Legal Rights and Possibilities to Access Satellite Data for a Non-Member State of Space Community: Case of Republic of Serbia

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Abstract

In today's technologically dependent society an average person interacts 36x per day with satellite through diverse applications (e.g. to note just one example - 3/4 of the data used in weather prediction models depend on satellite data). Because of this wide use of satellites, nowadays 80+ countries currently operate at least one satellite in space (latest countries to reach space were Ghana, Mongolia, Bangladesh and Angola). Especially for states that are less economically and technologically developed, space systems are particularly useful and necessary in order to achieve "frog leaping" and decrease the economic and social inequalities between developing and developed states. Involvement in space activities gives them the opportunity to utilize state of the art technology and solve local issues (e.g. environmental, e-health, e-medicine, transportation). Taking a closer look at the satellite data and imagery, it can be observed that the users are mainly public sector clients, such as military institutions for security uses as well as environmental and agricultural authorities. Hence, in the first line it is important to examine which legal framework is governing the access to satellite data and if public sector clients from the developing countries have the same guaranteed rights under international law as the developed nations. This paper will offer in its first part an overview of existing international norms regulating access to satellite data, focusing on relevant provisions in the corpus *iuris spatialis*. In the second

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part it will compare these legal rights with the praxis, i.e. determining what are actual possibilities to exercise these rights, if a state is not involved in space activities and has never been a member of space community like in the case of Republic of Serbia. In the third and final part, the paper will zoom in on the EU flagship programs - Copernicus and Galileo - and ESA's data access policies in regards to states that are neither EU nor ESA member states, but are striving for full European integration, as Serbia.

Keywords: satellite data, digital divide, space law, EU, Copernicus, Republic of Serbia.

1. Introduction

In today's technologically dependent society an average person interacts 36x per day with satellite through diverse applications. Even more so, space systems are indispensable instruments nowadays to achieve development goals. Developing on Millennium development Goals, on 1st of January 2017 2030 Agenda for Sustainable Development came into force.[1] The 2030 Agenda has set out 17 sustainable development goals (SDGs) and 169 targets to achieve over the course of next 15 years.[2] Satellite systems, which application allows monitoring of critical issues such as food and water security and disaster management, and which application can directly combat challenges such as hunger through precision farming, directly contribute to achieving 13 out of 17 SDGs.[3] These systems collect valuable data regarding soil, wasteland, groundwater levels, droughts and ocean activities, and as mentioned, in areas like agricultural they make it possible for farmers to make better estimations due to satellite imaging regarding the pricing and for government to determine buffer stocks for the upcoming season.[4] Finally satellite monitoring and collection of data enhance governments' ability to take sound environmental policies, a principle that is called "digitally empowered decision making for development".[5] Governments are able to make better assessments how to increase their productivity and at the same time minimise their output. However, even though satellite systems its

1 UN Resolution A/RES/70/1, 2030 Agenda for Suistainable Development, 1st of January 2017.

2 See further 2030 Agenda: SDGs, http://www.atlanticinteractions.org/wp-content/uploads/2018/05/1-6_Jorge_Del_Rio_Vera_UNOOSA_Cape_Verde.pdf, last accessed 14.12.2018.

3 Space Supporting the Sustainable Development Goals, 3rd High Level Industry-Science-Governmnet Dialogue on Atlantic Interaction, http://www.atlanticinteractions.org/wp-content/uploads/2018/05/1-6_Jorge_Del_Rio_Vera_UNOOSA_Cape_Verde.pdf, last accessed 14.12.2018.

4 Gopalakrishnan Narayanan, representative from the Indian Space Research Organisation, stated this at the Conference report, Safeguarding space for all: security ad peaceful uses, UN Institute for Disarmament research, Geneva, 25-26 March, 2004.

5 Ibid

application and data can have enormous and crucial contributions to the standard of living, not every nation has the capability to have an indigenous satellite infrastructure nor those it have always free access to the collected data. Even when country can access satellite data for free it still requires local know-how, expertise and data processing capabilities in order to have any use of the data. These differentiate positions and capabilities are especially evident when high income and low income States are compared. Thus, a digital divide exists between States on different levels of economic development.

