

# 59<sup>th</sup> IISL COLLOQUIUM ON THE LAW OF OUTER SPACE

## **Session 3**

CONTEMPORARY CONSIDERATIONS ABOUT THE  
1986 PRINCIPLES RELATING TO REMOTE  
SENSING OF THE EARTH FROM SPACE

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# The Need of an International Convention on Remote Sensing

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## Abstract

From 2002 to 2004, the Brazilian Delegation at the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space – UN/COPUOS – tried to include a new item on the agenda of that Subcommittee, regarding the need of establishing an international convention on remote sensing. Brazil considered that the 1986 Principles Relating to Remote Sensing of the Earth from Outer Space, adopted by the United Nations General Assembly (UNGA) Resolution 41/65, should be converted in a binding instrument and updated in order to attend new situations resulting from technological innovations and commercial applications of remote sensing. In 2003, during the 42<sup>nd</sup> Session of that Legal Subcommittee, the Brazilian delegation submitted a working paper entitled “Why is an international convention on remote sensing of the Earth from outer space necessary?” At that same Session, Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Greece, Mexico and Peru presented a working paper emphasizing that the Subcommittee should consider a new agenda item entitled “Discussion on the development of an international convention on remote sensing”.

However, the consensus was not achieved because some developed countries considered that the Principles, as such, were operating well. Those developed countries held the view that thanks to the increasing number of developing countries with their own remote sensing satellites, the fact that direct access was available to other States and the spread of remote sensing technology to all countries demonstrate that international cooperation had developed well under the 1986 Principles. This argument was and continues to be questionable. Most countries still do not have access to the technology of remote sensing, although it has become indispensable for all nations.

In 2005, during the 44<sup>th</sup> Session of the COPUOS Legal Subcommittee, Brazil decided to withdraw its proposal in view of the fact that the Subcommittee would not be in a position to reach consensus on the inclusion of that item on its agenda. However, despite the decision of Brazil, the referred paper remains convincing, from the

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Brazilian point of view, to demonstrate the reasons for the establishment of a specific convention on remote sensing.

Considering the crucial importance of the vital multidisciplinary application of remote sensing for the global society, this paper aims to highlight the need of developing an appropriated legal framework for such activity.

## I. Introduction

Remote sensing is definitely one of the greatest benefits of space technology for mankind. According to Principle I of the 1986 Principles on Remote Sensing, “(a) the term remote sensing means the sensing of the Earth’s surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment”.

Nowadays, as never before, remote sensing has a wide range of applications such as observation, reconnaissance and monitoring of productive areas (relating to agriculture, cattle, fishing and industry); deforestation assessment; monitoring of natural resources; prevention of natural disasters; transportation infrastructure (such as highways, railways, ports and airports); traffic control; meteorological and tourism services; and urban planning, among others.

Whereas remote sensing is a fundamental tool for their sustainable development, developing countries would be pleased by any initiative from developed countries, which could provide them with technical assistance in this area. After all, according to Principle II of the 1986 Principles on Remote Sensing, “[r]emote sensing activities shall be carried out for the benefit and in the interests of all countries, irrespective of their economic, social, scientific and technological development, and taking into particular consideration the needs of the developing countries”.

The assistance between developing and developed countries is stated in Principle V of the 1986 Principles on Remote Sensing, *in verbis*: “States carrying out remote sensing activities shall promote international cooperation in these activities. To this end, they shall make available to other States opportunities for participation therein. Such participation shall be based in each case on equitable and mutually acceptable terms”.

Nonetheless, remote sensing has become a profitable business. Currently, private companies from developed countries are carrying out the majority of remote sensing activities. Obviously, such companies, in general, are not interested in transferring their technologies, because they prefer to keep developing countries as mere customers.

Taking into account the technological advancements that have occurred since 1986, when the Principles on Remote Sensing were adopted, they are no longer able to attend the current issues. In spite of this reality, developed

countries refuse to discuss the need to update the Principles or, perhaps, the need to establish a specific convention on remote sensing.

In this scenario, in 2002, during the 41<sup>st</sup> Session of the COPUOS Legal Subcommittee, the Brazilian delegation bravely decided to touch on this sensitive subject.

Brazil expressed the view that a new item on discussion on an international convention based on the Principles Relating to Remote Sensing of the Earth from Outer Space should be included in the agenda for the 42<sup>nd</sup> Session of that Legal Subcommittee. Brazil considered that the development of such a convention was necessary to update the Principles and to develop rules for new situations resulting from technological innovations and commercial applications of remote sensing.<sup>1</sup> The delegation from Greece co-sponsored the Brazilian proposal. However, the consensus was not reached.

