

INTELLECTUAL PROPERTY PROTECTION IN OUTER SPACE – AN OVERVIEW

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Abstract

The present paper intends to, macroscopically, look at the working of intellectual property in tandem with the two international principles of space law; and how intellectual property protection functions in space. The paper is divided into three parts. First part of the paper takes up international principles of space law that outer space, including the Moon and other celestial bodies shall not be subject to national appropriation by claim of sovereignty and the exploration thereof shall be the province of all mankind and draws contrast against the territorial nature of intellectual property protection regime. Further, it evaluates the distinct ‘province of all mankind’ feature of such said international principles against the potential of intellectual property to be a tool for an unfair bargain. Second part of the paper explores the application of intellectual property protection framework with respect to space activities. Third part of the paper engages with a peripheral study of remote sensing data and ‘space inventions’ and their intellectual property protection within the ambit of copyright and patent law.

I Intellectual property and international principles of space law

II Intellectual property and space activities

III Study of Remote Sensing Databases and Patents

IV Conclusion

I Intellectual property and international principles of space law

“INTELLECTUAL PROPERTY rights can be acquired and applied in two ways: territorially and internationally.”¹ When an intellectual property² is registered in one state, the IP rights are secured only within that state. However, it may not be wrong to say that under the present advanced multilateral treaty framework pertaining to IP rights, securing and enforcement of such IP rights is virtually global, since a member state to a treaty may provide national treatment to a foreign IP right and secure or enforce such foreign IP right under its jurisdiction through its domestic laws.³ One cannot but argue that sovereign jurisdiction of a state is central to secure and enforce IP rights, consequently, challenges appear when the IP rights are contemplated in outer space where claims of sovereignty cannot be made.

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¹Ruwantissa Abeyratne, “The Application of Intellectual Property Rights to Outer Space Activities” 29 *J. Space L.* 2 (2003).

² Intellectual Property hereinafter is referred as IP.

³ Reference here may be made to multilateral treaties like WIPO Convention, 1967, Berne Convention, 1886, Paris Convention for the Protection of Industrial Property, 1883, TRIPS, 1995.

Article 1 and 2 of the Outer Space Treaty 1967,⁴ state that:

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....

There shall be freedom of scientific investigation in outer space, including the Moon and other celestial bodies, and States shall facilitate and encourage international cooperation in such investigation

Outer space, including the Moon and other celestial bodies, shall not be subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

In similar vein, the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of all States, Taking into Particular Account the Needs of Developing Countries, 1996⁵ provides that the exploration and use of outer space for peaceful purposes:

[S]hall be carried out for the benefit and in the interest of all States, irrespective of their degree of economic, social or scientific and technological development, and shall be the province of all mankind. Particular account should be taken of the needs of developing countries.

States are free to determine all aspects of their participation in international cooperation in the exploration and use of outer space on an equitable and mutually acceptable basis. Contractual terms in such cooperative ventures should be fair and reasonable and they should be in full compliance with the legitimate rights and interests of the parties concerned as, for example, with intellectual property rights.

Although the participation of the private sector in space activities is increasingly visible today, the principles of international cooperation and collective development noted above are

⁴ Refer to Outer Space Treaty of the year 1967, *available at*: <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html> (Last visited April 25, 2019).

⁵ Refer to Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, 1996, *available at*: <https://www.un.org/documents/ga/res/51/a51r122.htm> (Last visited on April 25, 2019).

still valid. “While recognizing the importance of intellectual property for the exploration of outer space and the further development of science and technology, questions have been raised as to whether the protection and enforcement of intellectual property rights may conflict with fundamental principles laid down in the Outer Space Treaty.”⁶, the fundamental principles, *inter-alia*, of outer space treaty being “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” and that “the outer space, including the Moon and other celestial bodies shall not be subject to national appropriation by claim of sovereignty.”⁷

On one hand an argument may be that taking away the commercial enterprises’ return from their investment or compromising their IP rights by way of compulsory licensing may have an adverse effect on the research and development of technologies pertaining to the usage of outer space. On the other hand, an argument may be that the remote sensing and earth observation technologies and telecommunication technologies have become almost indispensable for socio-economic development of developing states. Some scholars argue that not only the outer space technology and resources which may support territorial development but also the technology which may provide access to states to outer space has been kept out of the reach of developing states through patent laws.

