

# **DARK AND QUIET SKIES BELONG TO HUMANITY: A COMMON HERITAGE**

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## **ABSTRACT:**

*“The most pressing reason to preserve dark skies could be the ability to continue making observations of the universe from the Earth. It may seem simple, but urban growth and associated night lighting in the last 50 years have made it impossible to carry out high-level astronomical research in many places in Europe and North America. On a more individual level, this implies that large portions of the population are very disconnected from what it means to see the night sky and cannot appreciate our place in the universe. However, beyond astronomy, excessive night lighting has biological and ecological implications since it disrupts the life cycles of fauna (including humans); of the fauna, insects, birds and turtles have always used stars to navigate between different territories with the changing of the seasons”<sup>1</sup>.*

In April 2022, the new International Astronomical Union (IAU) Centre for the Protection of Dark and Quiet Sky from Satellite Constellations Interference (CPS) began its operation. Considerable progress has been made in the analysis and initial implementation of mitigating measures...[...]

## **ABSTRACT:**

*“La razón más apremiante para preservar los cielos oscuros podría ser la capacidad de continuar observando el Universo desde la Tierra. El crecimiento urbano y la iluminación nocturna asociada, en los últimos 50 años han hecho imposible llevar a cabo investigaciones astronómicas de alto nivel en muchos lugares de Europa y América del Norte. Desde un nivel más individual, esto implica que grandes porciones de la población de están muy desconectadas de lo que significa ver el cielo nocturno y no pueden apreciar cual es nuestro lugar en el universo. Sin embargo, más allá de la astronomía, la iluminación nocturna excesiva tiene implicaciones biológicas y ecológicas, ya que trastorna los ciclos de vida de la fauna (incluidos los humanos); de la fauna, insectos, pájaros y tortugas siempre han utilizado las estrellas para navegar entre distintos territorios con el cambio de las estaciones”.*

En abril de 2022, el nuevo Centro para la Protección del Cielo Oscuros y Tranquilo de la Interferencia de Constelaciones de Satélites (CPS) de la Unión Astronómica Internacional (IAU) comenzó a funcionar. Se ha avanzado considerablemente en el análisis e implementación inicial de medidas de mitigación...[...]

## **KEYWORDS:**

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<sup>1</sup> The right to Dark Skies. Published in 2016 by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France and the UNESCO Office in Mexico, Presidente Masaryk 526, Polanco, Miguel Hidalgo, 11550 Ciudad de Mexico, D.F., Mexico. © UNESCO 2016 ISBN 978-92-3-000028-8

#Spacelaw #Protection on Dark Skies #stargazing #astronomy #space sustainable use

**PALABRAS CLAVE:**

#Derecho espacial #cieloscuros #stargazing#astronomia # uso sostenible de espacio.

The right to enjoy dark skies has been recognized by UNESCO<sup>2</sup> as an implicit right in the conservation of cultural and natural heritage for future generations according to the Declaration in Defence of the Night Sky and the Right to Starlight (2007)<sup>3</sup> The conclusions undoubtedly had a very positive impact on astronomical and ecological challenges, and will also affect the issues of energy saving and rational energy use. Electric power should improve the quality of life for all, but its use shall be rational.

Light should be a common good, but it is necessary, as stated, be consumed and managed sustainably. Astronomy has been the science that helped sailors to travel throughout the length and breadth of this world. Since the 17th century, sky charts have been perfected, which were elaborate ephemeris for use in navigation. These charts of the sky were made throughout the 17th to the 19th centuries, in observatories that were, in general, in the centers of the largest European cities<sup>4</sup>.

The invention of commercial electricity, an unstoppable process of increasingly illuminating cities began in the 20th century. Lighting was a sign of modernity and security. In the middle of the 20th century, the implementation of lamps in cities is a priority. At the end of the century lighting is already omnipresent, making the old observatories unusable for observation.

