of data collected from more than one satellite).

The majority of the data policies embeds the practice for which the transformation of data into products through processing and analysis permits their recognition as IP of its owner and, thus, being subject to copyright law. Data generators (either government agencies or private entities) explicitly claim copyright over their products in their distribution contracts/licensing agreements, irrespective of the type of data or derived products. In the case where the owner and the supplier are different entities, the copyright holders of data are normally the owner of the satellite, instead of the data supplier.[41] Others do not claim copyright for the resulting products if they are modified to the extent that the original image is no longer identifiable.

For a long time, ESA and EU member states had a lack of comprehensive policy and legislation governing remote sensing data and, consequently, European satellite operators protected data through licensing and copyright laws[42] which is implemented depending on national law.[43] The EU's regulatory framework for copyright is largely but not completely unified. It was implemented through a set of directives, which the member states need

41 E.g., CNES holds the copyright for Spot Sat from Spot 1 to Spot 5 even if Spot Image distributes it.

42 Khorram, *supra* note 24, at 270.

43 For instance, the "Portability Regulation" (2017). Three additional instruments are Directive 87/54/EC, Council Decision 94/824/EC and Council Decision 96/644/EC. Moreover, it is also relevant the E-commerce Directive and the Conditional Access Directive.

to enact into their national law, regulations and additional tools. More recently, the *sui generis* right of protection for database (Database Directive 96/9/EC – ECDD)[44] has been recognized as the more suitable basis for the protection of economic rights for satellite images in the remote sensing area. It was adopted by the EU with ESA's full participation and was subsequently incorporated into domestic laws by the EU Member States.[45] The main purpose is to safeguard the database creation process and their correlated "investment of considerable human, technical and financial resources" (Preamble, para 7), differentiating from the domestic copyright laws which exclude the protection of effort and labour.[46] It has given a hint on the level of retribution permissible covering two levels of protection: Article 3(1) protects copyrights database results of author's intellectual creation in term of selection and arrangement of contents; and Article 7(4) states a right which applies "irrespective of the eligibility of that database for protection by copyright or by other rights" embedding a *sui generis* rights outside the scope of the traditional doctrine on copyrights that protect database contents.[47] Therefore, a creative database can enjoy protection in term of both copyright and *sui generis* right. Under Article 1(2), the database right applies to "a collection of independent works, data or other materials arranged in a systematic or methodical way and individually accessible by electronic or other means." Thus, it can apply to all types of satellite products (raw data, processed data and analyses information): requirement for its qualification under Article 7(1) is the evidence of a substantive – qualitative or quantitative – investment (money and time) by the maker of a database in obtaining, verifying or representing the contents. It lasts fifteen years from the "completion" of the database (Article 10). A concern relates to non-universal applicability of *sui generis* rights since the ECDD is applicable only in the European Community and some few other jurisdictions.[48]

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44 EC, *Council Directive 96/9/EC of European Parliament and of Council of March 1996on the legal protection of databases*, [1996] OJ L77/20 [*ECDD*].

45 M. Mejia-Kaiser, "Satellite Remore Sensing Data in Database Copyright or *sui generis* protection in Europe?" (1997), XXII-I, Ann Air & Space L, at 496.

46 J.P. Penadès & L. M. Velencoso, *European Perspective on the Common European Sales Law* (Springer, 2014), at 213.

47 L. Dufresne, "Protection of space data products under the European Directive on the legal protection of database, proceedings of the international conference: satellite remote sensing in aid of development: legal consideration" (26–27 September 2002), Tunis, ECSL, at 43.

48 Alongside copyright laws, the data generation, distribution and use in the European context is impacted by regulations governing access to data and information produced by governments or by private entities on their behalf (public sector information, PSI regulations) and by the EU INSPIRE Regulation. See C. Doldirina, "INSPIRE: a real step forward in building an interoperable and unified spatial information infrastructure for Europe?" (2009), ESPI Perspectives, 20.

5. Conclusion

The analysis has demonstrated the gap between the grade of protection data generators demand and the one available under the present law. EO data are generated and stored using different standards, procedures or formats, varying legal conditions and restrictions of access to and use of data. The inconsistencies among the different practice of EO data generators concerning access policy, the conditions of licensing for its access and use, and the applicable legal frameworks of IP rights create uncertainties and confusion and affect the legal interoperability of data. As a result of the rapid increase in production of remote sensing data and the technological transformation of the field, backed by an ongoing process of commercialization of space activities, a precise and comprehensive relevant legal framework for remote sensing able to deal with the fast-moving field is highly requested, especially for promoting data use and data share, and generate greater confidence in the use of EO data for critical applications. It is critical to establish the direction the new regulations and policies are taking to ensure easier data access and data integrity.[49] Likely, there is high room for rationalization of data access and use but regimentation is needed.

Furthermore, EO data are employed for many purposes, applications and activities that are beneficial to the society such as climate change research or emergency response activities: they provide coordinated and comprehensive information for making informed decisions. Its access is indispensable for their success and, consequently, the application to the concept of open data access to them is fundamental. For instance, considering the right of the public to access environmental information that is increasingly recognized, the Earth's environment monitoring and the elaboration of coordinated safeguarding plans finds an obstacle on the limitations concerning data availability and accessibility, and the restrictive conditions on data use. Instead, a full and open exchange of data as a default access policy among the governments would result in a significant increase of data usability and data sharing for remote sensing applications. In this sense, it is important to mention the European Directive 2003/4/EC[50] that forces public authorities to make environmental information systematically available for dissemination to the public, at a reasonable cost in all circumstances.[51]

To conclude, EO data represent a growing and valuable resource for many scientific, research and practical applications carried out by users around the world, but it is not possible to fully unlock its potential if not placing the

49 Doldirina, *supra* note 11, at 74.

50 EC, *Council Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information, repealing EC, Council Directive 90/313/EEC,* [2003] OJ, L 158.

51 R. Harris; "Remote Sensing Policy" in *The SAGE Handbook of Remote Sensing* (New York: SAGE Publications Ltd, 2009) at 18-29.

datasets in the public domain and creating a more user-friendly environment. It is a path in favour of accessibility, availability and, consequently, development and innovation, in a context where public authorities and research centres have generally low willingness-to-pay due to budget pressure. Functional tactics for making EO data publicly available for use without restrictions are both in public law and private law. In relation to the latter, contracts, waivers and licenses.[52] The former favours statutory, regulatory, and policy instrument. Surely, enhanced access to and use of EO data can be guaranteed through rationalized national policies and regulations following the international tendencies and practices of open data access policy. It is only by maximizing satellite remote sensing usage that a higher grade of public benefits can be reached; thus, contributing to meeting the challenging tasks of protecting the environment for the advantage of humanity.

52 Doldirina, *supra* note 11, at 80.