Brazil and Greece decided to retain their proposal for possible discussion at the subsequent sessions of that Subcommittee.<sup>2</sup>

## II. Remote Sensing in Brazil

Before talking about the initiatives taken by the Brazilian delegation during the 42<sup>nd</sup> Session of the COPUOS Legal Subcommittee, it is valid to know why remote sensing is so important for Brazil.

As a huge country, Brazil obtains many benefits from remote sensing applications, especially data regarding the deforestation in the Amazon region.

The National Institute for Space Research (INPE) is the Brazilian governmental entity that carries out most of the remote sensing programs. However, remote sensing is no longer a State exclusivity, because today there are some Brazilian private companies that perform this activity.<sup>3</sup>

Since developed countries in many technological areas are not interested in establishing partnership with developing countries, because this could affect the business of their private companies, developing space-faring countries have to set up joint ventures among themselves, as a way to improve their remote sensing activities.

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1 See item # 134 of the Report of the Legal Subcommittee on the work of its 41<sup>st</sup> Session (document A/AC.105/787).

2 Idem – item # 141 (b).

3 According to INPE ([http://www.dgi.inpe.br/siteDgi\\_EN/eventos/links-por.htm](http://www.dgi.inpe.br/siteDgi_EN/eventos/links-por.htm)), the main Brazilian remote sensing private companies are: i) Alado Imagens de Satélite e Informática; ii) Base Aerofotogrametria e Projetos S.A.; iii) Engesat – Imagens de Satélite; iv) GeoDesing Internacional – Imagens de Satélite e Sensoriamento Remoto; v) Gisplan Tecnologia da Geoinformação; vi) Intersat Imagens de Satélites; vii) Senografia – Sensoriamento Remoto Ltda.; viii) Threetek Soluções em Geomática; and ix) Visiona Tecnologia Espacial.

Brazil, over a period, tried to keep close space cooperation with its Latin American neighbors.<sup>4</sup> However, the advances were not large.

One of the best examples of fruitful South-South space cooperation was the program China-Brazil Earth Resources Satellites (CBERS), established in 1988. Satellite CBERS-4, the last one that was launched,<sup>5</sup> reestablished the Brazilian's Government ability to observe its own territory following a 4.5-year gap caused by the failure of CBERS-3.<sup>6</sup>

On 24/Aug/2016, the Brazilian Senate approved the Additional Protocol, signed between the Governments of Brazil and China, on the development of Satellite CBERS-4A, enabling the continuation of this successful Program.<sup>7</sup> The approval of this Additional Protocol was essential to ensure the budget for the construction of Satellite CBERS-4A, whose launching is planned for December/2018.<sup>8</sup>

Thanks to CBERS Program, Brazil has become a sensor State. Since China and Brazil had autonomy for establishing their own policy for distributing CBERS data within their territories, Brazil, through its Ministry of Science and Technology,<sup>9</sup> decided in 2005 to distribute CBERS data free of charge to Brazilian users during an initial period of two years, in order to disseminate its use by a variety of national entities. Both parties had agreed that, during such an experimental phase, CBERS data could not be distributed to foreign States or people, or even to nationals living abroad.

CBERS site on the Internet was opened experimentally in April 2004, but it was officially inaugurated on 15/Jun/2004. The decision to distribute CBERS data free of charge popularized its use by public and private organizations, as well as different kind of professionals. Remote sensing companies also improved their products and services due to the easy access to CBERS data.

On 17/Jun/2005, just one year after the inauguration of the CBERS site, INPE celebrated the distribution of 100,000 CBERS-2 images for Brazilian users.

On 28/Sep/2009, the National Institute for Space Research (INPE) reached the incredible milestone of one million images from CBERS distributed free of charge.

In 2014, Brazil and China decided to introduce CBERS Program in the global market of commercializing satellite images. On 14/Jul/2014, they signed a cooperation agreement on remote sensing satellites data, with the purpose of

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4 The Argentinian satellites SAC-B (launched in 1996), SAC-C (launched in 2000), and SAC-D/Aquarius (launched in 2011) were tested at the INPE's facilities, in São José dos Campos, SP, Brazil.

5 CBERS-4 was successfully launched on December 7, 2014.

6 <https://en.wikipedia.org/wiki/CBERS-4>.