World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) considering the ethical dimension of outer space activities recommended at its second session:⁸

To take all appropriate measures to provide researchers with free access to scientific data in order to guarantee sharing of knowledge with a view to promote scientific progress; to place scientific outer space data at the disposal of the developing countries; to foster the definition of procedures to permit sharing of the resulting benefits, bearing

⁶ International Bureau of WIPO: Issue Paper, “Intellectual Property and Space Activities”, 18 (2004), *available at*: https://www.wipo.int/export/sites/www/patent-law/en/developments/pdf/ip_space.pdf (last visited Dec. 24, 2019).

⁷ The Outer Space Treaty of the year 1967, art. 1 and 2, *available at*: <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html> (last visited Dec.25, 2019).

⁸Refer to Report of 2nd Session of World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), *available at*: <https://unesdoc.unesco.org/ark:/48223/pf0000132962> (last visited on Dec.25, 2019).

in mind the legitimate interests of these countries and acting in the most equitable and balanced manner possible.

In similar vein the article 66 (2) and article 67 of TRIPS Agreement, 1995 make suggestive provisions where under the developed member state may provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed member states and the developed member states may provide, on request and on mutually agreed terms and conditions, technical and financial cooperation in favour of developing and least-developed member states.⁹

There is a want of a definite mechanism and framework which may, fairly, give a value judgement and provide for the balancing of socio-economic justice with that of the intellectual property rights with respect to space activities. It may be noted here that UN has recognised the potential of space activities as a medium of globally inclusive socio-economic development. A high level Fora has been organised by United Nations Office for Outer Space Affairs to address the cross-sectoral impact of integrating economic, environmental, social, policy and regulatory dimensions of space in pursuance of global sustainable development.¹⁰ High level Forum: Space as a driver for socio-economic sustainable development in its 2016, Dubai Declaration¹¹ asserts “that space exploration is a long-term driver for innovation, strengthening international cooperation on an all-inclusive basis among nations, and creating new opportunities for addressing global challenges, and that this area could benefit from establishing an exploration and innovation coordination mechanism at the global level.”

“Emanating from the provisions of the Outer Space Treaty, which heralds the freedom principle in outer space, it is up to the individual countries to create, in accordance with the responsibilities imposed and possibilities offered by the comprehensive framework of public international space law, a legal climate conducive to private enterprise participation in space activities.”¹²

⁹ Refer to TRIPS Agreement, 1995, *available at*: https://www.wto.org/english/docs_e/legal_e/27-trips.pdf (last visited on Dec. 25, 2019).

¹⁰ Refer to High Level Fora: Space as a Driver for Socio-Economic Sustainable Development, *available at*: <http://www.unoosa.org/oosa/en/ourwork/hlf/hlf.html> (last visited Dec. 24, 2019).

¹¹ Refer to High Level Fora: Space as a Driver for Socio-Economic Sustainable Development, Dubai Declaration, 2016 *available at*: http://www.unoosa.org/documents/pdf/hlf/1st_hlf_Dubai/Dubai_Declaration.pdf (last visited Dec. 24, 2019).

¹² Hanneke Van Traa-Engelman, “The Commercial Exploitation of Outer Space: Issues of Intellectual Property Rights and Liability” 4 *LJIL* 303 (1991).

Barbara Luxenberg and Gerald J. Mossinghoff with reference to incentive for investment *viz. a viz. space activities* write:¹³

Private entities investing in commercial space ventures will spend large amounts of money over long periods of time before a return on investment can be expected. Those entities will require assurance that they can protect the ideas and inventions... Without strong protection for patents, trade secrets, and proprietary data and know-how, companies will not have the incentive to invest in developing the commercial potential of a space station.

One cannot but argue, “intellectual property protection will play an important role in developing successful space business models involving public/private collaborations.”¹⁴

II Intellectual property and space activities

At the cost of reiteration, it is stated, given the territorial nature of IP protection laws, the sovereign jurisdiction of a state is a *sine qua non* for securing and enforcing IP right, consequently, we are presented with challenges to IP with respect to space activities.