2. Digital divide

Satellite data utilization represents an important aspect concerning high and low income countries, as it can help low income countries to overcome the digital divide. Digital divide is considered as a difference between those countries that have access to new forms of information and communication technology (ICT), and those ones that do not have this access.[6] Information access can broadly be divided into three phase process: physical access, skills access (education component) and usage access.[7] Digital divide is present in two forms. The first form is digital divide within one country, which is addressed by national policies. In high income countries focus is on universal household access, while public access serves as a second option. However, in low income countries information access is acquired in public buildings and community centers, while household access is considered a luxury.[8] The second form is international divide between information rich and information poor countries, which translates in practice as another grave difference between high and low income countries.[9] There is a strong correlation between income per capita and information access. Technologically advanced countries are able to collect data regarding their country and surrounding region from various sources, thanks to their strong digital infrastructure. In this way they can optimize their geographical advantages and also prepare for (or even prevent) numerous natural disasters and in that manner minimize their damages and costs. Data that is necessary to make these estimations is called the big Earth data.

2.1. Big Earth Data

Observing atmosphere, land and ocean produces huge amounts of data and these data are primarily derived from satellite observations and ground sensor networks, and then other sources. This is collectively called big Earth

6 E. Murelli, Breaking the Digital Divide: Implications for Developing Countries, p. 2.
7 J. Van Dijk, The Digital Divide in Europe, 2008, p. 3 ff.
8 Ibid
9 Policy Options to Combat the Digital Divide in Western Europe, vol. 5, 2002.

data. "Big Earth data is characterized as being massive, multi-source, heterogeneous, multi-temporal, multi-scale, high-dimensional, highly complex, non-stationary, and unstructured. It provides support for data-intensive research in the Earth sciences".[10] Furthermore, these data have temporal, spatial, and physical correlations. They are called "big" because of their high-resolution and because they consist of multiple bands.[11] They can be derived from "multi-source" as data sources and acquisition methods are diverse depending on the imaging mechanisms and models used. They are considered "multi-temporal" as the sampling intervals are short and the data acquisition rate is high.[12] Lastly, big Earth data are also "high value" because of their crucial importance in understanding ecological environment, land resources, predicting and preventing natural disasters, and developing geoscience. However, big Earth data comes also with "big challenges". Due to its characteristics, transmission, storage, processing, analysis, management and sharing of these data encounter great technical issues. Hence, technical solutions are primarily sought in the development of, "big Earth data-oriented computing platforms, algorithms, and software systems including high-performance systems, mass storage techniques, fully automated processing techniques, efficient computing techniques, and data-sharing and service systems. Technologies related to big Earth data include Earth observation, communication technology, computing, and networks, among others."[13] In order to combat natural challenges that nowadays countries face such as, e.g. climate change, natural resources depletion, food and water shortages, energy insufficiency, population growth and at the same time ensure sustainable development access to big Earth data and their utilization are of outmost importance for each country.[14] Irrespective of their income level Big Earth data with their real-time or near real-time acquisition frequency improve governments' and policymakers' ability for understanding the near and long-term capabilities of a country. To this end, infrastructure for transmission, storage, and processing as well as expertise for analyzing, management, and sharing of big Earth data is necessary. It is evident that every country needs infrastructure and expertise to utilize big Earth data, but the question rises do the low income countries have this?

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10 H. Guo, Big Earth data: A new frontier in Earth and information sciences, https://www.tandfonline.com/doi/full/10.1080/20964471.2017.1403062, last accessed on 24.09.2018.