The United Nations General Assembly proclaimed 2015 as the International Year of light and Light-based Technologies (IYL 2015), with Mexico acting as one of the promoters of this initiative. El Consejo Nacional de Ciencia y Tecnología de México (CONACYT) took advantage of this decision to promote the communication of science and technology on this subject and supported various activities focused in a more rational use of it as well as the possible consequences of irresponsible behaviour with respect to it.. It may seem contradictory that, among the many projects carried out during the IYL2015 that highlighted the application of light across various

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<sup>2</sup> The right to Dark Skies. Published in 2016 by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France and the UNESCO Office in Mexico, Presidente Masaryk 526, Polanco, Miguel Hidalgo, 11550 Ciudad de Mexico, D.F., Mexico. © UNESCO 2016 ISBN 978-92-3-000028-8 This publication is available in Open Access under the Attribution-ShareAlike 3.0 IGO (CC-BY-SA 3.0 IGO) license (<http://creativecommons.org/licenses/by-sa/3.0/igo/>). By using the content of this publication, the users accept to be bound by the terms of use of the UNESCO Open Access Repository (<http://www.unesco.org/open-access/terms-use-ccbysa-en>).

<sup>3</sup> The Starlight Declaration (La Palma 2007). Declaración Mundial en Defensa del Cielo Nocturno y el Derecho a Observar las Estrellas. Declaración Starlight - La Palma 2007 ([starlight2007.net](http://starlight2007.net))

<sup>4</sup> a protección del cielo en los observatorios: Valores científicos Culturas y ambientales José Miguel Rodríguez Espinosa Instituto de Astrofísica de Canarias, España [unesdoc.unesco.org/ark:/48223/pf0000246131/PDF/246131mul.pdf.multi](http://unesdoc.unesco.org/ark:/48223/pf0000246131/PDF/246131mul.pdf.multi)

disciplines, an international meeting on The Right to Dark Skies was organized by the UNESCO Office in Mexico.

Anyone who lives in a city knows that the act of looking up at night for stars leads to almost inevitable disappointment. Either they are not there or only the ones that shine the most can be seen. Sometimes we make a wish upon a shining, roving satellite.

Despite this is a human problem can also be seen as a legal problem too as there seems to be two different activities converging each other;

- 1- Large constellations of satellites on the one hand
- 2- Astronomical observations plus cultural rights of indigenous communities as a fundamental right to own a pristine sky.

Although there is a lack on specific regulation of this topic a number of international space rules, and pieces of national legislation can apply or be relevant to this situation:

The application of **Art I OST**<sup>5</sup> establishes freedom to explore outer space and freedom to conduct scientific activities in outer space.

Both, astronomy and satcoms constitute legitimate and lawful activities.

The Outer space does not establish any hierarchy or any kind between competing space activities.

**ART II OST** In any case, the national appropriation of space territory is prohibited by the General Space Treaty in all its forms of claim. This issue is important because airspace and outer space share a border and there is no international consensus on the delimitation of the separation of both. Contrary to space law, air law did contemplate sovereign delimitation due to security issues (and it is understandable taking into account the development of the two world wars). This was collected at first through agreements between States and later with two major international instruments, the Paris Convention on Air Navigation of 1919 and the Chicago Convention on International Civil Aviation of 1944<sup>6</sup>

**Article III OST** opens the way of the application of other branches or areas of international law in outer space international environmental law

Principles of international environmental law that might apply may include:

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<sup>5</sup> The Outer Space Treaty 1967 [TRATADOS Y PRINCIPIOS DE LAS NACIONES UNIDAS SOBRE EL ESPACIO ULTRATERRESTRE \(unoosa.org\)](https://www.unoosa.org/) Tratado sobre los principios que deben regir las actividades de los Estados en la exploración y utilización del espacio ultraterrestre, incluso la Luna y otros cuerpos celestes. Publicado en: «BOE» núm. 30, de 4 de febrero de 1969, páginas 1675 a 1677 (3 págs.) Sección: I. Disposiciones generales Departamento: Ministerio de Asuntos Exteriores Referencia: BOE-A-1969-151

<sup>6</sup> Convenio sobre Aviación Civil Internacional, 7 de diciembre, 1944 (Convenio de Chicago, 1944). [https://www.icao.int/publications/documents/7300\\_cons.pdf](https://www.icao.int/publications/documents/7300_cons.pdf)

- (i) Sustainable use.
- (ii) Prevention of transboundary harm.
- (iii) Precautionary principle.

States have the duty to avoid the contamination of areas located beyond their national jurisdiction (one of those areas being outer space)

Low earth orbit constitutes an increasingly limited natural resource and they could eventually be conceived as part of the global natural environment, same as oceans and atmosphere.

**Art VI OST** establishes:

- (i) State responsibility for all national activities including those carried out by non-governmental entities
- (ii) National activities shall require authorisation and continuing supervision.

States are responsible for ensuring that all space actors including operators of satcom acts in conformity with the OST.