7 <http://www12.senado.leg.br/noticias/materias/2016/08/24/senado-aprova-acordo-de-cooperacao-entre-brasil-e-china-na-area-de-ciencia-e-tecnologia>.

8 <https://pt.wikipedia.org/wiki/CBERS-4A>.

9 In 2011, this name was changed to Ministry of Science, Technology and Innovation.

commercializing the CBERS images due to its high quality. However, they keep the possibility of free distribution in some cases, such as natural disasters, in accordance with Principle X of the 1986 Principles on Remote Sensing, which states: “Remote Sensing shall promote the protection of the Earth’s natural environment. To this end, States participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth’s natural environment shall disclose such information to States concerned”.

In November/2015, the Brazilian company Visiona<sup>10</sup> started a service of supplying and analyzing satellite images with the goal of developing remote sensing projects in Brazil and neighboring countries. To this end, the company entered into distribution agreements with some of the world leading operators of Earth observation satellites, namely, Airbus, DigitalGlobe, Restec and Imaging Services.

Therefore, remote sensing is of paramount importance to Brazil: whether it is to ensure sustainable development, as to promote the qualification of its professionals and industries.

### III. The Brazilian Proposal at the COPUOS Legal Subcommittee

During the 42<sup>nd</sup> Session of COPUOS Legal Subcommittee, held in Vienna, Austria, from 24 March to 4 April 2003, the Brazilian delegation submitted a working paper entitled “Why is an international convention on remote sensing of the Earth from outer space necessary?”<sup>11</sup>

The paper pointed out ten reasons, divided in letters “A” to “J”, which justified the need of establishing a specific convention on remote sensing, as follow:

Letter “A” – Satellite remote sensing activities are currently insufficiently regulated from the international point of view. The 1986 Principles on Remote Sensing do not address the questions raised today by the multiple satellite remote sensing programs, a large number of which are operated by private companies with strictly commercial objectives. There are many social demands to be attended by remote sensing.

Letter “B” – Remote sensing activities are now indispensable and must be regulated by a broad, compulsory and universally acknowledged instrument. The UNGA Resolution 41/65 is of a merely advisory nature and does not impose any obligations on States; nor does it meet the need for broad, secure and effective regulation of a strategic space activity for development by all countries.

Letter “C” – Many remote sensing activities are not yet subject to international regulation. Principle I of the 1986 Principles on Remote Sensing

<sup>10</sup> <http://www.visionaespaical.com.br/>.

<sup>11</sup> Document A/AC.105/C.2/L.244, issued on 31 March 2003.

does not mention the use of remote sensing for the observation, reconnaissance and monitoring of productive areas (relating to agriculture, cattle, fishing and industry), transportation infrastructure (such as highways, railways, ports and airports) or services (meteorological and tourism), nor for the verification of compliance with international treaties. None of those activities, of clear economic and strategic relevance, is governed by specific international regulations.

Letter “D” – It is necessary to regulate remote sensing activities with the precautions required by an international public service that is essential to the global community, including when it is provided by private entities. According to Principles II, III and IV of the 1986 Principles on Remote Sensing, remote sensing activities shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic, social or scientific and technological development. These principles emphasize the relevance of remote sensing activities for all countries. Thus, such activities are also “the province of all mankind”, in conformity with the clause of the common good, exposed in Article I, § 1°, of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, known as “Outer Space Treaty”.<sup>12</sup>

Letter “E” – The regularity and predictability of the remote sensing services by satellite must be guaranteed. The phrase “on a non-discriminatory basis and on reasonable cost terms”, presented in Principle XII, is too vague and flexible. It does not formulate a secure and effective norm, nor it guarantees to the sensed States a minimum of essential predictability in the significant commercial transactions of our time and, above all, in the light of the unfailingly rigorous and non-negotiable national security policies of the great world powers.

Letter “F” – A basic international legal system must be formulated for the growing commercialization of satellite remote sensing activities. The commercial interest should be respected and even stimulated, but cannot supersede the public interest. It should, to the contrary, adjust itself to the public function of remote sensing services.

Letter “G” – Appropriate regulations are needed, guaranteeing not only the right of commerce, but also the right of access. The Workshop on Space Law in the Twenty-first Century, sponsored by the International Institute of Space Law (IISL) and by the Office of the Outer Space Affairs (OOSA), held in Vienna, Austria, in 1999, as part of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) recommended that the COPUOS Legal Subcommittee should initiate the drafting of a treaty covering remote sensing from outer space on the basis

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12 Adopted by the UNGA Resolution 2222 (XXI), on 19/Dec/1966, opened for signature on 27/Jan/1967, entered into force on 10/Oct/1967.



of the 1986 Principles on Remote Sensing, taking into particular account the expanding growth in commercial remote sensing services and preserving the principle of non-discriminatory access to data.<sup>13</sup> It was pointed out that when UNGA Resolution 41/65 was adopted, the commercialization of remote sensing services practically did not exist. It emerged afterwards and underwent an acceleration in the 1990s, with a wide impact on the entire world.

