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59th IISL COLLOQUIUM ON THE LAW OF OUTER SPACE

Colloquium Report

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Report of the 59th Colloquium on the Law of Outer Space

Guadalajara, Mexico, 2016

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Session 1: 8th Nandasiri Jasentuliyana Keynote Lecture and Young Scholars Session

Co-Chairs: Tanja Masson-Zwaan and Rosa María Ramirez de Arellano y Haro
Rapporteur: Christopher D. Johnson

A total of eleven papers were presented in the 8th Nandasiri Jasentuliyana Keynote Lecture and Young Scholars Session, the first session of the 59th IISL Colloquium on the Law of Outer Space. The 2016 session opened with a keynote lecture by incoming IISL President, Kai Uwe-Schrogl, on the topic of space law and diplomacy. In his lecture, Dr. Schrogl spoke about both space law as the historical subject of diplomacy, and of space activities driving and assisting diplomacy. Today, in consideration of future space activities by more numerous and diverse actors doing more advanced activities, Dr. Schrogl raised the question as to whether the current space law regime requires expansion and elaboration. Just as importantly, there is the issue of balancing the notions of equitability and fairness (as enshrined in Article I of the 1967 Outer Space Treaty) with the notions of effectiveness and efficiency – notions which are so often mentioned by those promoting regulatory liberalism and the merits of private enterprise. This balancing has already taken place in the International Telecommunication Union (ITU) regime with respect to access and use of geostationary orbits and portions of the electromagnetic spectrum used for frequencies. Dr. Schrogl concluded his keynote address with an overview of the IISL, an international academic and professional organization whose current membership reflects almost sixty nationalities and an impressive array of academics and practitioners from various legal systems. The IISL is a kind of academic and quasi-diplomatic clearing house for the development of notions and ideas in space law.

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The session was then devoted to young scholars, including recent graduates and new members of the IISL. First to present was Pierfrancesco Breccia of Sapienza University, who delivered a paper concerning Article III of the Outer Space Treaty and its relevance in the international legal framework. This paper was also awarded the IISL's 2016 *Prof. Dr. I. H. Ph. Diederiks-Verschoor Award for the Best Paper by a Young Scholar*. Mr. Breccia's paper discussed the complex and subtle interlinkages between space law as an apparently self-contained regime and the broader foundation of public international law. He contended that these linkages have yet to be mapped in their full detail, and that the seams and interstices between these regimes give pause to both scholar and practitioner in the considering rights and obligations of states in their space activities.

Further papers presented at the young scholar's session continued in a similar vein, each discussing arising issues in the existing space law regime, its adequacy for addressing emerging and planned space activities, and domestic unilateral and international multilateral space law responses. The second paper was presented by Philip De Man and discussed the impact of national space legislation on interpreting principles in international law, specifically on principles of global cooperation. He contends that national space legislation and state practice are both important elements in forming interpretations of treaty provisions, especially with ambiguous treaty provisions. However, the practice by some pioneering and advanced states may determine the interpretation of some principles, and the responsibility of non-spacefaring nations which might disagree with the practice of these states is to voice their disagreement in international fora.

The third paper was presented by Eloi Petros, who discussed legal issues implicated by the concept of a moon village. The emerging idea of a moon village is one which is open to partners of the existing International Space Station (ISS) and non-partners, along with non-state actors such as private space companies. As private actors will be central to the moon village, their involvement will require legal innovation on many levels, including perhaps at the international level. Lessons from the ISS experience point toward unprecedented challenges in the ways that oversight of national activities are conducted, as well as potential liability problems. However, the concept of the moon village is still emerging, with all stakeholders and potential activities yet to be fully mapped.

Dimitra Stefoudi then presented on legal aspects of big data, such as the massive amounts of data to be generated by space projects and programs. The topic of space and big data was the focus of a recent team project at the International Space University's 2016 Space Studies Program, held in Haifa, Israel, and Ms. Stefoudi served on the team project and delivered her findings to the Colloquium. Space data applications include data for position, navigation and timing (PNT) applications, Earth observation, disaster

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management, environmental protection, space sciences, and various commercial applications still emerging such as connectivity and data transmission applications. With all this data from space, legal issues emerge from the sheer wealth and amount of data available, along with integrating the data accurately and liability issues which might emerge. Data protection and privacy issues will also be present.