11 Ibid

12 Ibid

13 Ibid

14 GuanHua Xu, QuanSheng Ge, Peng Gong, XiuQi Fang, BangBo Cheng, Bin He, Yong Luo, Bing Xu (2013). Societal response to challenges of global change and human sustainable development. Chinese Science Bulletin, 58(25), 3161–3168

2.2. Big Earth Data and Low Income Countries

Low income countries need accurate, reliable and timely data of the state of their territory (both terrestrial and marine) from the air and on the ground, but most importantly from space. For example, the European Space Agency's Sentinel-5P satellite, launched in October 2017, takes 20 million observations of air pollutants and gases each day.[15] However, coverage and infrastructure are poor in low income countries. Most of them cannot afford to launch EO satellites or to build ground facilities for mass data processing and monitoring of soil. Going back to the previous mentioned example of Sentinel-5P, it would take one computer more than a 1000 years currently to process 3 million planetary-scale satellite scenes, whereas a cloud-computing facility could do it in month and a half time. This testifies to the importance of ground capabilities. Further, low income countries rarely invest in training experts in EO techniques. In addition to low (or no) investments in indigenous capabilities and expertise, local data are also rarely shared between neighboring countries.[16] Thus, low income countries are faced with four main challenges in regards to big Earth data:

- they do not have necessary infrastructure and expertise;
- they have poor access to data;
- there is too little cooperation;
- and the digital divide between high income and low income countries exists.

Thus, following areas are most affected by the lack of possibility of low income countries to use EO data: mitigating disaster risk, ensuring water, food and agriculture security, sustainable development of urban areas and infrastructure, protecting natural and cultural heritage, and understanding climate changes.[17] The relevance of EO data can be seen more clearly from the following example. EO data are highly relevant for urban planning as they can "show trends in the growth of cities and help planners to resolve issues such as traffic congestion, energy shortages, urban sprawl and poor basic services."[18]

Remote sensing satellites are an important source of EO data and satellite imagery and measurements obtained by them are converted into useful

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15 What is Sentinel 5P, https://earth.esa.int/web/guest/missions/esa-eo-missions/sentinel-5p, last accessed 25.09.2018.
16 Steps to the digital silk road, https://www.nature.com/articles/d41586-018-01303-y, last accessed on 24.09.2018.
17 Ibid
18 Ibid

information by specialized programs and this allows decision makers to create policies benefiting their citizens. Big Earth data and their utilization is therefore, an important tool to bridge the divide between high income and low income countries. However, the question arises if the low income countries that do not have their own infrastructure and expertise, have any rights to obtain data that has been collected by the developed States.

3. Legal framework governing access to satellite data – general overview

In order to examine how can States access EO data and what are rights and obligations regarding satellite data and imagery sharing, first the rules governing the collection of satellite data need to be looked into. Satellite data collecting is done via remote sensing by a satellite. Remote sensing is simply the collection of information from a distance[19] and in this case, from outer space distance. EO data can be a great strategic asset and they can also have high political and military relevance (e.g. air pollution data or Synthetic Aperture Radar images).[20] Thus, EO data collecting and accessing is subject to various international and national regulations.
Taking into consideration that satellite systems are utilized to perform remote sensing, the first logical step is to examine the *corpus juris spatialis* in order to establish which norms are relevant for this type of activity.

3.1 The Outer Space Treaty (the OST)

The OST is the first treaty ever adopted regulating space activities and it is considered the *magna carta* of space law. This treaty does not explicitly address remote sensing activities nor does it mention *verbatim*. However, the Art I gives right to use outer space and that such activities shall be carried out for the benefit and in the interest of all countries.[21] This freedom of use of outer space encompasses also remote sensing activities.[22] Furthermore, the Art VI OST imposes an obligation of a State to be internationally responsible for all national activities, including remote sensing activities. This is highly important to bear in mind, as numerous of remote sensing data are in the hands of private companies. Lastly, the Art IX OST emphasize the

19 Cf. E.g. E.C. Barrett and L.F. Curtis, *Introduction to Environment Remote Sensing*, 1976, p.3: “Remote sensing is the observation of a target by a device separate from it by some distance”.

20 A. Soucek, *Space science data policies* in Outer PScae in Society, Politics and Law, C. Brünner & A. Soucek (eds.), Springer New York, 2011, p. 672.