Letter “H” – Fundamental concepts must be defined in a clear and detailed manner, filling the significant gaps that exist today. The first fundamental concept to be defined from the point of view of developing countries, is that set out in Principle IV, according to which remote sensing activities shall not be conducted in a manner detrimental to legitimate rights and interests of the sensed State. It was mentioned that a convention on remote sensing could delineate the rights and duties of sensed States, as well as the rights and duties of States carrying out remote sensing activities. Beyond that, the international convention should contain basic norms for the protection of intellectual property and patents, principally with regard to analyzed satellite sensed data, in order to ensure legitimate rights, without, however, discontinuing or hindering access to data for countries that are in need of such information, especially sensed States.

Letter “I” – Responsibilities must be established for the use of remote sensing data, especially in relation to sensed States. The concept of remote sensing activities, provided in Principle I of the 1986 Principles on Remote Sensing, does not include the use of the analyzed data, which has been causing more harm to sensed States. The attention was drawn to Principle XIV, which attributes international responsibility for remote sensing activities only to “States operating remote sensing satellites”. In this view, responsibility is established only for operations of remote sensing satellites and not for the use of remote sensing data obtained through such operations.

Letter “J” – Coherence, harmony and effectiveness should be lent to the principles and norms regarding remote sensing activities, in order to prevent contradictory interpretations. Some Principles have high level of uncertainty. Principle IV, for instance, acknowledges both the freedom of remote sensing, as well as the rights and the interests of sensed States, without indicating how that conciliation may, in fact, be attained. Principle V establishes the duty of promoting international cooperation to those States carrying out remote sensing activities. However, the participation of sensed States shall be based “on equitable and mutually acceptable terms”. In this way, if a sensor State does not accept the participation of a sensed State, it will not be subject to any penalty. A just and equitable convention must ensure an equilibrium

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13 *Proceedings of the Workshop on Space Law in the Twenty-first Century Organized by the International Institute on Space Law with the Office for Outer Space Affairs* (United Nations publication, Sales No. E.00.I.5), p. 3.

between the technological and economic power of the States carrying out remote sensing activities and the legitimate rights and interests of sensed States, the weaker party of this unbalanced relationship.

These are the ten arguments presented by Brazil to support the need of establishing a specific convention on remote sensing. It is important to highlight that despite the Brazilian Working Paper has been issued over 10 years ago its arguments remain fully valid.

#### **IV. The Proposal of a New Agenda Item**

Because of the Working Paper submitted by Brazil during the 42<sup>nd</sup> Session of the COPUOS Legal Subcommittee, many developing countries decided to sponsor the Brazilian proposal of including a new agenda item, regarding the need of establishing a specific convention on remote sensing.

In this scenario, at that same Session, Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Greece, Mexico and Peru presented another working paper emphasizing that the Subcommittee should consider a new agenda item entitled "Discussion on the development of an international convention on remote sensing".<sup>14</sup> Those delegations held the view that international cooperation on remote sensing was essential to ensure that developing countries would have better access to data and remote sensing images of their own territories.

However, some delegations from developed countries considered that it was not necessary to update the Principles, as they were operating well. Those delegations understood that the increasing number of developing countries with their own remote sensing satellites, the fact that direct access was available to other States and the spread of remote sensing technology to all countries demonstrated that international cooperation had developed well under the Principles.<sup>15</sup>

Some developed countries also mentioned that given the current problems faced by the global satellite industry, it would create a negative impact to begin discussions on an international regulatory regime that had not been demonstrated as needed.<sup>16</sup>

All of these arguments raise many serious doubts. They must be discussed under the presentation of concrete numbers and facts.

Since the consensus was not reached, the delegations from Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Greece, Mexico and Peru stated that they would evaluate the possibility of reviewing their proposal taking into account

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14 Document A/AC.105/C.2/L.245.

15 See item # 139 of the Report of the Legal Subcommittee on the work of its 42<sup>nd</sup> Session (document A/AC.105/805).