Olga Stelmakh-Drescher and Ivan Kosenkov then addressed the question of non-operational small satellites and how to conduct capacity building in space in a manner consistent with the possibility that small satellites can contribute to the space debris problem. They discussed how the current international framework seems ill-suited for small satellites, especially considering that there is no specific framework for small satellites, and they recommended that more thoughtful management of low Earth orbit (LEO) for emerging small satellites and mega constellations plans be implemented. They also recommended a deeper look at existing soft law and guidelines for small satellites, especially as small satellites often shortened operational lifespan and non-maneuverability distinguish them from larger, traditional spacecraft systems.

Konstantina Liperi then delivered a paper discussing scarcity over certain space resources, such as spectrum and orbit. Both spectrum and orbit are shared resources and subject to the non-appropriation principle of the Outer Space Treaty. However, the idea exists that users and operators in the space environment might want to engage in bilateral private trading of orbits and/or spectrum. This would seem to drive efficiency and innovation in the space sector, as orbits and frequencies would be in the hands of those who value them the most. While not prohibited by space law, the practice does not seem to be explicitly permitted either.

Simona Spassova next discussed the use of alternative dispute resolution in the satellite communications industry. One possible avenue for alternative dispute resolution is the International Chamber of Commerce's International Court of Arbitration. A second option would be using the Permanent Court of Arbitration (PCA)'s Optional Rules for the Arbitration of Disputes Relating to Outer Space Activities. A third option would be using the mechanisms in the International Telecommunications Union (ITU). Although the ITU lacks a specific mandate it seems to act as mediator in many instances of disagreements between states parties. The ITU also has technical expertise and is perceived as being impartial.

Tugrul Cakir discussed the public service exceptions containing the space assets protocol and the Luxemburg protocol on railway rolling stock, both protocols to the Cape Town Convention on Mobile Assets. The public service exceptions proved to be difficult concepts in the negotiations for both protocols, with the space assets protocol seeming to reduce potential negative impacts to creditors in maintaining public service during default, while the Luxembourg protocol compromises between diverging interests by way of compromise.

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Nicholas Puschman spoke about environmental sustainability provisions and best efforts provisions are used by the space industry in contracting. Because space-related risks remain inherently difficult to calculate, the space industry uses "best efforts" clauses in contracting, and provisions like these provide a method to ensure that issues such as liability are addressed. Additionally, as space sustainability becomes ever more important, and actors in the space industry realize the importance of preventing space debris and similar measures, contracts within the industry have begun to incorporate sustainability provisions, often making reference to standards and guidelines promulgated on the national, regional, and international level.

Akiko Watanabe discussed the concept of the launching state in space law, and the possibility of liability accruing on states which do not fall into the category of launching state as it is traditionally conceived. The four categories or methods of defining launching states, as defined in the space treaties, leave open the possibility that a state purchasing a satellite previously launched would not be defined as the launching state. While individual contractual solutions have been exploited, another method is to reinterpret the treaties themselves so as to be more in line with the concept of control of the space object.

Finally, Hannes Mayer discussed legal issues related to planetary defense. While asteroids and other Near Earth Objects (NEOs) do not fall into the definition of space object under the relevant treaties, asteroid deflection activities would still constitute national space activities, with the ensuing international responsibility and potential international liability obligations. Consequently, any planetary defense undertaking might create or be part of the causal chain leading to damage, including damage as an unintended consequence, and the organizers or executors of such a defense might be considered responsible and liable for that ensuing damage. A deeper look in the implications and extensions of the mechanisms of space law is therefore necessary if space law is to aid, and not prevent, planetary defense activities.

In summary, while the papers discussed a very wide array of issues in space law, a common theme emerged. In the views of the young scholars in space law, the existing international and national space law regime is already being stretched to address existing and envisaged activities, and workable regulatory solutions should be pursued for planned and envisioned activities in the near future and mid-term future.

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Session 2: Legal Perspectives on Space Resources and Off-Earth Mining

Chairman: Prof. Dr. Mark J. Sundahl, Cleveland State University, United States;
Chairman: Dr. Fabio Tronchetti, University of Mississippi, China;
Rapporteur: Dr. Guoyu Wang, Beijing Institute of Technology, China

This session on the legal issues arising from the extraction of natural resources from celestial bodies attracted a great deal of interest. Only a limited number of the 38 abstracts submitted could be selected for presentation. The speakers were geographically diverse and were drawn from industry, government, and academia. Interest in the panel topic has grown in recent years due to the establishment of multiple asteroid-mining companies and the passage of the 2015 Space Resource Exploration and Utilization Act (SREUA) in the United States. The room was filled to standing room-only capacity and robust discussion lasted until audience questions were cut off after the session ran past the allotted three hours. The Co-Chairs opened the panel by introducing the subject matter under discussion and calling the first speaker to the podium.