States must assess compliance of private operators with applicable international law and guarantee a responsible and sustainable, both economic and environmental use of the Earth's orbital space environment, arguably including the issue of light pollution caused by their space objects.

**Article IX OST** constitutes another limitation to the freedoms of Article I.

States parties have to pay *due regard* to the corresponding interests of other states and avoid the harmful interference that for instance the light pollution created by satcoms may cause in astronomy

There is also an obligation to consult with affected State Parties in case an ongoing or potential harmful interference with their activities.

Is ground based that astronomy is protected under Article IX it is not clear from the text but historical interpretation strongly suggests that it is as the origin of Art. IX can be found in certain large scale experiments conducted in low earth orbit during the early 1960s ( Project West Ford Nuclear Explosion)

Is light pollution a harmful contamination of space or an adverse change of the Earth's environment as per Art IX) in my opinion it can be interpreted that way.

The problem with the **Article IX** is its vagueness and lack of the state practice so far.

The Committee on the Peaceful Uses of Outer Space (COPUOS) stated that: The deployment of communication satellites constellations in low Earth orbit may represent a valuable step forward in improving world connectivity. However, their large number, their sun-reflected luminosity and

their radio frequency emissions have a serious impact on astronomical observations as well as on the pristine appearance of the night sky.

The issue has been raised to the attention of the Subcommittee since its 57th Session with the Technical Presentation “The impact of mega-constellations of communication satellites on Astronomy”, presented by the International Astronomical Union. The discussion continued at the 58th Session of the Subcommittee with the Conference Room Paper AC.105/C.1/2021/CRP.17<sup>7</sup>”

“*Recommendations to Keep Dark and Quiet Skies for Science and Society*” presented by Chile, Ethiopia, Jordan, Slovakia, Spain and the International Astronomical Union which was positively commented by 18 Delegations.

At the 59th Session of the Subcommittee the dedicated single-issue agenda item 18, “General exchange of views on dark and quiet skies for science and society” was added, under which the working paper “*Protection of the dark and quiet sky*” (A/AC.105/C.1/L.396<sup>8</sup>) was prepared by Austria, Chile, the Dominican Republic, Slovakia, Spain, International Astronomical Union (IAU), European Astronomical Research in the Southern Hemisphere (ESO) and the Square Kilometre Array Observatory (SKAO).

More than 25 Delegations, either under agenda item 18 or 4 (“General exchange of views”) expressed their view on the issue which can be summarized as follows: (a) Astronomical observations for both optical and radio astronomy are an essential aspect of space activities and should be protected from interference (A/AC.105/1258, para. 267<sup>9</sup>);(b) As a consequence of the New Space the ever-increasing number of stakeholders, including private entities, that are launching spacecraft into orbit, raises serious concerns about their degrading interference on astronomical observations (A/AC.105/1258, para. 266<sup>10</sup>);(c) There is a need for trade-offs between the requirements of the astronomical community and those of the orbital operators (A/AC.105/1258, para. 271<sup>11</sup>);(d) The collaboration between the astronomical community and the satellite industries and operators aimed at studying and implementing mitigating measures has produced positive results and should be encouraged. This collaboration includes coordination agreements where companies have made commitments to abide by the International Telecommunication Union international (ITU) standards, modifications of orbital altitudes, voluntary changes to satellite designs, provision of telemetry information for observational follow-up and modification of satellite orientation in orbit raising and lowering procedures used to minimized reflected light (A/AC.105/1258, para. 272<sup>12</sup>);(e) Because of the rapid evolution in

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<sup>7</sup>[https://www.unoosa.org/oosa/oosadoc/data/documents/2021/aac.105c.12021crp/aac.105c.12021crp.17\\_0.html](https://www.unoosa.org/oosa/oosadoc/data/documents/2021/aac.105c.12021crp/aac.105c.12021crp.17_0.html)

<sup>8</sup> [https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105c.1/aac.105c.1l.396\\_0.html](https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105c.1/aac.105c.1l.396_0.html)

<sup>9</sup> [https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258\\_0.html](https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258_0.html)

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[https://www.unoosa.org/oosa/oosadoc/data/documents/2021/aac.105c.12021crp/aac.105c.12021crp.17\\_0.html](https://www.unoosa.org/oosa/oosadoc/data/documents/2021/aac.105c.12021crp/aac.105c.12021crp.17_0.html)

<sup>11</sup> [https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258\\_0.html](https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258_0.html)

<sup>12</sup> [https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258\\_0.html](https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258_0.html)

launches of satellite constellations, the ongoing exchange of views on dark and quiet skies should continue to take place in the Subcommittee, with a single-issue agenda item on dark and quiet skies for science and society to be included in future sessions of the Subcommittee (A/AC.105/1258, para. 276<sup>13</sup>).