16 *Idem* – item # 142.

comments from other delegations and make it available for consideration by the Legal Subcommittee at its 43<sup>rd</sup> Session.

During the 43<sup>rd</sup> Session of the COPUOS Legal Subcommittee, held in 2004, Brazil decided to change its proposal, in a way to convince all States about the need of updating the 1986 Principles on Remote Sensing. At that time, taking into account that developed countries refuse emphatically to consider the elaboration of a new convention, Brazil changed the title of its proposal to “Analysis of current remote sensing practices within the framework of the Principles Relating to Remote Sensing of the Earth from Outer Space”.

As members of the Brazilian delegation, the authors of this paper witnessed the efforts of French delegation, through its distinguished delegate, Prof. Gabriel Laferranderie, from the European Centre for Space Law (ECSL), to convince the USA delegation about the feasibility of the item proposed by Brazil. Prof. Laferranderie emphasized that the Principles would only be revised, without any commitment to elaborate a new binding instrument.

However, even with this substantial change of focus, the consensus was not reached.

In 2005, during the 44<sup>th</sup> Session of the COPUOS Legal Subcommittee, Brazil decided to withdraw its proposal in view of the fact that the Subcommittee would not be in a position to reach consensus on the inclusion of that item on its agenda.

The Brazilian delegation further noted that the question of providing better access to the benefits associated with the use of remote sensing technologies enjoyed broad interest, and that appropriate legal framework could play an important role in the development and dissemination of remote sensing applications.<sup>17</sup>

After the withdrawing of the Brazilian proposal, two different proposals for new agenda item were presented concerning the same subject:

- 1) Proposal presented by Chile and Colombia entitled “Discussion on matters relating to the Principles on Remote Sensing”; and
- 2) Proposal presented by Greece entitled “Review of the Principles on Remote Sensing, with a view to transforming them into a treaty in the future”.

Although both proposals were repeated in the following sessions of the COPUOS Legal Subcommittee, they have not reached consensus and were never included in the agenda of that Subcommittee.

Therefore, despite the enormous technological advancement of remote sensing activities over the last third years, simply nothing regarding this subject is currently under consideration of the COPUOS Legal Subcommittee.

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<sup>17</sup> See item # 143 of the Report of the Legal Subcommittee on the work of its 44<sup>th</sup> Session (document A/AC.105/850).

## V. IISL/ECSL Symposium

In 2005, during the 44<sup>th</sup> Session of the COPUOS Legal Subcommittee, the International Institute of Space Law (IISL) and the European Centre for Space Law (ECSL) held a Symposium entitled “Desirability of Reviewing the 1986 United Nations Principles Relating to Remote Sensing of the Earth from Outer Space”.<sup>18</sup>

At that occasion, four presentations were delivered, namely: i) The International Legal Framework of Remote Sensing in the Year 2005: Changed Conditions and Changed Needs?”, by Mahulena Hofmann (Max Plank Institute, Germany); ii) “The 1986 United Nations Principles and current state practice in North America”, by Joanne Gabrynowicz (National Remote Sensing and Space Law Centre, United States of America); iii) “The United Nations Principles: On the Necessity of a Revisit”, by Rajeev Lochan (Indian Space Research Organization – ISRO – India); and iv) “The 1986 United Nations Principles and current state practice in Europe”, by Marco Ferrazzani (European Space Agency).

Hoffman mentioned that the 1986 Principles on Remote Sensing are a child of the Cold War period and the east-west antagonism. She addressed to the fact that the fear of the then socialist States and numerous developing countries of an unlimited sensing of their territories contributed to the proposals of an international regime at the end of the 1970s. This regime should have been based mainly on the principle of state sovereignty and should have been generally restrictive in its nature. In contrast, thereto, other States were interested in the unlimited observation of the Earth and supported an open system of remote sensing the core of which should have been the non-discriminatory-access rule. In this scenario, the result was a non-binding compromise, which sought to achieve a balance between the two political approaches but did not satisfy the objectives of any of them. Hoffmann pointed out the increased number of States and commercial entities that currently constitute remote sensing actors, generating a hybrid public-private environment.