The first paper, entitled "The Hague Space Resources Governance Working Group: A Progress Report", was authored jointly by Tanja Masson-Zwaan, René Lefeber, Giuseppe Reibaldi, and Merinda Stewart. The paper was presented by Tanja Masson-Zwaan from Leiden University. The paper described the constituency, purpose, and process of the Working Group as well as a status report on its progress. She explained that the Working Group has undertaken the drafting of "building blocks" that are intended to "prepare a basis" for the regulation of resource extraction in space.

The second paper, entitled "Title IV of the U.S. Commercial Space Launch Competitiveness Act of 2015: A Critical Step Forward in Facilitating the Development of a Viable Space Infrastructure", was presented by Sagi Kfir, General Counsel for Deep Space Industries Inc. Kfir dispelled some misconceptions about the recent enactment in the U.S. of the SREUA and explained the industry need for regulatory certainty in order to secure investment. Following his presentation, Kfir took questions from the audience. Prof. Sergio Marchisio made a statement about the limited application of customary international law in space. Prof. Olavo Bittencourt opined that a multilateral approach to the issue of space resources would have been preferable to unilateral domestic regulation. Kfir responded by calling attention to the deference given to international law in the text of the SREUA and the open legislative process that proceeded its enactment. A student then asked whether any sovereign action relating to space was prohibited under Article II of the Outer Space Treaty. Kfir clarified (together with Prof. Frans von der Dunk who spoke later in the session) that only sovereign acts which amount to appropriation are prohibited, not sovereign acts in general.

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Ram S. Jakhu of McGill University and Steven Freeland of Western Sydney University delivered the next paper entitled "The Relationship between the Outer Space Treaty and Customary International Law." Prof. Jakhu provided a thorough explanation of the emergence of customary international law in space. In the course of his talk, Prof. Jakhu explained that resource extraction is permitted under existing international law, but that it must be carried out for the benefit of all mankind.

Mahulena Hofmann of the University of Luxembourg took to the podium next to deliver the fourth paper which was entitled "COSPAR Recommendations in a New Context? Environmental Aspects of Space Mining." She provided a history of the evolution of planetary protection measures that have culminated in the COSPAR regulations for avoiding interplanetary contamination. At the end, Prof. Hofmann observes that the COSPAR recommendations apply to all space missions without exception, which includes asteroid mining. She also advised that all missions should utilize the COSPAR recommendations when seeking compliance with Article IX of the OST, but also noted that the recommendations are not legally binding.

The paper entitled "The Dawn of an International Regime for Space Resources: Multilateral Perspectives" was next presented by Olavo de Oliveira Bittencourt Neto of the Catholic University de Santos. Bittencourt posited that the use of outer space requires coordination and cooperation among the international community. He explained the benefits of a multi-lateral approach to interpreting the Outer Space Treaty with respect to resource extraction. He applauded the multi-lateral nature of the Hague Space Resources Working Group and called for further international action on the topic. Both co-chairs spoke up following Bittencourt's presentation regarding the need to provide regulatory certainty to investors in a timely fashion that can be provided by relatively swift domestic action, whereas the international rule-making process, while certainly desirable, is a longer-term project.

The next paper, entitled "The End of the Concept of 'Common Heritage of Mankind'? – The Views of State Parties to the Moon Agreement", was then delivered by Irmgard Marboe of the University of Vienna. Her paper raised the interesting questions of how state-members of the Moon Agreement should approach asteroid mining. Under the "common heritage of mankind" principle enunciated in the Moon Agreement, Marboe explained that an international approach to resource extraction (ideally as envisioned in Article 11 of the Agreement) is required. She provided a detailed recapitulation of the recent COPUOS Legal Subcommittee meeting and noted that the views of State parties to the Moon Agreement were somewhat mixed. Upon closing, Marboe praised the efforts of the Hague Space Resources Working Group in undertaking an international effort to address these issues.