## **II. An update on the impact of the constellations on astronomy**

The preservation of dark skies means retaining the ability to observe the sky in dark conditions similar to those that has always existed specially before the space race existed and all kinds of pollution clouded our skies. rooted since the beginning of time in the ancestral cults of prehistoric tribes, in magical rites and ultimately embedded in the deepest depths of the human being.

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In April 2022, the new International Astronomical Union (IAU) Centre for the Protection of Dark and Quiet Sky from Satellite Constellations Interference (CPS) began its operation. Considerable progress has been made in the analysis and initial implementation of mitigating measures.

Namely:

(a) More than 200 external members (either individuals or institutional) have offered their collaboration to CPS.

(b) A network of observers (mostly professional or amateur astronomers), coordinated by CPS, started collecting data of the apparent luminosity of the different satellites along their orbit. These data are instrumental to understand the reflection behaviour of the satellites and to calibrate a new predictive model of the expected luminosity by future constellations. Some of these data have been explicitly requested by some constellations operators;(c) Technological studies on different materials have been initiated by some companies in the attempt to reduce the bi-directional reflectivity of the satellites. The result of these studies are made publicly available to the world space industry ;(d) Contacts have been established by CPS with private companies that can provide accurate positional predictions of the satellites. These data could then be used to

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<sup>13</sup> [https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258\\_0.html](https://www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105/aac.1051258_0.html)

<sup>14</sup> The right to Dark Skies. Published in 2016 by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France and the UNESCO Office in Mexico, Presidente Masaryk 526, Polanco, Miguel Hidalgo, 11550 Ciudad de Mexico, D.F., Mexico.© UNESCO 2016ISBN 978-92-3-000028-8

schedule the astronomical observations in such a way that the satellite's trails are avoided;(e) Discussions with operators are ongoing to implement mitigation measures to protect radio astronomy sites, especially radio quiet zones;(f) The lessons so far learned and the best practices to be proposed to future constellation companies are being collected and made publicly available.

### **III. The path forward: a proposal**

Considering the rapid evolution of the Low Earth Orbit (LEO) constellations, it is considered necessary that the legal Subcommittee is kept informed about their impact on the visibility of the night sky, and on their impact on the science of astronomy.

It should be noted that not all aspects of coordination between satellite constellations and astronomy are appropriate for the Subcommittee: for example, global regulatory considerations relevant to radio frequency allocations are the responsibility of the ITU-R<sup>15</sup>, as it was correctly remarked in the past by some delegations. This new scenario where optical, infrared and radio emission effects share the same source, calls for a coordinated effort by the entities that oversee the peaceful use of space, regulate the use of the radio spectrum, are involved in the development and operations of large satellite constellations and the astronomical community. The IAU CPS may serve as a key coordinating body for the various stakeholders involved and member States are encouraged to participate in the appropriate forum.

For this purpose, two proposals are submitted to the attention of the delegations to the Subcommittee:

The maintenance of the single-issue agenda item "General Exchange of views on Dark and Quiet Sky" for the next 61st Session of the Subcommittee in 2024<sup>16</sup>;

The creation of an Expert Group with the task of promoting awareness, providing guidance, and enabling communication and cooperation between member States and stakeholders regarding the impact of the satellite constellations on astronomy, formulating recommendations in agreement with all stakeholders. This Expert Group should regularly report to the Subcommittee on the matter and leverage the work and structure of the IAU CPS. The duration of the workplan of the Expert Group is proposed to be of three years.

They meant to offer the possibility to any delegation to freely express their position and report on actions on the matter without having to confine it under a more generic agenda item.