21 Art I OST provides as follows: “The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”

22 A. Soucek, *RSP Principle III* in Cologne Commentary on Space Law, vol. III, S. Hobe et all (eds.), Carl Heymanns Verlag, 2015, p. 109.

importance of cooperation and mutual assistance when carrying out outer space activities, including again the remote sensing ones.[23]
In the following year after the adoption of the OST, four more space treaties were adopted and they all developed on the OST principles. Unfortunately, they also lacked to address the remote sensing activities directly. In the 70ies States began to intensively discuss legal framework for remote sensing. A number of States even came up with drafts for a treaty[24] but there was not enough political will to adopt a new treaty. Instead a United Nations General Assembly (UN GA) Resolutions was adopted in 1986 without a vote.[25]

3.2. The 1986 Principles Relating to Remote Sensing of the Earth from Outer Space (RS Principles)

It took 15 years of discussion, to finally adopt a set of 15 principles by a General Assembly Resolution.[26] These principles were adopted in a form of a Resolution and therefore they do not represent binding norms, but merely guidelines.[27] Not only is their "binding" nature limited from the start, but also their applicability is curbed by the very narrowed and vague wording used in defining the principles. For example, Principle I (a) makes it clear that the Resolution applies only to remote sensing "of the Earth surface … for the purpose of improving natural resource management, land use and protection of the environment".[28] This definition limits the application of the Resolution to three specific purposes and following the strict interpretation of this Principle, commercial uses are not covered. Content wise, numerous principles are simply restating already existing rules of general international law, space law treaties, UN Charter or ITU. The main issue with these Principles, which took 15 years of discussing was the opposing views between supporters of the principle of sovereignty and advocates for the principle of the freedom of use of outer space and the freedom to disseminate information.[29] Finally, the debate was resolved with guidelines that permit gathering data from outer space anywhere on Earth and are very vague when it comes to data access and dissemination to third parties. Sensing State

23 Ibid
24 Brazil submitted a draft for a treaty titled: „Treaty on remote sensing of natural resources by satellites"; Argentina submitted a draft of treaty principles entitled: "Draft international agreement on activities carried out through remote-sensing satellite surveys of earth resources", and France submitted a documents entitled: "Draft principles governing remote sensing of Earth resources from outer space".
25 UNGA Res. 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, 3 December 1986.
26 UNGA Resolution 41/65 1986.
27 B. Cheng, *Studies in International Space Law*, Clarendon Press, Oxford, 1997, p. 590.
28 Principle I (a)
29 B. Cheng, *Studies in International Space Law*, Clarendon Press, Oxford, 1997, p. 592.

should made available primary, processed and analysed date (that is in its possession) to the sensed State on a "non-discriminatory basis and on reasonable cost terms … taking particularly into account the needs and interests of the developing countries".[30] This gives no special treatment to the sensed State nor can it amount to legal basis for demanding data access or demanding it for free. Instead it only signifies that the sensed State only has equal rights to obtain the data and information of its territory under the same conditions as others and at reasonable cost.[31] It does not gain any preferential or greater rights comparing to other States nor does it have any right to demand the sharing of data if the sensing State does not want to share data at all. Furthermore, in regards to the anaylsed data that are mostly in the hands of private companies it seems that the sensed State can only address its claim towards the sensing State and not towards the private entity for which the sensing State is internationally responsible.[32] Lastly, on the topic of dissemination, the Resolution is silent.[33]

3.3 International Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (Disaster Charter)[34]

In addition to the RS Principles, ESA and the French Space Agency CNES initiated a cooperation agreement between space agencies and space system operators (including private actors) in order to "support relief efforts and allow registered users to request and access free satellite data over stricken regions". [35] Currently Disaster Charter has 17 Members.[36] In contrast to the RS Principles, the Disaster Charter addresses not only remote sensing but also other space-based services that can be utilized in the case of a disaster and in this way it offers an additional mechanisms to provide information and other assistance. Disaster Charter is a practical implementation of cooperative utilization of facilities by space agencies and of sharing data by satellite operators. This practical implementation offers services in the cases of emergency, as it can be activated by any country affected by natural disaster.