Virgiliu Pop of the Romanian Space Agency next stepped to the podium to deliver, with trademark enthusiasm, his paper entitled "Is Outer Space proper the 'Common Heritage of Mankind'?" Mr. Pop's paper exposed a trend in

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diplomatic communications as improperly reading the Common Heritage of Mankind principle found in the Moon Agreement into general international space law. Pop explained that under the Outer Space Treaty the language used is the "province of all mankind" rather than the Common Heritage of Mankind. Moreover, he stresses that this phrase ("province of all mankind") applies to space activities and not to space itself. He then described how this misconception was (perhaps deliberately) promoted through misunderstanding, misinformation, and misdirection. The session's rapporteur, Guoyu Wang, commented after Mr. Pop's presentation that the Chinese phrase is "common wealth of mankind" rather than "common heritage of mankind."

In a particularly engaging presentation, Dr. Michael Chatzipanagiotis next delivered his presentation "3D Printing Using Material from Celestial Bodies: A Method to Circumvent the Non-Appropriation Principle?" in the innovative format of a hypothetical story. His paper examined whether the non-appropriation principle could be circumvented through 3-D manufacturing using space resources. He stated that the question of ownership of a manufactured item remains open under international law. To solve the problem, Mr. Chatzipanagiotis suggests establishing an international organization according to the model of the International Seabed Authority. Through licenses granted by this organization for the exploitation of resources, the ownership of manufactured items would then be recognized under international law.

The ninth paper, entitled "The Paradox of the United States' Position on the Regulation of Space Resource Extraction," was presented by Melissa K. Force of MK Force Consulting. In her paper, Force examines the apparent paradox of the U.S. lack of interest in an international framework for resource extraction despite the fact that the U.S. negotiated the terms of the Moon Agreement which calls for an international regulatory process.

The next paper was entitled "Legal Challenges in front of private sectors on exploration of Space Resources and off-earth mining" and was written jointly by Hamid Kazemi and Ali Akbar Golroo of the Iranian Aerospace Research Institute. The presentation explained the insufficiency of existing international space law regarding the liability of private actors. The question was raised in the presentation about whether states should be held liable at all for the actions of private actors. In the end, the paper recommends the possible revision of the existing treaties to more explicitly address the issue of liability for private actors, such as asteroid mining companies.

Eytan Tepper of McGill University next mounted the podium to deliver the penultimate paper of the session entitled "Space Resources: Between Economic and Legal Commons." In his paper, Tepper undertakes a novel analysis of the issue of property rights over extracted resources by taking as his starting point a re-categorization of space resources as "common-pool resources" under the economic theories of Nobel Laureate Elinor Ostrum. By

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separating the economic aspects of asteroid mining from its legal aspects, Tepper forces commentators to take a new perspective on the matter.

The twelfth and final paper of the session was entitled "Space resources exploitation from the International and Domestic Law Perspectives: The Russian Approach" and was delivered by Olga Volynskaya of ROSCOSMOS. Volynskaya explained the Russian perspective on space resource extraction and concluded that the exploitation of space resources requires an internationally accepted legal regime, as contemplated in Article 11 of the Moon Agreement.

Although the three hours allotted for the session had expired, the audience remained for a brief question and answer period. Perhaps most notably, Prof. von der Dunk reminded those in the room that the 1986 ILA Seoul Declaration made clear that even if space is deemed to be the common heritage of mankind, this would not prohibit the extraction of natural resources.

The session, as a whole, provided a forum for a robust exchange of ideas on the matter of space resources and encouraged a series of insightful discussions. With few exceptions, a quick review of the papers summarized above indicate a general consensus of those who participated in the session that the extraction of and ownership over space resources is not prohibited by international law. That said, there was also a general consensus that international cooperation and consultation on the issue is important.

Session 3: Contemporary Considerations about the 1986 Principles Relating to Remote Sensing of the Earth from Space

Co-chair: Professor Maureen Williams and Dr. Martha Mejia-Kaiser
Rapporteur: Kumar Abhijeet

The session on remote sensing witnessed six presentations. Prof. Maureen Williams opened the session with a reference to some of the most important landmarks in the field following the adoption of the UN Principles relating to Remote Sensing of the Earth from Outer Space (1986). She mentioned, inter alia, the development of Principle XII on 'the right of access to data" which, initially, raised a sharp confrontation between the developing and industrialised world on the grounds that the former were being 'spied on' by third states having the appropriate technology. As time went by, however, this rather political disagreement subsided. By means of bilateral and regional agreements based on international cooperation principles covering aspects on which the Principles remained silent, developing countries gradually began accessing the advanced technologies. The net result was that, a few years later, a number of developing states, apart from being 'sensed states,' became 'sensing states' as well. Therefore, the initial confrontation was much less dramatic.