For the purpose of IP protection, distinction may be drawn between (i) outer space activities which may be performed in outer space, including the Moon and other celestial bodies, as discussed hereinabove, (ii) outer space activities which may be performed in a space vehicle or space object, and (iii) the outer space activities or rather activities relating to outer space which may be performed within the territorial jurisdictional limits of a state(s).

The outer space activities or rather activities relating to outer space which may be performed within the territorial jurisdictional limits of a state(s), could be regulated within the purview of domestic intellectual property law framework of the concerned state or through the multilateral treaty framework, as the case may be. The need for a uniform or unitary international legal framework may be felt more for the outer space activities which may be performed beyond the territorial limits of a state.

Although under international law, no state has a right to enact laws which may affect the rights of another state or its citizens outside the boundaries of such enacting state, however

¹³ Barbara Luxenberg; Gerald J. Mossinghoff, “Intellectual Property and Space Activities” 13 *J. Space L.* 8 (1985).

¹⁴*Supra* note 6 at 21.

under certain situations a state may exercise control and jurisdiction beyond its territorial limits. One such situation arises in the case of the ‘law of the flag’, i.e. the internationally accepted principle under article 5 of the Convention on the High Seas, 1958¹⁵ where under the state of registry of vessel retains control and jurisdiction over the ship and over people and activities thereon board, on the high seas.

“The doctrine of quasi-territoriality of vessels takes it that, so far as persons, things, and acts (done) on board a vessel are concerned, the board of the vessel is a jurisdictional locus of its own, and, as such, is within the jurisdiction of the sovereign of the flag.”¹⁶

Since “International law recognizes the exclusive jurisdiction of the state whose flag is flown as regards everything which occurs on board a ship on the high seas.”,¹⁷ it may be argued that, like in the case of ships which fly that state’s flag on the high seas and on aircrafts which are registered by that state, the domestic IP law might be applicable by way of analogy to space objects registered in that state.¹⁸

At this juncture attention may be drawn towards the definition of ‘space object’, ‘launching state’, ‘state of registry’ and Article 8 of the Outer space treaty:¹⁹

‘Space object’ includes ‘component parts of a space object as well as its launch vehicle and parts thereof’

‘launching state’ means ‘(i) A State which launches or procures the launching of a space object; (ii) A State from whose territory or facility a space object is launched’

‘State of registry’ means ‘a launching State on whose registry a space object is carried in accordance with article II.’

Article 8 of Outer space treaty, 1967:

¹⁵ Refer to Convention on the High Seas, 1958, *available at*:

https://www.gc.noaa.gov/documents/8_1_1958_high_seas.pdf (last visited on Apr. 24, 2019).

¹⁶ Alexander N. Sack, “The Doctrine of Quasi-Territoriality of Vessels and the Admiralty Jurisdiction over Crimes Committed on Board National Vessels in Foreign Ports” 12 *N.Y.U. L. Q. Rev.* 628 (1935).

¹⁷ Harry M. Saragovitz, *The Law of Intellectual Property in Outer Space*, 17 *PTC J. Res. & Ed.* 88 (1975).

¹⁸ Refer to *Ibid.* and *Supra* note 6 at 11.

¹⁹ Convention on Registration of Objects Launched into Outer Space, 1974, art. 1 and 2. *Available at*: http://www.unoosa.org/pdf/gares/ARES_29_3235E.pdf (last visited April 25, 2019) and Art. 1 of Convention on International Liability for Damage Caused by Space Objects, 1971. *Available at*: http://www.unoosa.org/pdf/gares/ARES_26_2777E.pdf (last visited Apr. 25, 2019).

A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return.

Two things may be noted – (i) the doctrine of quasi-territoriality has been extended to the space objects and the state of registry has been given jurisdiction over its space object and the personnel thereon; (ii) that it is not the launching state but the state of registry which exercises jurisdiction over a space object.

The distinction between launching state and the state of registry is significant. It is not the domestic legal framework of the launching state (which may carry out the launch or provide a particular piece of technology), it is the domestic legal framework of state of registry which shall be applicable over the space object.

The language of article 8 of outer space treaty may appear to pose a problem, it reads “A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, *while in outer space or on a celestial body.*” Does this mean that the control and jurisdiction of the state of registry shall only begin to operate when such space object is in outer space? No, the answer is found in the language of Article 8 itself where it reads “A State Party to the Treaty on whose registry an object launched into outer space is carried *shall retain jurisdiction and control* over such object...”; retaining can only be of a prior existing thing. A further question which may arise is, does the ‘doctrine of temporary presence’ as embodied in Article 5ter of Paris Convention for the Protection of Industrial Property, 1883 will be called in to the picture as it is usually done in case of sea vessels?