Gabrynowicz gave a presentation regarding the legal framework of remote sensing activities in North America. She talked about the US-Canada Agreement on Commercial Remote Sensing Satellite Systems, signed on 16/Jun/2000, whose common statement is to foster “broad private uses of commercial remote sensing satellite systems while protecting common national security and foreign policy interests”. She also mentioned the Bill C-25 Act, which governs the operation of remote sensing space systems in Canada. Concerning the United States of America, Prof. Gabrynowicz draw

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18 The document A/AC.105/C.2/2005/CRP.8 contains a compilation of the presentations delivered during the Symposium on 4 April 2005.

the attention to the 1992 Land Remote Sensing Policy Act; to the Licensing of Private Land Remote-Sensing Space Systems; and to the Policy NSPD 27. According to Dr. Rajeev Lochan, the 1986 Principles on Remote Sensing are not flawless, yet contain most of the novel features. He stated that “[s]eeking better compliance of not-so-perfect arrangement is a more prudent alternative to an elusive concept of flawless treaty”.

Dr. Ferrazzani noted that “having access to data from Earth Observing satellites is often expensive and always cumbersome. The use of these data is therefore restricted to governments, large companies and highly trained people, and this is severely limiting the development of science, applications and services that space remote sensing programs may be able to offer. Delivery of the data to the end user is still quite complex and this does not facilitate applications requiring near real-time access”. He remarked that the European Space Agency (ESA) policies “have one ultimate objective: allowing for the sustainability of the next generation of operational Earth Observation satellites by increasing the use of EO data”.

Although academic institutions – IISL and ECSL – had organized the Symposium, the presentations were given in a diplomatic and political environment. Whereas the delegations of the countries of the speakers were part of the audience, the speakers presumably sought to avoid any conflict with the political positions from their respective countries. Probably for this reason, the presentations were not conclusive about the need or not of the elaboration of a binding legal instrument on remote sensing.

However, it remained clear that the existing Principles are no longer sufficient to regulate remote sensing activities, having regard to the unprecedented technological innovations that have taken place in this sector.

## **VI. The Importance of Remote Sensing for Developing Countries**

As already stated, nowadays remote sensing plays a fundamental role for developing countries. Not by chance, Principle II of the 1986 Principles on Remote Sensing establishes that remote sensing activities should take “into particular consideration the needs of the developing countries”.

The accurate use of this tool – remote sensing – might improve the quality of life of developing countries’ population. Remote sensing may be used to collect data on the economic outcomes, urban growth, crop management, and monitoring of natural resources, among other relevant applications. These data may be analyzed and compared with a view to bring social benefits for local populations.

One among of the several uses of remote sensing in developing countries is for the monitoring of tropical diseases, such as cholera, malaria, and dengue. Remote sensing data have been used to monitor the most infected areas,

revealing where the local governments should increase their efforts to eradicate the diseases, as well as to provide necessary medical care.<sup>19</sup>

In Brazil, the Brazilian National Institute for Space Research (INPE) has used satellite imagery to make a systematic study of Amazon deforestation since April 1989. INPE's projects related to Amazon, namely PRODES<sup>20</sup> and DETER,<sup>21</sup> include the use of remote sensing satellite images for deforestation assessment. Data obtained using these projects are fundamental to define the measures that will be taken by the Brazilian Government, including public policies of prevention and surveillance where deforestation has increased.

However, the costs of satellite images are usually high and, for this reason, many developing countries cannot afford remote sensing activities. In this specific point, it should be remembered that Principle XII of the 1986 Principles on Remote Sensing establishes that the sensed State shall have access to the primary data and processed data of its territory "on a non-discriminatory basis and on reasonable cost terms". Currently, this Principle XII has become a dead letter, simply because private and profitable companies have been carrying out remote sensing and they are not interested in providing satellite images at "reasonable cost terms".

Fortunately, remote sensing is not always treated just as a business, but also as a tool to be used for the benefit of developing countries.

In their article "Combining Satellite Imagery and Machine Learning to Predict Poverty", published by Science Magazine,<sup>22</sup> six researchers from Stanford University, CA, United States of America,<sup>23</sup> using survey and satellite data from five African countries – Nigeria, Tanzania, Uganda, Malawi, and Rwanda – demonstrated that it is possible to track and target poverty in developing countries.

The authors mentioned that "[h]igh-resolution satellite imagery is increasingly available at the global scale and contains an abundance of information about landscape features that could be correlated with economic activity. Unfortunately, such data are highly unstructured and thus challenging to extract meaningful insights from at scale, even with intensive manual analysis". They emphasized that "existing high-resolution daytime satellite imagery can be used to make fairly accurate predictions about the spatial distribution of economic well-being across five African countries. Our model performs well despite inexact data on both the timing of the daytime

19 See, for instance, the article "Climate and infectious disease: use of remote sensing for detection of vibrio cholera by indirect measurement" at <http://www.ncbi.nlm.nih.gov/pubmed/10677480>.