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Williams then addressed various applications of remote sensing activities over the years, such as the validity of satellite as evidence in court. She drew the attention to certain difficulties experienced within the ICJ and PCA in cases relating to satellite imagery at the stage of evidence. This situation, nowadays, has lost momentum. However, it is considered that the question is still important where international boundary disputes are concerned and delicate issues of sovereignty involved. Reference was also made by the speaker to the protection of privacy given the far-reaching modern technologies, such as Google Earth. The speaker pointed out that, in light of some of the presentations for this session, there seemed to be a revival of positions favouring the need to have a binding international instrument on remote sensing, which certain states had defended enthusiastically at the beginning of the new millennium, and then dropped in view of the lack of a political will to do so on the governmental level, particularly within the Legal Subcommittee of COPUOS.

Following these introductory comments the various authors were called upon to make their presentations. The first speaker Alvaro Fabricio made a presentation on the topic "The Need of An International Convention on Remote Sensing." As the title speaks he argued for the establishment of a specific convention on remote sensing, critiquing the UN Remote Sensing Principles, and highlighted the need of developing an appropriated legal framework for such activity. Questions that came from audience were how would an international convention reduce data cost; is there a possibility of adoption of regional policy in Latin America. It was also suggested that free access to remote sensing at time of disaster, mentioned in Disaster Charter to be included in the paper.

The second paper "Towards A New Approach to Support the 1986 UN Principles on Remote Sensing" jointly authored by Dr. Ali Akbar Golroo and Dr. Hamid Kazemi highlighted that 1986 UN Remote Sensing Principles being a non-binding resolution, what is its legal implications. Emphasis was made to develop these principles into binding documents or to elaborate new regulations for activities related to remote sensing. Lack of political will to move international space law forward is a major hurdle towards realization of the new regulations.

Andrea Harrington presented her paper "The Role of Sovereignty in Remote Sensing and Customary International Law." She expressed that despite 1986 Remote Sensing Principles enjoying customary law status, the Principles have limited scope. Some of the Remote Sensing Principles are simply restatements of customary international law or treaty obligations, or interpretations of existing treaty obligations. Her presentation invited many question from the audience like which principles are customary international law; how does one account for national laws on remote sensing; are there any freedom of exploration on remote sensing; whether Google Earth can sense everything.

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P.J. Blount made structured presentation for his paper titled "The Satellite and The Individual: The Legal Resolution of Remote Sensing." Followed by brief introduction to the historical development and core principles of international remote sensing law, the changing context of remote sensing with developing technology was explained. Some of the legal issues highlighted were how individuals have become implicated in remote sensing; privacy issues in data access & collection; and the use of satellite image in protection of human rights, among others.

Fifth presenter was Gabriella Catalano Sgrosso. She presented her paper titled "Migration Flows in The EU and Remote Sensing" highlighted the problem of migration flows in Europe, the potential threat posed by terrorist groups, and the measures that European countries can take to prevent and counteract such new foe without sacrificing the rights granted within the EU. She suggested a possible solution could be remote sensing of borders in migrant countries of origin, carried out by companies from destination countries. She acknowledged that this is an expensive affair but is of opinion that the cost could be shared by the destination country and the EU, based on existing agreements. Her conclusion was it is important for Europe to adopt a global approach to migration, by strengthening cooperation, coherence, and synergies, in compliance with the EU development policy and other external policies.

Final presentation was by Stefan A. Kaiser on the topic "Time for Improvement: The 1986 UN Remote Sensing Principles in the Information Age." He highlighted the gaps of the UN Remote Sensing Principles and areas which may need a review in light of the technical and societal changes. Key issues raised in his presentation were military and security uses of remote sensing; impact of sovereignty on the remote sensing principles; and information age vs. remote sensing.