30 Principle XII
31 S. Mosteshar, *Regulation of remote sensing by satellites* in Routledge Handbook of Space Law, r. Jakhu & P. S. Dempsey (eds.), Routledge, London, 2017, p. 151.
32 F. von der Dunk, *Legal aspects of using space-derived geospatial information for emergency response, with particular reference to the Charter on Space and Major Disasters* in Geospatial Information Technology for Emergency Response, S. Zlatanova & J. Li (eds.), 2008, pp. 21-40.
33 B. Cheng, *Studies in International Space Law*, Clarendon Press, Oxford, 1997, p. 595.
34 International Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological disasters, Rev. 3 (25/04/2000).
35 S. Mosteshar, *Regulation of remote sensing by satellites* in Routledge Handbook of Space Law, R. Jakhu & P. S. Dempsey (eds.), Routledge, London, 2017, p. 144.
36 Membership history, https://disasterscharter.org/web/guest/history, last accessed on 17.09.2018.

Activation can be divided into four steps. In the first step, when a disaster occurs the so-called Authorised User (AU) - "typically a representative of a national civil protection, rescue, or security organisation - logs in to the Charter Operational System and submits a request to mobilise the space and associated ground resources associated with the Charter members in order to obtain data and information on a major disaster. AU's are the only bodies authorised to directly request an activation of the Charter. They may also request support on behalf of another user with which they co-operate for relief purposes."[37] In the second step, a 24-hour On-Duty Operator then processes the request, and verifies the identity of the requestor as well if the User Request Form has been correctly completed. Following this, in the third step the Operator within an hour informs an Emergency On-Call Officer (ECO) – who is in charge of assessing the scope of the disaster. The ECO then make a plan (based on available satellite resources) and suggests what would be the best satellites to use based on the AU's request. This plan is submitted to the relevant space agency, which tries to the best of its effort to operate its satellite systems in a way to meet the request. Lastly, in the fourth step, a Project Manager (PM) is assigned to assist the AU in this process. The ECO informs the PM about the previously undertaken steps and now the PM coordinates the delivery of maps from the Value Added Providers to the end user and co-operating bodies as necessary. "The Value Added Providers take the data provided by member agencies and interpret this, assessing what they see from the satellites and compiling it into value added products - maps created from the data and any ground verification and reports that the Value Added Provider may conduct."[38]

4. EU legal framework

The European EO data policies insist on the principle of "full and open" access. This type of access means that "data and information derived from publically-funded research are made available with as few restrictions as possible, on a non-discriminatory basis, for no more than the cost of reproduction and distribution".[39] At the EU level, this policy is evident through implementation of several EU directives that aim to encourage Member States to adopt open data policies at their national level. Hence, Directive on the re-use of public sector information (PSI Directive) regulates

37 How the charter works, https://disasterscharter.org/web/guest/how-the-charter-works, last accessed on 17.09.2018.

38 Ibid

39 P.F. Uhlir, S. Chen, I. Gabrynowitz, I and K. Jansen, Toward implementation oft he Global Earth Observation System of Systems Data Sharing principles, Journal of Space Law 35, 2009, p. 206.; G. Süß, *Earth observation data policies* in Outer Space in Society, Politics and Law (C. Brünner & A. Soucek eds.), Springer Vienna, 2011, p. 678.

that environmental information must be given to the public upon their request. Next, the INSPIRE Directive entails general rules for establishing a European infrastructure for spatial information with the goal to fulfill EU environmental policies. Accordingly, public institutions may charge and licence each other and EU authorities, however these charges are to be kept to the bare minimum necessary to ensure quality and supply of EO data and services. Lastly, Copernicus programme and its legal framework advocate for fully open access without any cost involved if the data is not used in commercial purposes (then there might be some costs). The INSPIRE Directive and Copernicus will be examined more closely in the following paragraphs.