Article 5^{ter} of Paris Convention for the Protection of Industrial Property, 1883 provides:²⁰

²⁰ Paris Convention for the Protection of Industrial Property, 1883, art. 5ter.

Patents: Patented Devices Forming Part of Vessels, Aircraft, or Land Vehicles:

In any country of the Union the following shall not be considered as infringements of the rights of a patentee:

(i) the use on board vessels of other countries of the Union of devices forming the subject of his patent in the body of the vessel, in the machinery, tackle, gear and other accessories, when such vessels temporarily or accidentally enter the waters of the said country, provided that such devices are used there exclusively for the needs of the vessel;

(ii) the use of devices forming the subject of the patent in the construction or operation of aircraft or land vehicles of other countries of the Union, or of accessories of such aircraft or land vehicles, when those aircraft or land vehicles temporarily or accidentally enter the said country.

The language of the article 5ter does not expressly provide for extending the protection of doctrine of temporary presence to space objects; a firm stand on an interpretation which may bring space objects within the purview of article 5ter has not been taken by WIPO.²¹

We revert to the quest of finding the jurisdictional nexus for application of IP laws to outer space activities and state that for the acquisition and enforcement of IP rights with respect to the outer space activities which may be performed in a space vehicle or space object “the prerequisite for the applicability of the principle of quasi-territoriality is the *registration of ‘all’ the space objects* which might have a connection with intellectual property.”²²

For demonstrating the regulation of IP in outer space a specific mention of the International Space Station Intergovernmental Agreement’s article 21²³ may be made since it presents a simple yet effective modality of regulating IP rights in outer space and simultaneously and equally importantly, provides a legal framework for a cooperative space activity.

²¹ *Supra* note 6 at 20.

²² *Supra* note 6 at 13.

²³ Refer to International Space Station Intergovernmental Agreement, 1998 (hereinafter referred to as IGA) Available at: <https://www.state.gov/documents/organization/107683.pdf> (Last visited on April 25, 2019).

IGA through article 21(1) prescribes to the term ‘Intellectual Property’ the same meaning as of article 2 of the Convention Establishing the World Intellectual Property Organization, 1967.²⁴

Article 21(2) of IGA by deeming fiction extends the doctrine of quasi-territoriality to International Space Station ²⁵ and provides that for the purpose of regulating IP, an activity which may occur in or on a Space Station flight element shall be deemed to have occurred only in the territory of the Partner State (the party state to IGA) of that element's registry. Article 21(2) further carves special provision with respect to European Space Agency’s registered elements and provides that any activity which may occur on such element may be deemed to have occurred within the territory of any European Partner State.

Article 21(3) of IGA provides that the states shall not apply its domestic laws concerning secrecy of inventions so as to prevent the filing of a patent application (for example, by imposing a delay or requiring prior authorization) in any other Partner State that provides for the protection of the secrecy of patent applications containing information that is classified or otherwise protected for national security purposes in respect of an invention, which may be made in or on the Space Station flight element of that state, by a person who is not its national or resident. It further provides that such provision would not prejudice the right of any Partner State in which a patent application is first filed to control the secrecy of such patent application or restrict its further filing and/or the right of any other Partner State in which an application is subsequently filed to restrict, pursuant to any international obligation, the dissemination of an application.

Under article 21 (6) of IGA, the IGA state members have agreed that “The temporary presence in the territory of a partner state of any articles, 'including the components of a flight element, in transit between any place on Earth and any flight element of the Space Station registered by another partner state or ESA shall not in itself form the basis for any proceedings in the first Partner State for patent infringement.” Thereby adopting the doctrine of temporary presence with respect to space objects *viz. a viz.* the partner states of International Space Station Intergovernmental Agreement.

²⁴ Refer to Convention Establishing the World Intellectual Property Organization, 1967, *available at*: <https://treaties.un.org/doc/Publication/UNTS/Volume%20828/volume-828-I-11846-English.pdf> (Last visited on Dec.25, 2019).