Session 4: Legal Challenges Represented by Large Satellite Infrastructures and Constellations

Co-Chairs: Prof. Steven Freeland and Dr. PJ Blount
Rapporteur: Mr. Alexander Soucek

A relatively new trend in space activities involves the deployment of large infrastructures and constellations of satellites in Low Earth Orbit, leading to relevant international concerns, not only regarding space traffic management, but also the sustainability of the space environment. Such a distinctive technological initiative poses legal challenges as far as Space Law is concerned. For example, what forms of legal and regulatory frameworks are necessary to balance the interests of a particular State (financial, compliance with its international obligations, acting in the interests of other States, etc) with the demands of entrepreneurs? Should the governing legal regime

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encourage/discourage this evolution towards a multitude of space actors? What role does/should law have in facilitating the commercial possibilities offered by low-cost satellites? How should the relevant legal rules balance the risks associated with such technology and infrastructure with the need to further enhance the potential benefits that these systems may offer?

The first presentation was "Ensuring Sustainability of Technology and the Law" by Lesley Jane Smith. In her presentation, Smith explained the concept of seeing (certain types of) satellites as "data storage mechanisms" or relay stations, and discussed the domestic regulation of data stored in or transmitted via satellites. Through an insightful approach, she interweaved cutting-edge concepts and mechanisms like cloud storage and big data with regulatory questions and approaches. One of the concepts explained, possibly of relevance in the context of future large satellite infrastructures, are "smart contracts," i.e. protocols to facilitate or verify contract performance. She also discussed the question to which extend national legislation does or will have to take regulatory action with regard to automated data processing, storage and relay as well as the distinction between the actual data and overlay data (meta-data).

Elina Morozova presented the second paper, which was titled "Bringing into Use of Frequency Assignments for non-GSO Constellations: New Regulatory Framework Required."

Morozova, of INTERSPUTNIK, dedicated her thought-provoking presentation to aspects of telecommunication law in relation to mega-constellations, and in particular, the meaning of "bringing into use" as provided for in the ITU Radio Regulations. After explaining the analogies applied today to non-GSO networks, she discussed potential new approaches of "bringing into use" a constellation consisting of hundreds or thousands of individual satellites operating in an orbital network. Options discussed included the need for all satellites to start operating before a constellation could be considered brought into use, to a "milestone" approach looking at percentage "fractions," i.e. minimum numbers of satellites, of a constellation to be gradually brought into use. Through developing various examples, Morozova showed the advantages of adopting a "milestone approach" as a future model for large satellite infrastructures.

"Black Market Launches of Small Satellites: A New Challenge for the Space Law Regime" was then presented by George Anthony Long. Long opened his stimulating presentation with the remark that "small satellites are the new drones": a commercial consumer product governments were not prepared to regulate when the market witnessed the product's exponential growth. A low cost alternative to accessing space, small satellites are often intentionally deployed in orbit without governmental authorisation, control or even knowledge, leading Long to draw analogies with a "black market" / "black launcher market" and discussing the various legal and regulatory

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consequences. Looking at the relatively high number of unregistered small satellites, he also explained that jurisdiction was irrelevant to triggering international responsibility and third-party liability.

Neta Palkovitz then presented "Dealing with the Regulatory Vacuum in LEO: New Insurance Solutions for Small Satellites Constellations." As an almost inevitable consequence of implementing the various planned mega-constellations, the satellite collision risk in low Earth orbit will increase in the years to come. In her interesting presentation, Palkovitz explained why she considered the present legal situation to amount to a "regulatory vacuum": the Liability Convention would not be compatible with dealing with low-scale damages to/of private entities such as small satellite operators; it was unclear what "fault" meant for damages caused by space objects in outer space; national laws would implement different norms and standards; and, as a result, it was difficult to identify a uniform state practice. She then explained case studies with regard to taking out third-party liability insurance for multiple small satellites, in particular the approach of declaration-based policies. Palkovitz concluded that the regular procurement of TPL insurance by operators may finally lead to a desired insurance practice.

The next presentation was by Larry Martinez and was titled "The Legal Dimensions of Cyber-conflict with regard to Large Satellite Infrastructures and Constellations." He started off by showing that believing in the very notion of "cyber *security*" ultimately is a self-deception, as can be repeatedly witnessed by cases of worldwide "computer pollution." He then discussed the evolving law and governance of cyber security, as well as the advantages and disadvantages of regulating cyber matters at global or domestic level. Satellite architectures like the ones envisaged in the various mega-constellation concepts would ultimately amount to digital structures that had to be adequately protected not only though technical means but also in a regulatory context.

The final presentation was "Reimagining National Regulatory Approaches to Third Party Liability Insurance: Towards a Single Aggregated Policy" and was presented by Edmond Boulle.

