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58th COLLOQUIUM ON THE LAW OF OUTER SPACE

COLLOQUIUM REPORT

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Report of the 58th Colloquium on the Law of Outer Space

Jerusalem, Israel, 2015

Contributed by Dimitrios Stratigentas, Neta Palkovitz, Simona Spassova, Michael Chatzipanagiotis, Deepika Jeyakodi, Andreas Loukakis and Olga S. Stelmakh

Compiled and edited by P.J. Blount and Rafael Moro-Aguilar

Session 1: 7th Nandasiri Jasentuliyana Keynote Lecture on Space Law and Young Scholars Session

Co-Chairs: Tanja Masson-Zwaan and Orna Ben Naftali
Rapporteurs: Dimitrios Stratigentas and Neta Palkovitz

A total of 10 papers were presented in this session of the 58th IISL Colloquium on the Law of Outer Space. The session opened with the keynote lecture delivered by Prof. Joanne Irene Gabrynowicz, examining the case of remote sensing from outer space and the evolution of the term 'use' within the meaning of the *corpus iuris spatialis*. Prof. Gabrynowicz made reference to the issue of sovereignty and how 'sensed' and 'sensing' States had different opinions on which legal regime is applicable, with the first supporting that earthly law and sovereignty should apply, whilst the latter suggesting that space law is applicable and permissions are not necessary. She then referred to the compromise that it was found and the non-discriminatory access policy, arguing that the relevant provision of the United Nations has become customary international law. Prof. Stephan Hobe asked whether the UN principles are being neglected and what is their relationship with national laws. Prof. Gabrynowicz answered that different provisions of the UN principles have different legal strength. For example, the principle stating that remote sensing is to be used for the protection of the environment and to prevent human harm is very strong. Prof. Hofmann then noted that today there is a proliferation of remote sensing and raised the question of whether people should start thinking about protecting themselves from remote sensing and the relevant companies. Prof. Gabrynowicz agreed that the issue becomes more and more relevant and questions of privacy and intellectual property rights are being addressed now on jurisdiction by jurisdiction basis. In the USA, for example, all

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digital data are now being treated in exactly the same way as data in paper. In the EU this is also a long-lasting issue.

Rishiraj Baruah presented the first paper after the keynote lecture, dealing with space mining and its legality. Baruah focused on the appropriation principle and its meaning, making an analogy to the Law of the Sea. He went on to propose an appropriate regime, providing also soft law alternatives admitting that a Treaty is not very likely any time soon. Dr. Cassandra Steer questioned about the origin of 'soft law' requirements, with Baruah noting that they could come from recommended practices of international organizations, giving as an example that of ICAO in the air law domain.

Yangzi Tao presented the following paper, also focusing on the exploitation of natural resources in outer space, affirming that there is no provision in general international or international space law prohibiting such exploitation. Acknowledging the importance of regulating these activities, Tao suggested three different approaches in regulating them, one of them being the recognition of international customary norms. Prof. Tanja Masson-Zwaan questioned whether the industry could wait for such norms to evolve into customary law at which point Tao agreed that there is an urgent need for clarity.

Sagi Kfir, General Counsel at Deep Space Industries, described the situation from the industry perspective. He specifically said that they are 'pounding at the doors of legislators' requesting clarity. He noted that although customary law may be important, the industry need urgent answers in regards to the issue of authorization and other provisions of the Outer Space Treaty. He assured that what the industry wants is not more rules, but rather clarification and specific guidance on the established provisions.

The next paper was presented by Charles Stotler, discussing the effects of fragmentation of international law on aerospace regulation. Stotler illustrated through an analysis of the US and UK national law on commerce that the goal is not harmonization, as it should be, but rather serving commercial interests.

Simona Spassova presented the next paper, referring to the issue of harmful interference and more specifically to the legal implications of erroneous GNSS signal. Spassova looked at the ITU regulations, the relevant provisions of the *corpus iuris spatialis* and general international law before illustrating the issue with a case study. Prof. Orna Ben Naftali asked for her recommendations on possible solutions. Answering, Spassova suggested that interpreting the term 'space object' as including a signal, or alternatively, developing ITU enforcement mechanisms could prove to be a solution.

Caroline Thro introduced her paper, presenting the legal issues that may arise from the development phase of the EU's navigation satellite system, Galileo, in regards to intellectual property rights, the potential conflict with the relevant ESA procurement rules and its consequences to third parties. She described the opposite rationale of the EU's and ESA's procurement rules for

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intellectual property rights, and stressed the importance of the issue due to the complexity of the project and the involvement of many actors.
The next paper was presented by Brendan Cohen, together with his co-author Elena Carpanelli, discussing the legal issues related to the enforcement of patent rights with respect to rocket launches. The speakers focused on the difficulty of enforcing domestic patent laws outside a State's territory, examining the extraterritoriality principle and considering the role of Article VIII of the Outer Space Treaty in determining where and how to apply the law of the State of registration of a space object.
Brian Stanford introduced the following paper, presenting NASA's innovative procurement design in regards to space systems. Stanford illustrated this by comparing NASA's approach to JAXA's and ESA's approaches, advocating the effectiveness of the first, and suggesting that it should act as a model for future endeavors within and outside the agency.
The next paper was presented by Dimitri Linden, introducing the diversification of national space legislation in regards to private space activities and how, instead, harmonization of these laws is desirable. Although harmonization is explicitly prohibited by Article 189 of the Treaty on the Functioning of the European Union (TFEU), there are legal bases to achieve it, such as, for example, the flexibility clause *ex* article 352 of the TFEU. Going more into depth, Linden suggested that harmonization of the registration of space objects should be encouraged as to ensure that all necessary information about space activities is transparently available. Nevertheless, he admitted that States would not be very willing to give up their discretionary powers with regard to licensing, export control and other legal matters that would help the harmonization of private space activities.
The final paper of this session was presented by Anja Nakarada Pecujlic, examining the presence of elements of *lex mercatoria* in the space domain and identifying the factors that led to its formulation. Pecujlic recognized the inability of the space law treaties to provide certainty to an ever evolving private space industry, while at the same time national space law is mostly limited to the authorization and supervision obligations of States. She then pinpointed to the traces of *lex mercatoria* in the space industry, such as the cross-waiver clause in private contracts and the third-party liability clause, concluding that this method could prove to be a solution for the space debris problem.
Very interesting questions were asked by the audience, offering the speakers the opportunity to provide further clarification as far as their papers were concerned. Concluding remarks were made by the session's chairs, Prof. Tanja Masson-Zwaan and Prof. Orna Ben Naftali, congratulating all participants for the fruitful discussion and a successful session.