4.1 The INSPIRE Directive

The INSPIRE Directive was published in the official Journal on the 25th April 2007 and entered into force on the 15th May 2007.[40] As mentioned above, this Directive lays down a general framework for spatial data infrastructure (SDI) for environmental policy. Necessity for this type of regulation came from lack of availability of crucial data, lack of coordination between authorities responsible for data gathering and restrictions in data sharing (copyright, access fees etc.).[41] Due to the fact that spatial data in different countries is produced using different standards, the INSPIRE Directive gathered experts in Europe with the aim to define common standards to describe and to share spatial data. Ease of access and opportune sharing of spatial information between public authorities is what this directive aims. It defines common standards for 34 spatial data themes, like transport networks, protected sites, population distribution etc. Further, the INSPIRE Directive entails following principles: first, data should be easy to interpret and conditions for acquisition of data should be listed; second, data should be collected only once and maintained in the most efficient way possible, third data should be combined and extracted from various sources, and shared with many users and applications.[42] Lastly, according to article 19 of the INSPIRE Directive, each Member State must designate a point of contact.

4.2 Copernicus

In February 2006, almost 60 states and the EU endorsed the ten-year implementation plan of the Global Earth Observation System of Systems

40 Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), OJ L 108, 25.4.2007, p. 1–14.

41 INPSIRE policy background, https://inspire.ec.europa.eu/inspire-policy-background/27902, last accessed 22.9.2018

42 INSPIRE principles, https://inspire.ec.europa.eu/inspire-principles/9, last accessed 22.0.2018.

(GEOSS). This plan is a voluntary, legally non-binding document, however party members to this initiative, declared their consensus on seeking to promote human welfare through GEOSS and Global Common Infrastructure. GEOSS encompasses following data sharing principles:

1. Endorsement of full and open exchange of data, metadata and products shared within GEOSS.
2. All shared data will be available with minimum time delay and minimum cost.
3. All shared data, metadata and products will be free of charge or no more than cost of reproduction and will in this way encourages research and education.

However, various national laws limit or restrict access and use of data based on protection of national security, privacy and intellectual property.[43]
Copernicus is declared a European contribution to GEOSS, and its data-sharing regime is compatible with that of the GEOSS.[44] Copernicus is the main EU flagship project, operated by ESA and it has a data sharing open policy. In more detail, this means that the Regulation on access to Copernicus data establishes "full an open" free worldwide access to Copernicus data and information for lawful reproduction, distribution, communication to the public, adaption, modification and combination with other data. [45] In addition, as indicated in recital 7 of the Regulation, Copernicus data-sharing regime is directly linked to international open data initiatives, namely GEOSS and information supplied by it is used mostly by policy creators and public sector. They use this data to develop adequate strategies, legislation and to act in times of crisis.
Copernicus is composed of EU Sentinel satellites, on-ground measurements and national Contributing Missions in order to deliver operational EO solutions in the environmental and security domain. Currently five Sentinel satellites are in orbit four of its six services are operational: emergency management and land, marine and atmosphere monitoring. Presently, there are more than 10 thousand users registered on the Sentinel Scientific Data

43 Organizational Aspects and Definitions of Key Concepts, https://www.earthobservations.org/documents/dsp/draft_white_paper_geoss_legal_interoperability_30_october_2011.pdf, last accessed 23.9.2018.
44 L.J. Smith, C. Doldirina, *Law relating to remote sensing – Earth observation* in Routledge Handbook of Space Law, R. Jakhu & P. S. Dempsey (eds.), Routledge, London, 2017, p. 264.
45 Commission Delegated Regulation No1159/2013 supplementing Regulation No. 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES).

Hub.[46] ESA operates two access points to Copernicus satellite data. First is Open Access Hub that anyone can access. Second is Copernicus Space Component Data Access, through which anyone can view data but downloading is restricted to public authorities, European projects and Copernicus services.[47]
The EU and ESA make cooperation agreements for Copernicus. In EU and ESA Member States these take the form of Collaborative Ground Segments, which constitutes data hubs where all Copernicus data can be accessed for the "participation States". For non-EU and non-ESA Member States there are Cooperation Agreements that do not involve any exchange of funds but merely rest on exchange of data. EU/ESA grants them access to Sentinel data on a mirror-hub which needs to be implemented by local partners of the Member State itself. To do this the Member State, or one of its institutions, signs a technical implementation agreement. This means that these states also get the data for free, but in return EU/ESA wants them to feed satellite or in-situ data into the system as well to have reciprocity.