²⁵ International Space Station hereinafter is referred as ISS.

It may not be out of place to mention here that Article 21 of IGA takes in to consideration and accounts for specific needs of European Space Agency's partner states with respect to novel issue of overlapping jurisdiction and multiplicity of legal proceedings presented by the factum of European Union.²⁶

III Study of Remote Sensing Databases and Patents

Remote sensing databases

“Non-creative databases, sometimes referred to as ‘sweat of the brow’ databases, are databases that are not creative but based on a certain level of effort or investment.”²⁷

The criteria of eligibility for IP protection to non-creative databases have not been prescribed globally. “Member states of WIPO have been discussing the possible introduction of international protection of non-original databases which presently do not qualify for protection under copyright law.”²⁸

Some states provide protection to non-creative databases through traditional IP legal framework of copyright where such non-creative databases have been created through sufficient judgment, skill, labour or investment; other states have made a *sui generis* legislative framework to provide IP protection to non-creative databases which strictly may not fall within the usual subject matter of copyright protection; European Union's Database directive 96/9/EC of 1996,²⁹ discussed herein below is an example of the same.

The protection to databases and non-creative databases against un-authorised copying and utilisation is a *sine qua non* for commercial exploitation of remote sensing and geo-spatial techniques and of the databases generated by such techniques.

Before proceeding forward, we may briefly look into the technical aspects of satellite remote sensing. “Primary remote sensing data are generated by an automated process built into the satellite sensors and then sent to the receiving stations on the ground by means of

²⁶ Reference may be made to Article 21(2) proviso for European partner states, art. 21(4), art. 21(5) and art. 21(6) of the IGA whereby overlapping jurisdiction of European partner states and multiplicity of legal proceedings which may arise there from have been dealt with.

²⁷ Refer to “Copyright and Databases”, available at:

https://www.esa.int/About_Us/Law_at_ESA/Intellectual_Property_Rights/Copyright_and_databases (Last visited Dec. 23, 2019).

²⁸ Refer to “Protection of Non-Original Databases”, available at:

<https://www.wipo.int/copyright/en/activities/databases.html> (last visited Dec. 25, 2019).

²⁹ Refer to European Union's Database directive 96/9/EC of 1996, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31996L0009&from=EN> (Last visited on April 25, 2019).

telemetry...without some degree of processing, primary remote sensing data are not comprehensible for human mind.”³⁰That such primary data is worked upon through auxiliary processing, which is the first set processing that may be applied on such data with a purpose of enabling further processing and analysis of data. The auxiliary processing is usually not considered as fulfilling the creativity criterion for copyright protection.³¹

The United Nations principles relating to remote sensing of Earth from outer space, 1986³² is the only international instrument adopted by General Assembly with respect to remote sensing and that too is only a soft law with no mention of IP protection of remote sensing data. However, the definition of ‘primary data’ and ‘processed data’ given there under with respect to remote sensing data are noteworthy:

‘Primary data’ means those raw data that are acquired by remote sensors borne by a space object and that are transmitted or delivered to the ground from space by telemetry in the form of electromagnetic signals, by photographic film, magnetic tape or any other means;

‘Processed data’ means the products resulting from the processing of the primary data, needed to make such data usable.

As per the definition noted above ‘Processed data’ “may be seen as a transition category between non-protectable primary remote sensing data and analysed information eligible for information...Analysed information most certainly falls under the copyright protection, as it is a result of human and computerised analysis of the primary data.”³³

On another note it may be said that, if above noted definitions are adopted for the purpose of protecting IP, problem may arise. The value attached to a primary data may be different as per the varying need or quality of the data that may be required or applied for a particular activity, *i.e.*, in some activities the degree of processing required may be considerably less in comparison to other activities, as such the amount of creativity, judgment, skill, labour or investment may not be enough to qualify such primary data for the protection of IP.

³⁰ Catherine Doldirina, “Intellectual property rights in the context of space activities”, in Frans Von der Dunk and Fabio Tronchetti (eds.), *Handbook of Space Law* 958 (Edward Elgar, UK, 2015).

³¹*Id.* at 959.

³² Refer to United Nations principles relating to remote sensing of Earth from outer space, 1986, *available at* : https://digitallibrary.un.org/record/126423/files/A_RES_41_65-EN.pdf (last visited on Dec. 25, 2019).