20 <http://www.obt.inpe.br/prodes/index.php>.

21 <http://www.obt.inpe.br/deter/>.

22 Science Magazine, of 19/Aug/2016, Vol. 353, Issue 6301, pp. 790/4.

23 Namely: Neal Jean, Marshall Burke, Michael Xie, W. Matthew Davis, David B. Lobell, and Stefano Ermon.

imagery and the location of clusters in the training data, and more precise data in either of these dimensions are likely to further improve model performance (...) Our approach could have broad application across many scientific domains and may be immediately useful for inexpensively producing granular data on other socioeconomic outcomes of interest to the international community, such as the large set of indicators proposed for the United Nations Sustainable Development Goals”.<sup>24</sup>

On this particular regard, if Principle V of the 1986 Principles on Remote Sensing, which establishes that “states carrying out remote sensing activities shall promote international cooperation in these activities”, were really effective nowadays, developing countries could be assisted by developed countries on the proper use and application of this tool.

Attention also must be paid to the final part of Principle IV, which says that remote sensing activities “shall not be conducted in a manner detrimental to legitimate rights and interests of the sensed States”. What does it mean concretely “not to conduct remote sensing activities in a manner detrimental to legitimate rights and interests of sensed States”? It is necessary to clarify and regulate in details such important rule for sensed States, which are in majority developing countries. The remote sensing’s community must know as exactly as possible the legal standardization of the detrimental actions in these activities. It is another strong argument confirming that the 1986 Principles on Remote Sensing must be updated, in particular because the needs and interests of developing countries, as demonstrated in the present topic, have not been taken into due consideration in some essential aspects.

## **VII. National Regulations for Remote Sensing Activities**

Although developed countries emphatically refuse to discuss the need of updating the 1986 Principles on Remote Sensing, they have established their own and detailed internal regulations about this subject.

The United States of America, for instance, has three regulations dealing specifically with remote sensing, which are: i) 1992 Remote Sensing Policy Act;<sup>25</sup> ii) 2003 Commercial Remote Sensing Policy;<sup>26</sup> and iii) 2006 Remote Sensing Regulations.<sup>27</sup>

Space activities in the Russian Federation, including those related to remote sensing, are regulated by the Decree # 5663-1, of 20/Aug/1993.<sup>28</sup>

24 See <https://sustainabledevelopment.un.org/>.

25 <https://www.govtrack.us/congress/bills/102/hr6133>.

26 <http://www.nesdis.noaa.gov/CRSRA/files/Commercial%20Remote%20Sensing%20Policy%202003.pdf>.

27 <http://www.nesdis.noaa.gov/CRSRA/files/15%20CFR%20Part%20960%20Regs%202006.pdf>.

28 [http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian\\_federation/decree\\_5663-1\\_E.html](http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian_federation/decree_5663-1_E.html).

In Europe, it can be mentioned the French Law # 2008-518, of 03/Jun/2008;<sup>29</sup> and the German National Data Security Policy on Space-Based Earth Remote Sensing Systems Act, of 01/Dec/2007.<sup>30</sup>

Whereas there is not a binding international instrument related to remote sensing and taking into account that developed countries are elaborating their national legislations on this subject, developing countries could consider the possibility of establishing their own regulations on such activities, individually or even regionally.

If developing countries do not have their national legislations on remote sensing, they will have to be subject to the legislations of developed countries when they will conclude bilateral agreements, contracts or other legal instruments with those countries or their private companies.

Among developing countries, India is an exception. It has already issued its Remote Sensing Data Policy (RSDP – 2011).<sup>31</sup>

#### **VIII. The Lack of Regulation in Brazil**

In Brazil, contrasting with its recognized technical expertise on remote sensing, as mentioned in topic II of this paper, there is not a national legislation on space activities. Currently, such activities are carried out in accordance with two Directives issued by the Brazilian Space Agency, namely:

- i) Directive # 05, of 21/Feb/2002, which approves the regulation on procedures for obtaining authorization to carry out space launching from the Brazilian territory; and
- ii) Directive # 120, of 26/Aug/2014, which approves the regulation on procedures and the definition of requirements necessary for the request, evaluation, issuance, control and follow-up of licenses for carrying out space launching activities on the Brazilian territory. This Directive replaced the one issued in 2001.<sup>32</sup>

Obviously, it is important to establish rules that will be useful for the development of space activities in the national territory; however, the need of setting up a general Brazilian space legislation remains.