4.3 EUMETSAT

Using EO data for concrete services and projects opens the door to a vast field of diverse applications possible. The application are as diverse as the needs. One of the most prominent needs is the weather monitoring. It has been invested a lot of time and resource on the European (and global) scale to employ a robust, mature technology for guaranteeing uninterrupted coverage.[48] In 1986 European Organisation for the Exploitation of Meteorological Satellites (Eumetsat) has been created.[49] Eumetsat is an intergovernmental organization with the aim to offer weather and climate-related satellite data to the National Meteorological Services (NMS) of its Member States in Europe, but also to the other users globally.[50] It is an example of European space-related cooperation and it numbers 30 members.

46 News Sentinel Online, https://earth.esa.int/web/sentinel/news;jsessionid=0B04F08FE5D00EBC4C82C50618717A96.jvm1?p_p_id=101_INSTANCE_xR9e&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&_101_INSTANCE_xR9e_delta=70&_101_INSTANCE_xR9e_keywords=&_101_INSTANCE_xR9e_advancedSearch=false&_101_INSTANCE_xR9e_andOperator=true&_101_INSTANCE_xR9e_cur=7, last accessed 14.12.2018.

47 Copernicus satellite data access, http://copernicus.eu/data-access-satellite, last accessed 23.9.2018.

48 A. Soucek, *Earth Observation* in Outer Space in Society, Politics and Law (C. Brünner & A. Soucek eds.), Springer Vieena, 2011, p. 118.

49 On a worldwide level, the World Meteorological Organisation (WMO) in the most relevant example of meteorology.

50 We are the EUMETSAT, https://www.eumetsat.int/website/home/AboutUs/WhoWeAre/index.html, last accessed on 26.09.2018.

[51] Member States have full access to data collected by Eumetsat and they also take part in the Council, which is the main decision-making organ.[52] Eumetsat operates a system of meteorological satellites that observe the atmosphere, ocean and land surfaces. Data collected by Eumetsat falls under different categories. It is differentiated between essential and non-essential data. Under "essential" meteosat data and products are understood: Three-hourly and Six-hourly Meteosat Data, the Meteosat Derived Products and the data offered through its Meteosat Internet Service.[53] These data are available to all users globally on a free and unrestricted basis.[54] Regarding other "non-essential" meteosat data, the NMSs of Member States will receive it for official duty use without any charges except for the decryption key costs.[55] On the other hand, NMSs of non-Member States have free access to Hourly Meteosta Data for official duty use, but have to pay a certain fee (determined by the Member States based on the gross national income) to gain access to Half-hourly and Quarter-hourly Meteosat Data for official duty use.[56] EUMETSAT's different categories of collected data and different access policies also reflect different economic possibilities of countries. If a country cannot pay its membership than it does not have access to the data of same precision.

5. Case of Republic of Serbia

In its last part, this paper examines the example of Republic of Serbia that is geographically situated in the south-east Europe. It has around seven millions inhabitant and its Gross Domestic Product (GDP) was worth 41.43 billion US dollars in 2017 (this represents 0.07 percent of the world economy).[57] According to World Bank classification of countries based on GNI per capita it belongs in an upper middle income countries,[58] however compared to European Union members, it is one of the most under developed. An important factor is significant brain drain among highly educated population.

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51 About Us, https://www.eumetsat.int/website/home/AboutUs/WhoWeAre/MemberStates/index.html, last accessed 17.9.2018.

52 Eumetsat Member States, https://www.eumetsat.int/website/home/AboutUs/WhoWeAre/MemberStates/index.html, last accessed on 26.09.2018.

53 "Essential" Meteosat Data and Products (4), Eumetsat Data Policy, last amended on 27 June, 2017.

54 "Essential" Data and Products in accordance with WMO Resolution 40 (Cg-XII).

55 Conditions of Access to non-Essential Meteosat Data by NMSs of Member States (6), Eumetsat Data Policy, last amended on 27 June, 2017.