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Session 2: The Relationship of International Humanitarian Law and Territorial Sovereignty with the Legal Regulation of Outer Space

Co-Chair: Steven Freeland and Ulrike M. Bohlmann
Rapporteur: Simona Spassova

The first presentation was made by Ram Jakhu of his joint paper with Steven Freeland ttled, "The Applicability of the United Nations Space Treaties during Armed Conflict." The presentation highlighted the growing importance of the question as to whether and to what extend the UN Space Treaties apply during a situation of armed conflict. Prof Jakhu proceeded by first examining the principles of General International Law during Warfare and then focused the discussion on the five Outer Space Treaties. Notwithstanding the context during which they were negotiated, these documents emphasize the peaceful use and exploration of outer space and codify a number of fundamental principles that may have the effect of limiting any possibility of armed conflict involving space. Whilst, from a normative perspective it is preferable that they should apply in such circumstances, this is not expressly provided for in the treaties themselves. After the detailed overview, the main conclusions drawn by Prof. Jakhu and Prof. Freeland are that the UN Space Treaties are covered by the rules of general international law related to the determination of effect of armed conflicts on treaties. The application of the principles of general International law to the UN Space Treaties should be determined taking into account the unique nature of space operations. All in all, the operation of UN Space Treaties is not *ipso facto* terminated or suspended during the armed conflicts, perhaps with the possible exception of specific provisions of the Rescue & Return Agreement & the Registration Convention. Lastly, and maybe most importantly, the international community should seriously negotiate additional binding instrument(s) that will help to avoid scenarios that do not bear contemplation.

The second presentation, "Cybersecurity in the Space Age," was given by Michael Potter. The presentation focused on the legal aspects of cybersecurity as relevant to issues such as outer space assets, space activities, as well as electromagnetic interference. Mr. Potter outlined the challenges within the current international legal regime, which is missing basic definitions of a 'cyberattack' as well as of 'Weapons of Mass Destruction. (WMDs)'. Notwithstanding, he argues that cyberattacks can constitute or can be regarded as WMDs. In addition, he pointed out that there is virtually no consensus on how to deal with cyberattacks in the international system, nor on the role and legality of digital and physical counter-attacks to combat these both generally, as well as those of a potential WMD magnitude. Conceivably cyberattack WMDs would have some space and satellite nexus, which would lead to the applicability of space law mechanisms. The international legal community needs to be prepared for this eventuality, although currently this preparedness is missing. Likely, the

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greatest drivers for change would be newsworthy attacks and damage resulting in commercial loses, eventually prompting behavioural changes as well.
Next, Cassandra Steer presented "Avoiding Legal Black Holes: International Humanitarian Law Applied to Conflicts in Outer Space." Dr. Steer's presentation argued for a continued application of the rules of International Humanitarian Law as well as Space law during cases of conflict in Outer Space – with a view to avoiding legal uncertainties or 'black holes' in such instances. She points out the danger of unilateral interpretations of international law when applied to space and asserts that the Rule of Law limits such one-sided positions. Not only, without the limitations of the Rule of Law, there is no system of reciprocity, which is something States in fact prefer. Dr. Steer argues that States have recognized that without the fundamental rule agreed to in Article III of the Outer Space treaty that all activities shall be carried out in accordance with international law, neither one could continue to use outer space with any sense of stability or safety. Thus, it remains a global interest to ensure that IHL is adhered to during conflicts in Outer Space and claims of suspension or exception are kept to an absolute minimum.
Peter Stubbe gave a paper titled "Environmental Protection as a Limitation to the Use of Force in Outer Space." Mr. Stubbe's presentation advocated the position that environmental protection norms do limit the use of force in outer space. Despite the absolute ban of the use of force in international law, military confrontations in international relations cannot be completely ruled out. This also applies to outer space. Satellites are heavily used for military purposes and could, therefore, be regarded by belligerent parties as legitimate military targets. Warfare in outer space would have a very negative impact on the outer space environment as it is associated with the creation of a massive amount of space debris. Mr. Stubbe argued that the environmental protection provisions of international humanitarian law, which applies to military warfare in outer space, have a limiting effect on the conduct of military operations in outer space. Outer space forms part of the human environment and space debris pollution constitutes a global environmental concern. This applies to both, the pollutive effect the deployment of space weapons have on the outer space environment as well as the use of debris as a weapon itself. Both forms prohibited under the essential environmental protection norms of the *ius in bello*.
"Humanitarian Law Implemented: Space Communication in the Service of International Humanitarian Law" was the next paper and was delivered by Mahulena Hofmann. Prof. Hofmann's presentation focused on a particular example of a novel satellite communication service, which has been used during times of armed conflicts and civil unrests. The project in question is *emergency.lu* and it was originally developed for application during times of natural catastrophes and disasters. The presentation dealt with the legal basis for the operations of emergency.lu in international as well as national law. At

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the international level, the legal basis is found in a number of areas: the UN Charter and the principle of international cooperation; the 1977 Protocol I to the Geneva Conventions, the ITU regulatory system and lastly – a specific Agreement between the Grand Duchy of Luxembourg and the ITU. After the overview of the relevant national provisions and details, the conclusions concern the implications of this service for space law, telecommunication law and humanitarian Law. In the context of space law, the responsibility and liability would be attached to the states launching the satellites used for the signals. In the realm of telecommunications law, the legal questions would concern the coordination and use of the relevant frequency bands. Lastly, the implications for humanitarian law would involve the question whether the restoration of basic telecommunications belongs to the obligations to guarantee supplies essential for the civilian population in and after a military conflict (ius in bello).