A tentative Terms of Reference for the proposed questions by the Expert Group could include the following, but should be revised and finalized by the Expert Group upon its formation:

(a) Promoting awareness of the impact on optical/infrared and radio astronomy by the launched and planned satellite constellations;

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<sup>15</sup> Radiocommunication sector <https://www.itu.int/es/ITU-R/Pages/default.aspx>

<sup>16</sup>[https://www.unoosa.org/res/oosadoc/data/documents/2023/aac\\_105c\\_12023crp/aac\\_105c\\_12023crp\\_18\\_0\\_html/AC105\\_C1\\_2023\\_CRP18E.pdf](https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_12023crp/aac_105c_12023crp_18_0_html/AC105_C1_2023_CRP18E.pdf)



- (b) Conducting a structured consultation process with industry and space operators to take account of best practices and mitigation guidelines;
- (c) Analysing the overall implications of the adoption of the various mitigating measures that are being proposed in close coordination with the satellite constellations companies;
- (d) Defining a coordinated approach to addressing both optical reflectivity and radio frequency emissions, with special consideration of the boundaries and interfaces between the Subcommittee and the ITU-R;
- (e) Supporting the development of recommendations and possible guidelines for mitigating measures and approaches to be voluntarily considered by member States and the constellation operators;
- (f) The Expert Group will elect its Bureau and will define its method of work;
- (g) Reporting regularly to the Subcommittee about its findings.

On the other hand, the EU Council approved Conclusions on a “Fair and sustainable use of space” Brussels, 24 January 2023(OR. en) 5576/23 ESPACE 3CFSP/PESC 124 CSDP/PSDC 57TRANS 16.<sup>17</sup> This, while not being a binding document, it’s the highest level of “policy intent” from the EU that gives a political mandate for actions in the Member States and Commission. Hereinafter we are going to stress some main points that have become the key points such are:

Space is recognized as a global common.

Implementation of the long-term sustainability guidelines are supported.

An EU approach to STM is endorsed, for instance, the contribution of the European Union Space Surveillance and Tracking service, in collaboration with the EU Space Programme Agency.

Acknowledges the Impacts of satellites on astronomy and calls for mitigation measures.

Acknowledges that the effects of light pollution and electromagnetic interference in particular from satellite constellations must be taken into consideration and mitigation measures put in place to minimise negative impacts on astronomical observations and research worldwide;

Acknowledges that effects of light pollution from satellite constellations need to be taken into consideration and mitigation measures put in place to avoid potential negative impacts on astronomical research worldwide; hence, understands that it could jeopardise space as a global commons; recognises the risk of space weather hazard to future space infrastructure initiatives; and encourages the Commission to take an active part in the development of space weather services as provided in the space regulation<sup>18</sup>: and of course, recognises that communication

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<sup>17</sup> <https://data.consilium.europa.eu/doc/document/ST-5576-2023-INIT/en/pdf> Brussels 24/01/2023 5576/23 ESPACE 3 CFSP/PESC 124 CSDP/PSDC 57 TRANS 16

<sup>18</sup> Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021



frequencies are a finite resource and thus a constraint on activities in space; invites the Member States to coordinate efforts towards the International Telecommunication Union (ITU) in order to reach a fair and equitable distribution of frequencies for space infrastructure.

Welcomes the efforts of the United Nations Committee on the Peaceful Use of Outer Space (UNCOPUOS) in this regard Calls Upon the Member States and the Commission to continue implementing “The 21 voluntary guidelines for the Long-term Sustainability of Outer Space Activities”; *“Encourages the Commission and the High Representative, together with the Member States, to pursue a concerted and coordinated approach on how to achieve effective implementation of these guidelines, including in the EU space programme and while respecting Member States’ competences, in order to reach a European approach that is sustainable in the long term, considers in particular that the current requirement for the safe decommissioning of satellites 25 years after end-of-life should be re-evaluated; and invites the Commission to put forward suggestions for requirements to be discussed by Member States in order to achieve sustainability...<sup>19</sup>”*

### **CONCLUSION:**

The invention of electric power is undoubtedly one of humanity’s most fundamental developments.

The great advantage of illuminating our streets to return home at night, especially if the lighting is excessive, may conflict with the desire to study the confines of the universe. Excess night lighting prevents nearby telescopes from analysing the light coming from outer space. It is also a matter of biology and ecology as many species, both flora and fauna, are affected in their normal life cycles.