56 Conditions of Access to non-Essential Meteosat Data by NMSs of non-Member States (7), Eumetsat Data Policy, last amended on 27 June, 2017.

57 Serbia GDP, https://tradingeconomics.com/serbia/gdp, last accessed on 26.09.2018.

58 Country classification, www.un.org/en/development/desa/policy/wesp_current/2014wesp_country_classification.pdf, last accessed 28.8.2018.

OECD projected that Serbia lost around $9 billion as a direct result of brain drain in the science, technology, and innovation sector in the period between 1991 and 2010.[59] Serbia as a successor of legal rights and obligations of Yugoslavia, is a signatory State to four out of the five space treaties (three have also been ratified). However, Serbia is not a Member State of the UN COPUOS. Further, even though, Serbia is a party to the four space treaties, Serbia has not signed the RS Principles.

Regarding the Disaster Charter, Serbia is not an Authorized User. This was evident in 2014 when Serbia was affected by the worst floods it has experienced in the past 100 years. Due to the fact that it does not have the capacity to download and utilise maps in case of a natural disaster (as elaborated above), Serbia had to ask Roscosmos to submit the request instead. Serbia experienced enormous damages that amounted to 1.5 million euros.[60]

Serbia is geographically part of Europe, but it is still not a EU member. Regarding the INSPIRE Directive in Serbia designated point of contact is Republic Geodetic Authority (RGA). RGA is a member of Eurograhics organization, which is working closely with European parliament in implementing Inspire Directive.[61] Concerning Copernicus, Serbia is in the process of negotiating the Technical Operating Arrangements (TOA's), executing political arrangements signed between the EU and the country in question. In the case for Serbia, it will only offer in-situ data to the EU/ESA, since Serbia does not have its own EO satellites.

6. Conclusion

It is evident that Serbia would greatly benefit from having indigenous EO satellite systems and ground infrastructure. It could use satellite data for better natural disaster responding, for optimizing its agriculture, for monitoring its rich river-baselines, assessing better developments of urban areas, combating air pollution and understanding better climate changes affecting its region. However, Serbian national policy does not foresee any investments in EO indigenous infrastructure. If Serbia relays on the open data policies from other "providing" countries, it would still need local data processing segments and expertise to apply the received data. Currently, there are no indications that Serbia will make substantial investments in data processing segments nor in training experts. This leaves Serbia in the lower end of the digital divide. However, Serbia is not a developing state, it is a

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59 Brain-drain from Serbia, www.oecd.org/global-relations/45870834.pdf, last accessed 28.9.2018.

60 http://www.obnova.gov.rs/uploads/useruploads/Documents/Izvestaj-o-proceni-potreba-za-oporavak-i-obnovu-posledica-poplava.pdf, last accessed 17.09.2018.

61 INSPIRE, http://www.geosrbija.rs/template1.aspx?pageID=112, last accessed 22.9.2018

transitional state. It cannot argue the same conditions as the developing states can, when they claim their rights to free access. In addition, Serbia is not a party to RS Principles nor member of the Disaster Charter, and it is not a Member State of the UN COPUOS. Further it is not a member of EU and even though it signed a Cooperating Agreement with European Commission regarding Copernicus, Copernicus already has an open data policy. Hence, Serbia is not gaining wider access, it will instead provide Copernicus with in-situ data and thereby widen Copernicus' pool of information. It is more a statement of international cooperation than a step forward in accessing data. Taking all of this into consideration, Serbia does not have a lot of doors it can knock to, without first making an effort on its own to become a part of the space community. It is not a member anywhere, it is not addressed by any provisions explicitly, it cannot claim for any extra rights without first taking on some of the obligations by participating and investing in its own capabilities and expertise. Notwithstanding all of this, Serbia should not be completely forgotten by the international space community and left alone in "no-man's land". International cooperation is embedded in the space domain since its creation and it has always underlined importance of global advancement. Therefore, Serbia should start making the first steps towards space community, but also the space community should offer its guidance and assistance for Serbia to take its place at the table.