Finally, Olga Volynskaya presented "The applicability of the right to self-defence to the area of exploration and exploitation of outer space." Dr. Volynskaya pointed out that in the recent years the issue of the necessity to prevent utilization of weapons in space and preserve the freedom of outer space from military operations has been raised more and more often at the international fora. The problem of applicability of the fundamental right to self-defence recognised by Article 51 of the UN Charter to the area of exploration and exploitation of outer space is the cornerstone of such discussions at any levels. The presentation thus, analyzed a range of aspects of applicability of Article 51 of the UN Charter to outer space, potential ways of its adaptation to the domain of exploration and use of outer space in the context of the long-term sustainability of space activities, the concept developed within the framework of the United Nations, as well as other international initiatives related to the promotion of safety, security and stability of space activities. In conclusion, Dr. Volynskaya underlined the need for an unambiguous interpretation of the existing space law provisions by national policies and doctrines so as not to endanger the fundamentals of the regulatory regime of space activities. A wide international discussion is needed to reveal, analyze and regulate the whole range of aspects on application of the right of self-defence in outer space with the final aim is to ensure safety in space and the long-term sustainability of space activities.

Session 3: The Portrayal of Space (Law) in Media and Movies

Chairs: Melissa K. Force and Steven Mirmina
Rapporteur: Michael Chatzipanagiotis

The subject of this session was very original and every participant therein was looking forward to the presentations. The chairpersons had even prepared a

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cinema-like poster of the session before the event, and they had posted it on the IISL profile in facebook and on the front door of the room.

The session started with a presentation under the title "The Hard or Soft Law of *Gravity*?" which was made by co-chair Melissa K. Force on behalf of Prof. Larry F. Martinez (California State University), who could not attend the Colloquium. Mr. Martinez's presentation analyzed the portrayal of outer space in two different movies: "Marooned" (1969) and "Gravity" (2013). They have some similarities: both are mainstream Academy-award winning films, and both depict groups of astronauts that find themselves in trouble while in Earth's orbit. However, the two films also represent two very distinct eras in space exploration: "Marooned" belongs to a "hard law", State-centric view of space exploration that was prevalent during the 1960s, while "Gravity" belongs to a more diverse era and reflects "soft-law", individualistic norms instead. The political environment is also totally different in both films: whereas "Marooned" portrayed an outer space for 30-ish white males only, and where the only entities in orbit were the USA and the USSR, "Gravity" depicts a middle-aged female astronaut in a globalized environment (an American astronaut returns to Earth in a Russian spacesuit piloting a Chinese capsule).

Next was the presentation by Mr. Rafael Moro-Aguilar (Orbspace) of his paper on "Science Fiction Movies on the Moon". Mr. Moro-Aguilar's paper analyzed four classic sci-fi movies in which the theme of lunar exploration and colonization is present as either the main topic or a side topic. Fritz Lang's "Woman in the Moon" (1929), and Duncan Jones' "Moon" (2009), both touch upon legal issues of licensing and supervision of non-governmental space activities, as well as the problem of exploitation of lunar resources, which is currently unsatisfactorily regulated by international space law. Another classic sci-fi movie, Nathan Juran's "H.G. Wells' First Men on the Moon" (1964), raises the issue of the harmful biological contamination of celestial bodies, a hazard that should be prevented according to Art. IX OST. Finally, Stanley Kubrick's and Arthur C. Clarke's epic masterpiece "2001: A Space Odyssey" (1968) touches upon two important legal issues of lunar exploration: (1) the duty of States to inform the international community about their activities conducted on the Moon (Art. XI OST); and (2) the right to visit Moon stations and other lunar installations by representatives of other States (Art. XII OST).

Afterwards, Dr. George Kyriakopoulos (University of Athens) highlighted the strong human-centric aspects of space law in "Where Law Meets Cinema: James Cameron's Avatar as Food for Thought about the Anthropocentric Nature of Space Law". Based on the plot of "Avatar", Dr. Kyriakopoulos observed that the film, combined with provisions of current space law on space exploration and exploitation, especially that outer space is "province of mankind" (Art. I OST), risks creating a vision of "intense anthropocentrism"

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in the planetary exploration process. Such vision would be similar to the Colonization era on Earth, during which indigenous populations suffered from technologically more advanced conquerors. Current international law, including international space law, does not consider the protection of alien intelligent life, a fact indicating potential legal gaps. To fill these gaps, Art. IX OST coupled with the COSPAR recommendations on planetary protection from contamination can provide some guidance.

On a less heavy note, Dr. Kai-Uwe Schrögl (ESA) presented the paper of Dr. Annette Froehlich (TU Graz/DLR), which was titled "Bugs Bunny and Daffy Duck vs. Marvin The Martian: A perspective from (earthly) international space law". The paper analyzed several clips from short cartoon films, featuring well-known Warner Bross characters Bugs Bunny, Daffy Duck, and Marvin the Martian. Such humorous clips included, for instance, Marvin's obsession with the idea to destroy the Earth "because it obstructs my view of Venus". More seriously, these cartoon films bring to mind a number of problems from a space law perspective, such as the exploration and use of outer space for the benefit of all mankind (Art. I OST), protection of outer space from harmful contamination (Art. IX OST), the principle of non-appropriation (Art. II OST), issues of non militarization of space (Art. IV OST), registration of space objects (Art. VIII OST), responsibility and liability for damage caused by space objects (Arts. VI-VII OST), and even the need for a space traffic management.