*“The 2030 Agenda for Sustainable Development constructs a long-term vision for new approaches, both in governance and technological innovations. The agenda is one of the key drivers for development toward sustainability and better living conditions on Earth. Space technologies have been viewed as integral to Sustainable Development goals (SDG) achievement and they can be used to support most goals. Space programs, such as Earth Observation (EO) and Global Navigation Satellite Systems (GNSS), can make significant contributions in different areas, including natural disaster forecasting, air and water quality monitoring, emergency response, search and rescue operations, and more. In addition, the use of data contributes to building stronger partnerships and coordination for the peaceful uses of outer space, and helps to reduce the space divide (UNOOSA, 2018d). This report considers space to be a critical tool for advancing and measuring the UN SDGs and their targets. As outlined*

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Establishing the Union Space Programme and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU

<sup>19</sup>[https://www.unoosa.org/res/oosadoc/data/documents/2021/stspace/stspace79\\_0\\_html/st\\_space79E.pdf](https://www.unoosa.org/res/oosadoc/data/documents/2021/stspace/stspace79_0_html/st_space79E.pdf)

*in UN Resolution 73/6, the Space2030 Agenda aims to strengthen “the contribution of space activities and space tools to the achievement of the global agendas addressing long-term sustainable development concerns of humankind” (UNGA Resolution73/6, 2018). Both Space2030 and the 2030 Sustainable Development Agenda 2030 (SDA) are closely linked and, for a large part, have common goals and a common reporting date in 2030”<sup>20</sup>.*

Satcoms operators and the astronomical community engaged since 2019 in a coordination effort aimed to mitigate the harmful effects of satellites on astronomical data, and best practices are being created for that purpose.

This channel of collaboration must be maintained, and for the moment it may be sufficient to at least mitigate this unintended effect.

However, this is essentially a self-regulation effort as it depends on the goodwill of the operators, and implementation of mitigation measures is done on a voluntary basis by the constellations.

Perhaps, it could be complemented by other voluntary initiatives that have been proposed, such as space sustainability rating (SSR) of the operators if SSR is extended to the area of light pollution caused by space objects.

Since my point of view eventually, having some international rules standards or guidelines that are applied uniformly to all operators may become necessary.

Should the international community decide to create such uniform international standards an excellent forum to do so would be the present UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

The eventual standards could use as a model the space debris mitigation guidelines and the long-term sustainability guidelines adopted in COPUOS in 2007 and 2009 respectively<sup>21</sup>.

This is a model that offers flexibility and at the same time certainty to the governments and operators.

The idea would be to create a series of non-binding guidelines that States would accept and gradually apply through their national space laws.

In the longer term, the international community might decide to conclude agreements protecting astronomy ( or stargazing generally) as well as the quality of the night sky.

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<sup>20</sup> The 2030 Sustainable Development Goals and the Role of Space Agenda.  
[https://www.researchgate.net/publication/337708280\\_Space\\_2030\\_Space\\_for\\_the\\_future\\_space\\_for\\_a](https://www.researchgate.net/publication/337708280_Space_2030_Space_for_the_future_space_for_a)  
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[https://www.unoosa.org/documents/pdf/spacelaw/sd/COPUOS\\_space\\_debris\\_mitigation\\_guidelines.pdf](https://www.unoosa.org/documents/pdf/spacelaw/sd/COPUOS_space_debris_mitigation_guidelines.pdf)  
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For instance, there is the possibility of declaring astronomy as a world o human heritage; some soft law texts already exist in that regard, such as the Starlight Declaration<sup>22</sup> (La Palma 2007).

In addition, certain international texts such as the 1996 International Covenant on Economic, Social and Cultural rights or the 2007<sup>23</sup> UN Declaration on the rights of Indigenous Peoples acknowledge the importance of participation in cultural live and science, and the right of Indigenous peoples to perform ceremonies and maintain their traditions.

All this suggests that stargazing and the right to a natural dark night sky are increasingly viewed as a fundamental right under international law.

Solutions to this problem may also come from national space law.

The (IISL) International Institute of Space Law working group (WG) looked for any national regulation limiting the optical brightness of space objects but could find none.

The only related national rule is a United States federal law enacted in 2001 prohibiting obtrusive space advertising; it does not apply exactly to our case but it provides an interesting precedent of protecting the value of the dark night sky.

On the other hand, the WG identified a large number of national and local laws and regulations protecting the quality of the night sky from ground emitted light pollution at the local level.

It is important to note that if no limits are set to the brightness of space objects, the progressive deterioration of the quality of the night sky will defeat the purpose of all these local laws and regulations and render them useless in practice.

Satellite constellations and astronomy are lawful forms of exploring and using outer space.

A coordination in the exercise of these freedoms is needed, and for the moment it is achieved through consultations between industry and astronomers; perhaps this could be reinforced through the SSR initiative.