³³*Supra* note 30 at 959.

Catherine Doldirina while commenting on IP protection of remote sensing data writes:³⁴

...[T]he WIPO Copyright Treaty explicitly excludes data from the scope of the copyright protection. The definitional distinction that the UN Remote Sensing Principles make between primary and other types of remote sensing data may be interpreted as an implicit recognition of the obligation not to protect data under copyright rules.

European Union recognising the resources expended in generating databases and in order to protect the investment made, adopted European Union's Database directive 96/9/EC as a *sui generis* legislation to protect the databases the generation of which incurred substantial investment. The Database directive 96/9/EC "codifies the right of the data base maker to prevent extraction or re-utilization of substantial parts of the contents of the protected database."³⁵

In contrast, considering the majority global IP regime with respect to remote sensing activities it may simply be said that when the qualification criterion which may be prescribed for copyright protection under the domestic legal framework is met, the primary data or remote sensing data set is protected as IP; otherwise the protection to such databases is weak since *sui-generis* legislations are not in vogue and the owner of such databases can only protect the contents of databases through contractual bargains under licenses, which provide limited protection against the actions of licensee and not a protection *in rem*.

Referring to Green Paper on Copyright and the Challenge of Technology - Copyright Issues Requiring Immediate Action by European Commission, Catherine Doldirina writes:³⁶

...[T]he aim of treating any type of remote sensing data as copyrightable, which extends the traditional scope of copyright protection to the content of works, distorts the very foundational principle of copyright to protect original expression only. If, or rather since, the protection of the actual content of remote sensing data is of the utmost importance for their generators - and usually this is the case - other forms of protection should be developed or adopted instead...

³⁴*Ibid.*

³⁵*Supra* note 30 at 955.

³⁶*Supra* note 30 at 962 & 971.

One of the major issues regarding the protection of remote sensing data is that often it is not the expression that is intended to be protected, but the actual content. Copyright, however, conceptually is ill-suited for such demands... It is recommended that rights holders avoid claiming applicability of copyright protection to the content. Licenses as such are a viable mechanism... This mechanism lacks features of a negative right that copyright confers on its owner, but at least binds the parties involved to follow the agreed conditions of behaviour.

Patents

The patents related to outer space activities may be faced with the problems posed by patentability criteria of novelty, non-obviousness and usefulness or functionality to 'space inventions'.³⁷ It may so happen that a technology or particular kind of patent may only be operational in micro gravity and as such it may be difficult to prove or demonstrate its functionality or inventive step or novelty, on earth.³⁸

Further, a question may arise in case of a patent which may be invented in outer space with a cooperative effort of several states, with respect to the determination of jurisdiction and the person who may be entitled to file for patent protection. Prudence dictates rules and agreement should be established prior to undertaking such cooperative endeavour. The International Space Station Intergovernmental Agreement presents a good example of such agreement.

Enforcement of patent rights presents another problem with respect to outer space activities, which is due to the territorial nature of protection of patents and the principle and that the outer space is the province of all mankind and shall not be subject to national appropriation by claim of sovereignty.

Although in view of discussion above, it can be said that the state of registry shall be entitled to exercise its sovereign jurisdiction on the requisite space object or space vehicle and as such the state of registry shall secure and enforce the patent rights through its domestic legal framework for IP protection. However, "[d]epending on the regulatory differences among

³⁷ The expression 'space invention' refers to inventions related to outer space activity and/or a space related invention.

³⁸ *Supra* note 30 at 980.

states, companies involved in space activities that may produce patentable inventions may establish contractual arrangements and determine the state where protection is initially sought. This may in turn lead to complications stemming from ‘forum shopping’ or ‘flags of convenience’ practices, neither of which is considered an optimal path to follow.”³⁹

Also, the doctrine of temporary presence has bearing on viability of outer space activities. The exception of doctrine of temporary presence “is important for space activities, in particular due to the fact that there are only a limited number of launching sites and a vast number of states or companies have to transport their satellites to and through the territories of other states to have them launched into outer space.”⁴⁰ Certain states *viz.* United States of America and France have incorporated principle of doctrine of temporary presence in their domestic legal frame work,⁴¹ hence promoting outer space activities by creating exception in domestic patent law.