Mr. George Anthony Long (Legal Parallax, LLC), in his presentation "The Meaning of Life and Close Encounters of the Commercial Kind" analyzed legal problems arising from contact with extra-terrestrial life, mainly of microbial form, on the basis of the film "Aliens". The ever increasing involvement of commercial private entities in space endeavors increases the chances that such first contact will not happen in the presence of governmental actors. Mr. Long's presentation focused on the legal duties of the entities conducting such contact, especially protection from forward- and back-contamination, as well as on the protection of intellectual property rights in international and domestic space law. He also presented a discussion of "the meaning of life", or what constitutes "alien life" for such purposes: according to COSPAR's Planetary Protection Policy, the fundamental criterion would be the ability to replicate. Mr. Long concluded that binding protocols on the discovery, study and potential use of alien microbial life are necessary.

Last but not least, Mr. José Monserrat Filho (Brazilian Space Agency) presented the paper he had written with Mr. Álvaro Fabricio dos Santos (Brazilian Association for Aeronautics and Space Law) on "Avatar Film: Perspectives from Space Law". The thesis of the authors was that the "Avatar" film is a rich case of study of Space Law, as it provides several situations where the international legal framework could be applicable. Parallels were drawn between the plot of the film and international provisions on, among others,

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non appropriation of outer space and celestial bodies (Art. II OST), international responsibility for national activities on celestial bodies (Art. VI OST), prior consultation to avoid interference with space activities of other States (Art. XI OST), use of outer space for peaceful purposes (Art. IV OST), and exploitation of mineral resources of celestial bodies. The authors concluded that the UN Treaties on Outer Space must be updated and therefore, the role of the United Nations – through its Committee on the Peaceful Uses of Outer Space (COPUOS) – must be enhanced.
All presentations were followed by vivid discussions. The closure of the session was accompanied with the hope and wish that similar sessions occur more often, and possibly with the participation of scientists from other scientific fields.

Session 4: Legal Issues of Space Traffic Management

Co-Chairs: Jana Robinson and Olga Volynskaya
Rapporteur: Deepika Jeyakodi

At this session on space traffic management (STM) 11 papers were presented highlighting the existing legal problems and further made proposals for the framing of a legal regime. The Co-chair Ms. Jana Robinson commenced the session by presenting an update on the Second IAA Study on Space Traffic Management. Tracing the background of the study since 2000 and citing developments in the subject through academic research over the years, she stated that the goal of the study was to offer guidance to existing and future space activity. The proposed 2016 Study, which is an international effort, aims to advance proposals on STM implementation. Three important diplomatic initiatives that contained STM elements were highlighted and the question of how their output could have an impact on future STM policies was also discussed. The presentation was concluded by mentioning a proposed timeline for the international study on STM.
Prof. Frans von der Dunk presented his paper on 'Space Traffic Management: A Challenge of Cosmic proportions', next, where he adopted a compare and contrast approach to identifying the unique features of space activities in developing an effective STM regime. He gave an overview of maritime and aviation traffic management, explaining the complications that will arise if principles therein were merely extended to spaceflight. He stressed on the need for an intergovernmental authority to approach the STM issue in a manner similar to that adopted for air traffic management on the high seas. Towards a solution, he suggested the development of space situational awareness system and competence structures.
Mr. James D. Rendleman, then presented a paper on 'STM Regime Needs and Organisational Options'. Asserting that any STM regime must embody the principles in Article IX of the Outer Space Treaty, he proposed three ap-

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proaches to STM architecture; Firstly, to evolve the status quo, employing the current DoD SSA Sharing Program as a foundation for STM; Secondly, establishing an STM intergovernmental organization and thirdly provision of STM by commercial operators. He examined and evaluated the options based on a rating system before concluding that a privately managed STM framework might provide a more flexible, responsive, and evolutionary process, which could reduce space operator compliance costs.

This was followed by Mr. PJ Blount's presentation on 'STM and the US Data Sharing Environment. He mentioned that effective data sharing was a pre requisite to the establishment of an STM Regime. Citing the exploratory role of the May 2014 U.S. Hearing on STM, and identifying inadequacies in the existing scenario, he suggested that the U.S. should adopt an open data policy. Drawing parallels to 'Remote Sensing Principles', he stated that an international regime can find seeds in domestic law. To a question about the competence of other space actors, he replied that any nation that can assist in moving towards an international regime, can assume the role of a leader. He urged for a cooperative stance in the U.S., who is in a position to lead, in order to not only secure its own national interests but also shape best practices for STM at a global level.

Mr. Marco Ferrazzani presented the next paper which revealed the 'Current Practices of ESA in Registering its Space Objects Launched into Earth Orbit or Beyond'. The on-going commitment of the Agency to respond to obligations under space law was elaborated upon. He briefly mentioned the former registration practice in ESA until 2013, before examining current practices. He explained in detail about the internal binding policy to substantiate and develop obligations as provided under the Registration Convention, the internal interpretation of terms such as 'ESA space object', 'status change', 'as soon as practicable', etc, and the new, multi-functional national registry for ESA. Mr. Ferrazzani cleared the queries of many members of the audience regarding the registration procedures adopted at ESA. Further, he elucidated and stressed on the equal importance of the technical and legal purposes behind registration.