Certain provisions of the OST apply to this issue, notably Articles I, III, VI and IX and could provide an inspiration for any future model.

A possible first step could be the adoption of non-binding guidelines in COPUOS limiting the light pollution caused by satcoms.

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<sup>22</sup> Fundacionstarlight.org The Starlight Declaration is a declaration made by the participants of the International Conference in Defense of the Quality of the Night Sky and the Right to Observe the Stars, together with representatives of UNESCO, OMT, IAU, and other international agencies and organizations<sup>1</sup>. The conference was held in La Palma, Canary Islands, Spain on April 20th, 2007. The declaration is about defending the night sky and the right to observe stars. It recognizes that the vision of starlight has been and is an inspiration for all humanity and that its observation has represented an essential element in the cultural and scientific development of all civilizations<sup>1</sup>.

<sup>23</sup> <https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights>

In the longer term, international agreements protecting astronomy and dark skies could be revised, complementing the many existing national laws and regulations that currently protect locally the quality of the night sky from light pollution

Quoting Dr Paul Bate, Chief Executive of the UK Space Agency, said: "<sup>24</sup>*Humanity relies on the benefits of space to keep us safe, connected, and able to tackle the climate emergency. Supporting the development and delivery of tools that raise awareness of the Long-Term Sustainability Guidelines is an important step in championing space sustainability. We are proud to be working with UNOOSA on this initiative to advance knowledge-sharing with other countries and helping to develop capabilities in nations that are starting out on their journey to space*<sup>25</sup>."

At the very end we shall have in mind that Dark skies belong to Humanity.

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<sup>24</sup> <https://www.gov.uk/government/news/paul-bate-appointed-as-uk-space-agency-ceo>

<sup>25</sup> [https://openlibrary.org/books/OL1423812M/Strategies\\_for\\_cultural\\_change](https://openlibrary.org/books/OL1423812M/Strategies_for_cultural_change)

## **GLOSARY:**

(CONACYT) Consejo Nacional de Ciencia y Tecnología de México

(CPS) Satellite Constellations Interference

(EO) Earth Observation

(ESO) European Astronomical Research in the Southern Hemisphere

(ISSL) International Institute of Space Law

(IAU) International Astronomical Union

(IYL) International Year of light and Light-based Technologies (IYL 2015)

(LEO) Low earth orbit

(OST) Outer Space Treaty 1967

(UNCOPUOS) The Committee on the Peaceful Uses of Outer Space scientific and Technical uses

(UNESCO) United Nations Education Science Cultural Organization

(UNOOSA) the United Nations Office for Outer Space Affairs

(ITU) the International Telecommunication Union

(ITU-R) the International Telecommunication Union – Radiocommunication sector

(GNSS) Global Navigation Satellite Systems

*(SDA) 2030 Sustainable Development Agenda 2030*

(SDG) Sustainable Development goals

(SSR) space sustainability rating

(SKAO) the Square Kilometre Array Observatory

(STM) Space Traffic Management

WG ( Working Group)

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<sup>1</sup>l a protección del cielo en los observatorios: Valores científicos Culturas y ambientales José Miguel Rodríguez Espinosa Instituto de Astrofísica de Canarias, España [unesdoc.unesco.org/ark:/48223/pf0000246131/PDF/246131mul.pdf.multi](https://unesdoc.unesco.org/ark:/48223/pf0000246131/PDF/246131mul.pdf.multi)

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“The impact of mega-constellations of communication satellites on Astronomy”, presented by the International Astronomical Union. The discussion continued at the 58th Session of the Subcommittee with the Conference Room Paper AC.105/C.1/2021/CRP.17

At the 59th Session of the Subcommittee the dedicated single-issue agenda item 18, “General exchange of views on dark and quiet skies for science and society” was added, under which the working paper

“Protection of the dark and quiet sky” (A/AC.105/C.1/L.396)

“General exchange of views” (A/AC.105/1258, para. 267);

(A/AC.105/1258, para. 266)

(A/AC.105/1258, para. 271)

(A/AC.105/1258, para. 272)

(A/AC.105/1258, para. 276)

Item “General Exchange of views on Dark and Quiet Sky” for the next 61st Session of the Subcommittee in 2024

The EU Council approved Conclusions on a “Fair and sustainable use of space” Brussels, 24 January 2023 (OR. en) 5576/23 ESPACE 3CFSP/PESC 124 CSDP/PSDC 57TRANS 16

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