Concerning remote sensing, the situation is even worse, because the Brazilian Decree # 2.278, of 17/Jul/1997, wrongly classifies such activity as aerial photogrammetry. The unique difference is the place where the sensor is installed: in a plane or in a satellite.

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29 <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000018939303>.

30 <http://www.unoosa.org/pdf/pres/lsc2010/tech-02.pdf>.

31 <http://dos.gov.in/sites/default/files/RSDP-2011.pdf>.

32 Directive # 27, of 20/Jun/2001.



According to Decree # 2.278/97, a company should get an authorization from the Brazilian Ministry of Defense to undertake remote sensing activities in Brazil. In practice, the Brazilian companies that carry out remote sensing activities have not considered Decree # 2.278/97, and its dispositions have been restricted to aerial photogrammetry activities. Notwithstanding, it is officially valid, so it should be updated, in order to limit its scope to aerial photogrammetry.

Gilberto Câmara and Hilcéa Santos Ferreira, researchers from INPE, reported that “[i]n 2000, a working group composed by members of the Ministry of Defense, Ministry of Science and Technology, Ministry of Foreign Affairs and Brazilian Space Agency gathered to discuss a specific legislation for remote sensing and an update of Decree 2278/97. They proposed a new legislation (Project Law 3587/00) that was forwarded to the Brazilian Congress. Once again, this action neglected the Brazilian remote sensing community, ignored the UN Remote Sensing Principles and neglected the technological advances. The proposed legislation defines broadly remote sensing as ‘the set of operations of reception, processing, interpretation, or distribution of satellite-collected data that under any form covers part the Brazilian territory’. The goal is to allow the government to control the institutions involved in remote sensing and aerial surveys. Any citizen would need permission from the government to use remote sensing data. Such a view conflicts with the open access policy already in place. INPE and members of the remote sensing community have expressed their strong opposition to PL 3587/00. Given such opposition, it is unlikely the proposal will be approved by Congress. Even if it be approved, it will impossible to be put into practice”.<sup>33</sup>

It should be mentioned that the Project Law 3587/00 is still under appreciation of the Brazilian Parliament, although it has not presented any advancement since 2010.

In this context, the Brazilian Association of Air and Space Law (SBDA),<sup>34</sup> through its Centre of Space Law Studies (NEDE), has been developing a project of a national law for remote sensing, with a view to warn the Brazilian authorities, especially those who are in charge of space affairs, about the need of regulating such activities.

33 In their paper “Current Status and Recent Developments in Brazilian Remote Sensing Law”, presented at the Second International Conference on the State of Remote Sensing Law”, organized by the University of Mississippi School of Law, held in Oxford, MS, USA, on 17-18 January 2008.

34 SBDA is a non-profit civil organization founded in 1950 and was declared of public interest in 1952. The mentioned project is, therefore, a non-governmental initiative. For more information regarding SBDA, see online <http://www.sbda.org.br>.

## **IX. Some Conclusive Remarks**

On 03/Dec/2016, the UNGA Resolution 41/65, which adopts the Principles Relating to Remote Sensing of the Earth from Outer Space, will celebrate its 30<sup>th</sup> Anniversary. Along this accelerated period, technological advancements were made. As already emphasized, remote sensing has become a fundamental tool for the everyday life of all nations.

Remote sensing has become a very profitable business. Today, mainly private companies are developing remote sensing activities in developed countries, unlike what occurred at the time of issue of the Principles, when exclusively States carried out such activities.

Undoubtedly, an activity of this importance has long since deserved a specific international convention to regulate it, as was demonstrated in the working paper presented by Brazil at the 42<sup>nd</sup> Session of the COPUOS Legal Subcommittee. The arguments presented in that document were summarized in topic III of this paper. It is unquestionable that the 1986 Principles on Remote Sensing are no longer able to deal with current issues.

As a conclusion, the following remarks are presented:

- 1) The 1986 Principles on Remote Sensing must be urgently updated due to extraordinary technological advances made since that time;
- 2) Taking into account the invaluable importance of remote sensing for the global security, social progress and general development of all nations, it is imperative to create an international legal binding instrument regulating such activity so indispensable in the present, as well as in the future;
- 3) While an international convention on remote sensing is not adopted, developing countries must develop their own laws, in order to prevent them from being subject and submitted to the laws of developed countries, which do not always correspond to the interests of developing countries; and
- 4) International cooperation on remote sensing must be encouraged and strengthened, since the adequate use of this technique may improve the quality of life of developing countries' population.