Dr. Michael Chatzipanagiotis presented the next paper titled 'Looking into the Future: The Case for an Integrated Aerospace Traffic Management'. The growing use of airspace, the development of spaceflight operations and reusable rockets were the premise based on which a compelling proposition to integrate STM with Air Traffic Management ATM was made. He explained how recent developments in ATM such as the Trajectory based operations, System Wide Information Management, etc., can be made applicable for space traffic too. The presentation was a call for action to develop appropriate legal and technical rules through international cooperation.

This was followed by Prof. Hatsuru Morita's presentation on 'An Economic Analysis of the Legal Liabilities of GNSS'. By stating that the present goal of

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GNSS operators was to achieve a socially efficient level of accuracy, he went to on to examine the ideal liability system that can be efficient. Identifying the roles of various actors involved in GNSS, their responsibilities and necessary incentives, he advocated for the application of Negligence Liability as opposed to Strict Liability. Relating his conclusion to the deterrence principle under tort law, Prof. Morita suggested that an existing legal structure thus greatly reduces the need for an international treaty regime to harmonize laws.
Prof. Makiko Shimizu's paper on 'The Liability of a Civil GNSS Operator under the Domestic Law: Case Studies' was also introduced by Prof. Morita. By providing a Japanese perspective, on the liabilities of the various players involved in GNSS, the author of the paper intended to justify the decisions of ICAO and UNIDROIT to not take concrete initiatives in addressing this issue until the requirements for the use of GNSS are elaborated further at a universal level.
This was followed by an introduction of Prof. Lesley Jane Smith's paper on the impact on growth markets in the down stream sector, by Ms. Anita Rene. Examining the parameters for connectivity and services in Space Law, the paper advocated the extension of Space Law Treaties to the down stream markets.
Ms. Elina Morozova presented the next paper, on the 'Legal Regulation of The Commercial Use of Radio-Frequency Spectrum'. The secondary market for orbital positions on the GSO through 'Lease' and its legality were discussed in detail. Explaining current practices of Intersputnik, Ms. Morzova listed the practical advantages of co-operation in the GSO which included simpler financing, efficient use of a limited resource and accommodating the needs of developing countries. She concluded by quoting Section 0.3 of the ITU Radio Regulations to emphasize that such use of the orbital positions were in line with the spirit of the law. When an example of such cooperation was sought, the author elaborated on the situation in Malaysia, discussing about payload sharing, notification in case of a lease and registration of networks.
Prof. Frans von der Dunk introduced the final paper of the session authored by Mr. Nathan Johnson, in which, the right of way for on-orbit space traffic management was discussed.
Over 30 persons attended this successful session on a very topical subject for space law. The audience actively engaged in deliberations with the authors during and post-session creating a great atmosphere for further debates and discussions on the topics presented.

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Session 5: Recent Developments in Space Law

Co-Chairs: Martha Mejía-Kaiser and K.R. Sridhara Murthi
Rapporteur: Andreas Loukakis

The fifth session entitled "Recent Developments in Space Law" addressed a number of topical space law and policy related issues. During this session a number of papers were presented addressing in particular legal issues of the most recent developments in the field of space law and policy. Briefly, authors in their presentations attempted to review and evaluate current law, both public and private, in addition to European, international and national legal provisions in that regard. Others also attempted to present trends with regard to national space legislation being currently developed. Last but not least, some of the speakers also addressed in their presentations the legal problems and complexities relating to the advent of new space activities such as the exploration and exploitation of near earth objects (i.e. asteroids) but also legal issues surrounding the exploration and exploitation of planetary resources (i.e. natural resources of the Moon and other celestial bodies).
A total number of 12 papers were presented, covering a vast range of topics and analyzing the subjects of the session under different perspectives. Dr. Martha Mejía-Kaiser (Germany) and Mr. KR Sridhara Murthi (India) opened the session by giving a brief introduction on the topics.
The first paper entitled "The Controversial Rules of International Law Governing Natural Resources of the Moon and Other Celestial Bodies" was written by Prof. Maureen Williams (Argentina). A summary of this paper was presented by one of the Co-Chairs of this session, Dr. Martha Mejía-Kaiser. Dr. Kaiser in her summary presentation underlined the basic legal issues highlighted within the paper of Prof. Maureen Williams, particularly once it comes to the use and exploitation of natural resources of the Moon and other celestial bodies. Dr. Kaiser presented briefly the most pertinent legal provisions that may come into play from the field of international space law with regard to issues relating to use and exploitation of natural resources of the Moon and other celestial bodies. Specific attention was paid to article II of the Outer Space Treaty and Article 11 of the Moon Agreement. The core of the analysis of the presentation was focused on whether ownership rights on natural resources can be considered as legal or illegal under various international (space) law provisions. Dr. Kaiser then concluded her presentation by underlying the fact that most of the international (space) law provisions create a number of controversies with respect to issues related to the use of natural resources in space. An interesting point raised by Dr. Kaiser in her summary presentation was that Prof. Maureen Williams in her paper recognized the importance of the new PCA Optional Rules of Arbitration on Outer Space Disputes adopted in 2011. According to the viewpoint of Prof. Maureen Williams, this new legal instrument under the authority of the Per-

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manent Court of Arbitration may be a responsive alternative for issues relating to dispute resolution arising from the use of natural resources of the Moon and other celestial bodies for the foreseeable future.

The next paper entitled "Spain: Towards a National Space Legislation and a Spanish Space Agency?" was presented by Prof. Maria-del-Carmen Munoz-Rodriguez (University of Jaen, Spain). In her presentation, Prof. Munoz-Rodriguez attempted to provide a brief account of the efforts for promoting national space legislation in Spain. Most importantly, she also made references to the future need of creating a new Spanish space agency. More specifically, Prof. Munoz-Rodriguez highlighted the fact that presently Spain has not enacted specific national space law acts. Nonetheless, she also pointed out that some national legal provisions can be noticed containing and addressing some international space law obligations. One example discussed in this regard was the Spanish Royal Decree providing for a national Spanish register of space objects.