Although through International Space Station Intergovernmental Agreement certain states have devised an international legal framework to cater to and promote ‘space inventions’ and have developed a platform for cooperative space projects, still a global and comprehensive international framework for patentable space inventions needs to be developed to ensure research and development of space activities.

IV Conclusion

It has come to be accepted that the space activities are a tool for securing globally inclusive socio-economic development and Intellectual property and its protection are instrumental in encouraging space exploration and development. “IP protection is vital for the development of space activities, as it is useful in safeguarding many of their outcomes, particularly when data and information are generated by satellites, or new patentable inventions are made.”⁴² Since the global community views space activities as a driver for socio-economic sustainable development, it would be essential to protect intellectual property relating to space activities.

The potential of intellectual property to be used as tool for unfair bargaining, has been attempted to be minimised through international forum like that of United Nations, World

³⁹*Supra* note 30 at 981.

⁴⁰*Supra* note 30 at 982.

⁴¹ Refer to *Supra* note 30 at 987.

⁴²*Supra* note 30 at 989.

Commission on the Ethics of Scientific Knowledge and Technology and High Level Forum: Space as a driver for socio-economic sustainable development and TRIPS Agreement, whereby it is urged to the international community to engage in internationally cooperative and mutually beneficial practices, to have fair and reasonable contractual bargains, to provide researchers with free access to scientific data and give incentives to enterprises for the purpose of promoting and encouraging technology transfer to least-developed states. Also, the international principles of space law which prescribe that the exploration of outer space shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, have attempted to orient space activities to further the interest of all of mankind.

Since sovereign jurisdiction of a state is central to secure and enforce IP rights, consequently challenges appear when the IP rights are contemplated in outer space where claims of sovereignty cannot be made. The doctrine of doctrine of quasi-territoriality is applied *viz. a viz.* the space objects and vehicles and the state of registry to provide a jurisdictional nexus for application of domestic laws of a state. We see that International Space Station Intergovernmental Agreement provides a good example of cooperative space activity and regulating IP with respect to space activities.

Currently existing IP norms pertaining to copyright and patent law pose difficulties when subject matter resulting from space activities is the proposed subject of IP protection. The copyright right norms pose a challenge to protection of non-creative data sets constituting the primary data sets generated by remote sensing activities. The patent eligibility criteria of novelty, non-obviousness and usefulness or functionality pose hurdles in patentability of space related technologies or inventions. Both copyright and patents face challenges in enforcement which is due to territorial nature of such IP rights; the quasi territoriality doctrine still being applied with ambiguity and with non-uniformity.

With respect to trade mark protection it may briefly be said that once space tourism becomes viable, trade and commerce grows at outer space and/or advertisement billboards are employed in outer space, the marks which may be applied or displayed in or on board or on the space objects could very well be secured within the trademark protection regime of the state of registry with the application of doctrine of quasi-territoriality.

There can be an argument that domestic intellectual property laws as they stand today are fairly harmonized.⁴³ However, it may not be ignored that various states apply internationally agreed or adopted principles with their own interpretations and tailor them to the maximum permissible limits to serve their own needs and interests.

As summation, it is stated that the states may adopt or agree upon international good practices or principles and develop an international legal framework which may address the needs of IP with respect to space activities. Various interests *viz.*, the need for innovation, exploration and utilisation of outer space, socio-economic development, private interest, state interest, interest of less developed states and globally inclusive sustainable development must be factored into the equation while drawing up the good practices or principles or framework of an IP regime with respect to outer space activities. Such good practices or principles may provide that the states may incorporate into their domestic legislation - the principle of doctrine of quasi-territoriality, exception of doctrine of temporary presence, make provisions for dilution of secrecy provisions with respect to cooperative space activities, provide for eligibility criteria for protection of non-creative databases and/or primary data sets generated through remote sensing activities, provide patentability criterion for space inventions, make provisions for giving incentives to private entities so as to encourage international cooperation for space activities and technology sharing for such purposes, make substantive provisions for sharing of remote sensing data and space technology on fair and reasonable terms considering the limitations and needs of developing states.

⁴³ Reliance for such argument may be made on basis of several international IP legal regime *viz.* WIPO Convention, 1967, Berne Convention, 1886, Paris Convention for the Protection of Industrial Property, 1883, TRIPS, 1995.