The third paper of the session in question entitled "How Simple Terms Mislead Us: The Pitfalls of Thinking about Outer Space as a Commons" was presented by Prof. Henry Hertzfeld (Space Policy Institute, George Washington University, USA). It is of note that the paper in question was co-authored by Brian Weeden and Christopher Johnson (both coming from Secure World Foundation, USA). Prof. Hertzfeld during his presentation delved in particular into the research question of whether outer space can be really understood as a global commons. In answering this question, Prof. Hertzfeld underlined the fact that the space treaties include several different phrases defining the exploration and use of outer space. These terms include *inter alia* the following examples: "[...] for the benefit of all peoples (countries)", "[...] shall be the "province of all mankind." Following these observations, Prof. Hertzfeld then drew his attention to the Moon Agreement by pointing out that this particular Treaty extends the aforementioned ideas in the phrase, "the Moon and its resources are the common heritage of all mankind." On this note, Prof. Hertzfeld then stressed that various legal and economic terms are nowadays used as parallels in outer space to the abovementioned phrases but however these terms do not appear in the space treaties themselves as such. To this end, the following phrases were mentioned in his presentation namely "space is a global commons," "common pool resources," "anticommons," "res nullius" and "res communis." In reality, and according to the viewpoint presented by Prof. Hertzfeld, none of these terms clearly fits the full legal or economic conditions of outer space, and none of them provide an adequate framework for the future handling of space resources, space exploration, or even for resolving the unavoidable future issues when there will be competing interests or major accidents occurring in outer space. After having reviewed the different definitions and terms that are often misused for space activities, Prof. Hertzfeld then attempted to draw several conclusions; his basic suggestion was that more pragmatic ways of insuring that the outer space environment will be effective-

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ly managed to avoid misuse, overuse, or abuse should ultimately be promoted. The advancement of more pragmatic methods could ultimately result in the recognition of limited property rights and developing new binding dispute resolution techniques.

The next paper of the session was written by Dr. Guoyu Wang (from China). His paper entitled "Who Owns the Natural Resources on the Asteroids" explored questions of property rights relating to the use of space resources, especially resources in asteroids. Dr. Wang during his speech focused in particular on three core research questions. The first question was that if and to which extent a national legislation granting ownership to space actors, or relevant national practices could contribute to or stimulate the development of space law in a general context. The second question dealt with the political risks that might be triggered by the attempt to grant property rights in space resources through national legislation. The last question pertained to what kind of international regime will be expected to be more practical as to the exploitation and mining of natural resources on asteroids. Dr. Wang highlighted the legal ambiguity of the most relevant space law instruments once it comes to space mining activities, namely Articles I and II of the Outer Space Treaty but also Article 11 of the Moon Agreement. He then attempted to furnish some conclusions in addition to proposing some more concrete solutions for the foreseeable future. He specifically advocated the argument that the issue of space mining activities may be better regulated through bilateral or multilateral agreements; in his viewpoint although the Moon Agreement is far from being generally accepted, the possibility of creating an international regime as provided for under Article 11 of the said Agreement may be the way forward as regards to the advent of space mining resources from asteroids.

The fifth paper was presented by Mr. Dennis Burnett (National Security and Export Compliance Consulting, USA). The use, exploration and exploitation of space resources was forming one of the fundamental elements of this presentation but from a different perspective. In particular, his paper entitled "Hypothetical Exploration and Use of Outer Space Act 2015" presented the text of a hypothetical act dealing with space resources that was drafted, not as a model for legislation by the United States or any other nation, but as a vehicle for stimulating a discussion by members of the International Institute of Space Law about the issues inherent in the consideration of any such legislation. More particularly, Mr. Dennis Burnett after having highlighted the fact that a hypothetical legal basis for such a national US act would be Article VI of the Outer Space Treaty, he proceeded by providing a brief account of some of the elements of this hypothetical act, in other words, a vast range of issues ranging from definitions, a specific system of authorization and supervision of commercial activities dealing with the exploration and use of outer space, the role to be played by different US entities-authorities such as the Federal Communications Commission and lastly there was also discussion of

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criminal sanctions and penalties in case of violations under the hypothetical act in question.

Following Mr. Burnett's presentation, Mr. Kumar Abhijeet (Institute of Air and Space Law, University of Cologne, Germany) presented the sixth paper of the session entitled "National Space Legislation for Developing Countries-Lessons from Europe". Mr. Abhijeet during his presentation addressed four focal points. He started by providing a brief overview of international space law provisions that could be used as a legal basis of enacting national space legislation; to this end particular attention was paid to Articles VI, VII and VIII of the Outer Space Treaty. He thereafter provided a list of EU countries that have already promoted national space legislation in Europe. Some examples discussed in this respect was Norway, Belgium, the Netherlands but also Austria. He subsequently stressed that all the aforementioned national space law acts concentrate mostly on points and issues relating to supervision and authorization, licensing conditions in addition to dispute resolution issues. Following that, Mr. Abhijeet reached his major conclusion, namely that the EU paradigm in the advent of national space legislation could potentially constitute a good example for developing countries being willing to enact national space legislation for the foreseeable future.

At this point, it is worth noting that legal issues related to the use and exploitation of space resources had a prevailing role during the fifth session on Recent Developments of Space Law. Needless to say, this session also attracted a number of stimulating presentations addressing other pertinent legal issues including the legal challenges surrounding earth observation activities, regulatory issues as regards to the use and exploitation of small satellites (i.e. cubesats), earth observation and data protection issues and lastly interesting space law developments in other regions such as Asia.

More specifically, the seventh paper of the session in question was written by Prof. Yasuaki Hashimoto (the National Institute for Defense Studies, Japan) and pertained its analysis to latest space law and policy developments in Japan. This paper entitled "The Latest Space Basic Plan in Japan – Its Features and Implications" was summarized by Prof. Setsuko Aoki (Keio University, Japan). During her summary presentation Prof. Aoki stressed that the latest basic plan on space policy in Japan was established by Strategic Headquarters for Space Policy in January 2015. According to Prof. Aoki, this latest development in Japan pays much attention to the security related outer space activities than the previous two Japanese basic plans of 2009 and 2013 respectively. In addition, she underlined that the new plan is thought to reflect some of the contents in National Security Strategy of December 2013. Having underlined these issues, then Prof. Aoki gave a brief overview of the three pillars as included within the latest basic plan in Japan namely issues related to safety of outer space, issues relevant for security by outer space and lastly issues dealing with space international cooperation.

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The eighth paper of the present session shifted its analysis to pertinent legal and regulatory issues surrounding the use of small satellites. This paper entitled "Small but on the Radar: The Regulatory Evolution of Small Satellites in the Netherlands" was co-authored by Mrs Neta Palkovitz (ISIS-Innovative Solutions in Space BV, the Netherlands) and by Prof. Tanja Masson-Zwaan (International Institute of Air and Space Law, Leiden University, the Netherlands). As underlined by Prof. Masson-Zwaan during her presentation, this paper was the corollary of an earlier paper presented in 2012. More substantially, in 2012 the authors presented a paper that explained the regulatory situation with respect to nanosatellites, in selected national laws of European states. According to the findings of the said paper the examples demonstrated a practice which excluded nanosatellites activities from the scope of certain national laws, leaving these satellites to orbit 'under the regulatory radar'. Nonetheless and since then, as highlighted by Prof. Masson-Zwaan the following tendencies in the field of nanosatellite market have been noticed: the market for small satellites has grown rapidly with hundreds of small satellites already launched. What is more, many entities are aiming to launch small satellite networks or constellations, which indicates that these satellites will be around to stay. One particular state that excluded small satellite activities from being licensed under its national space law was The Netherlands. With time, and as small satellite activities became a Dutch reality, the Dutch Government had to consider a solution to enable it to authorize and supervise these space activities, in line with Article VI of the Outer Space Treaty. Following these observations and developments, Prof. Masson-Zwaan during her presentation provided with a brief account of the abovementioned described regulatory evolution that started with the abovementioned exclusion by the Netherlands; she presented the progress underlined towards an ad hoc authorization process in 2013 in the Netherlands; and finally she reached her conclusion by describing a recent Decree extending the scope of the Dutch Space Activities Act (2007) to 'unguided satellites' as of 1 July 2015 on the one hand and by providing certain implications for the foreseeable future on the other hand.

Following this presentation, the next two paper presentations of the session in question described interesting space law developments in particular regions, namely Asia (i.e. China) as well as Europe. More concretely, Prof. Yun Zhao (the University of Hong Kong) in his presentation attempted to demonstrate the various legal issues that China may have to face from its future participation in the space protocol to the Cape Town Convention, whereas Prof. Irmgard Marboe (University of Vienna Austria) focused during her presentation on Earth observation and data policy issues within the European landscape (especially she paid particular attention to the so-called Copernicus program). Specifically, Prof. Marboe in her presentation discussed briefly the EU Directive 2003/98 providing for an open data policy within the EU and

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how this Directive can be interpreted in light of the existence of a high level of protection of various human and economic rights as applicable within the EU legal order (i.e. right to private life, the protection of personal data and of intellectual property).
The next paper of the session entitled Earth in Danger and Space Law was presented by Prof. Jose Monserrat-Filho (Brazilian Space Agency). Briefly, Prof. Monserrat-Filho attempted to demonstrate how space law can ultimately contribute to the management of catastrophes; he interestingly highlighted the fact that space law can ultimately be seen as an instrument of preventing catastrophes. Finally, the last paper of the present session entitled "International Legal Issues on Construction and Operation of Space Solar Power Station" was presented by Prof. Shouping Li (Beijing Institute of Technology, China). Briefly, Prof. Li presented the hypothetical case study of constructing and operating a space solar power station. He pointed out in his presentation that whereas such a project will ultimately be beneficial for the humanity, a need to improve the existing international space law provisions may be necessary in undertaking such a project in the near future.
At this point, it is worth mentioning that the fifth session of the fifty eighth Colloquium of the IISL on the Law of Outer Space was well attended with an approximate number of 50 participants. Furthermore, most of the participants were active during the session of discussion by raising fruitful and stimulating questions in relation to the subject matters of the presentations. A last point worth noting is that the issue of use and exploitation of space resources was quite topical during the session in question by attracting particular attention amongst the audience with a number of invigorating questions related to this topic at the end of the session.

Session 7: Joint IAF/IISL Session on the Legal Framework for Cooperative Space Activities

Chairs: Cristian Bank and Bernhard Schmidt-Tedd
Rapporteur: Olga S. Stelmakh

A total of 5 papers were presented at the Joint IISL / IAF Session on the Legal Framework for Cooperative Space Activities. The presentations addressed a wide range of topics and analyzed the subject matter under several different perspectives. The distinguished chairs opened the Session, introducing themselves and giving a brief introduction to the topic.
Prof. Setsuko Aoki from Keio University, Japan made the first presentation entitled "Identifying Common Legal Issues in International Cooperative Mechanisms." The presentation provided an overview of the work conducted within the UN COPUOS Legal Subcommittee purported at adopting the set of recommendations and conclusions distilling the common grounds in a range of space cooperative mechanisms to facilitate the creation of a solid

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and appropriate legal basis for space collaborative initiatives. In her presentation Prof. Aoki particularly focused on common principles and procedures in international space cooperation agreements according to the type of collaboration. She performed categorization of the international space cooperation agreements and extracted their distinctive features and key provisions. Prof. Aoki also examined the five-year UN COPUOS Legal Subcommittee work plan for 2013-2017 named "Review of the International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space". Particular attention has been paid to the development of the concept of "International Cooperation" reflected in the UN COPUOS legal instruments.

The next speaker Ms. Sumara Thompson-King from the National Aeronautics and Space Administration (NASA), delivered the presentation entitled "International Cooperation Mechanisms Used by the United States in the Peaceful Exploration and Use of Outer Space." Within her presentation she considered a range of cooperation mechanisms the United States utilizes with international partners in a broad and diverse portfolio of civil and commercial space activities. In particular, Ms. Thompson-King focused on four categories of cooperation mechanisms, notably the formal written agreements which establish commitments and create binding international obligations at the government level and at the space agency level with respect to the ISS, the framework agreements that facilitate specific cooperative endeavors, the Global Learning and Observations to Benefit the Environment (GLOBE) and multilateral cooperative fora not created through legally binding agreements in which the US participates. Ms. Thompson-King highlighted the main approaches that the United States, including NASA, use when engaging in international cooperation. In this context she specified that for different matters concerning international space cooperation different mechanisms are applied. Ms. Thompson-King further elaborated that when addressing international cooperation mechanisms, the United States intend to continue to partner through legally binding international agreements and to participate fully in many multilateral space policy and technical fora not established through binding international agreements.

Ms. Olga S. Stelmakh from the Parliament of Ukraine, made the following presentation entitled "Global space governance for ensuring responsible use of outer space, its sustainability and environmental security: legal perspective". In her presentation she focused on the dominant legal actions taken worldwide, more specifically at the regional and international level, towards responsible and secure use of outer space and ensuring of its sustainability. For this purpose she analyzed the sufficiency of applicable legally binding norms elaborated at the beginning of space era and extent of complementarity of the pertinent soft law provisions. Ms. Stelmakh also envisaged legal grounds for regulating emerging space threats and a shaped framework for measures taken at all stages of space activities towards achieving of aforementioned objectives. The emphasis has been made on legal initiatives to manage the risks posed by

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dangerous space debris, nuclear power source applications in outer space, destructive collisions, the crowding of satellites, the growing saturation of the radio-frequency spectrum, etc. Further Ms. Stelmakh provided a comprehensive overview of the legal scope for such topical concepts as "space situational awareness", "space traffic management" and "active debris removal". Finally, she examined the role of international cooperation through transparency and confidence-building measures designed to enhance coordinated actions in the context of concepts' proper implementation.

The next presentation entitled "Impact of International Code of Conduct for Outer Space Activities and EU contribution to collaborative projects – Devising a new approach for space law in Europe" was delivered by Ms. Anita Rinner from Karl Franzens Universität Graz, Austria. In her presentation she considered the role of International Code of Conduct (ICoC) as "soft" law for collaborative projects and its impact on them. She recalled that the ICoC was initially contemplated as the European Code of Conduct for Outer Space Activities being seen as an instrument for developing harmonised European standards in space debris mitigation, space traffic management and the sustainable use of outer space. For this purpose, she deemed expedient to analyze the EU space competences and the role of "soft" law, and came to the conclusion that non-binding rules could serve as a new approach to achieve harmonised behaviour in space within the European scope. Ms. Rinner also provided a brief overview of the ICoC drafting and negotiation process, focused on key provisions and the most critical amendments suggested to them. To conclude, she described the impact of ICoC on harmonisation of European space legislation, contribution to capacity-building of space traffic management, space debris mitigation, transparency and confidence builing measures, as well as on the collaboration in export and technology control.

The last presentation of this session entitled "Practical Application of Jus in Bello and Jus ad Bellum to the Legal Regulation of Outer Space Environment" was made by Mr. Olusoji Nester John from the African Regional Center for Space Science and Technology Education in English (ARCSSTE-E) in Nigeria. The paper presented was initially submitted to session 2 "The relationship of International Humanitarian Law and territorial sovereignty legal regulation of outer space" but due to late arrival of a speaker has been moved to the current session. In his presentation Mr. John focused on the International Humanitarian Law rules which govern the legality of the use of force by nations (jus ad bellum) and regulate the actual conduct of war once the use of force begins and has attained a reasonable level of intensity (jus in bello). In addition he considered practical application of such rules to the unique environment of outer space. Mr. John drew attention to the fact that the world has experienced incredible advances in technology and means of warfare. Due to the changing paradigm of the nature of military forces of States and the execution of armed conflicts, outer space is more frequently

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used for the purposes of protection of, and threats to, territorial integrity and sovereign independence. He provided a brief discussion on jus ad bellum and jus in bello, and talked about the legal regulation of outer space as it relates to armed conflict and its intersection with the two principles. Within his presentation Mr. John also analyzed the duties of space-faring belligerent nations towards non-combatant civilians and civilian objects in outer space and on Earth. He concluded that the legal regime of outer space as it relates to armed conflict in and through outer space is inadequate and in all armed conflicts, whether on land or in outer space, jus in bello should apply. Moreover Mr. John was of the view that those working in the field of International Space Law and International Humanitarian Law should come up with an all-embracing legal regime, which will embody the principle of jus in bello in the regulation of armed conflicts in and through outer space.

Detailed questions were presented from the audience, opening a lively debate in relation to the topics covered in this session. In sum, all presentations underlined the increasing importance of the legal framework in space cooperation. The closing remarks were delivered by Mr. Bank and Dr. Schmidt-Tedd.