Boulle provided an alternative way of approaching Third Party Liability (TPL) insurance – namely through a single, aggregated policy. As he could show in his stimulating presentation, an "aggregated approach" could ultimately bring a more robust protection to a State. In the discussion following his presentation, it was debated to what extend insurance models used by ship owners could be helpful in finding the right approach for satellite mega-constellations, too.

In summary, the session provided insightful discussions about one of the most prominent paradigm changes in spaceflight: the expected advent of very large satellite infrastructures. The speakers discussed a variety of interesting aspects – some of a more practical, some of a more theoretical nature, gave

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examples, and alluded to case studies in order to underline their various approaches. They also engaged with the audience in a thought-provoking discussion that showed that this topic will keep regulators and scholars likewise busy for the years to come.

Session 5: Current Developments in Space Law with Particular Consideration for Latin America

Chairs: Dr. Olavo de Oliveira Bittencourt Neto and Dr. Sylvia Ospina
Rapporteur: Dr. Luis Fernando Castillo Argañarás

A total of eleven papers were presented at the fifth IISL session on "Current Developments in Space Law with Particular Consideration for Latin America." The presentations covered a range of issues related to the developments of space law in Latin America, with different points of view. Additionally, one paper addressed space law issues in Africa, and another one addressed space law issues in India. The session began with an introduction made by the Chairs.

Carlos Gabriel Argüelles Arredondo presented the first paper, which pointed out the need to observe and understand how Space Law has served as a source of cooperation among space nations, and also that such activity is for the benefit of humanity. He analyzed the international Treaties and Agreements on outer space, and considered that space law is a branch of Public International Law that has evolved over the years, since the advent of the space age. He also pointed out that the international cooperation and space law were linked, because human activities in space and space exploration required the cooperation of the international community, as it has been evidenced by the International Space Station. Some thoughts about soft law and international cooperation were outlined in the context of Space Law.

Sylvia Ospina summarized the paper of Jairo Becerra, Juan Ramón Martinez, and Daniela Almario on the process, interpretation and extent of Colombia's accession to the Convention on Registration of Objects Launched into Outer Space (Registration Convention). This paper also analyzed the main consequences of its implementation on the national system.

Setsuko Aoki (Keio University) presented the paper entitled "Common Elements in the Latin American Mechanism in Cooperation in the Peaceful Exploration and Use of Outer Space."

This article explores how the Latin American concept of space law has influenced the international cooperation in carrying out space activities. First, the characteristics of Latin American rules of space law were studied. Secondly, the characteristics in Latin American regional cooperative mechanisms in space law were addressed using the comparative methodology. Several common elements of the Latin American mechanisms

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in cooperative mechanisms were presented, and the considerations were focused on the treaties between the different agencies and the difficulties involved in signing those treaties.

The next paper was presented by Luis F. Castillo Argañarás. It was about an analysis to determine to what extent international cooperation is helping Argentina to develop space technology in the framework of the cooperation agreements signed between Argentina and China under the Chinese Exploration Program of the Moon. It addressed the Chinese Moon Program and the importance of the agreements, both for China and Argentina.

Tatiana Viana and Juliana Scavuzzi presented the next paper. It focused on the recent Brazilian initiatives to address legal gaps and barriers that negatively impact the development of the national space industry. They discussed the Brazilian strategies to attract foreign investments and the protection mechanisms.

The next presentation was made by Camilo Guzmán Gómez and Pilar Zamora. It portrayed the evolution of the legal framework in space activities in Colombia and analyzed the new interpretation of the Public-Private Partnerships Law No. 1508 of 2012 on the legal regime of the Public-Private Partnerships in Colombia. The presentation discussed how this law could be the basis of the new Colombian space legal framework.

Kumar Abhijeet presented the next paper on the adoption of space law in India. It was entitled "Privatisation of PSLV: What the Law of Outer Space Demands?" The author made a point that the Indian space programme had a humble beginning in the year 1963 with experimental sounding rockets from Thumba, Kerala. For this launch, everything, including the payloads and rockets, came from outside India. But by 1980, India had developed its indigenous Satellite Launch Vehicle (SLV). Thereafter India has been continuously striving to develop its launch technology. The Polar Satellite Launch Vehicle (PSLV) first launched in September 1993 that has notched up 33 missions to date is the most active launch vehicle in India. Except for one failure during its maiden flight in 1993, the rest of these missions have been successful. To boost launch capacity and consequently increase the frequency of launches, India is working towards privatizing the PSLV operations. The launch of the first privately built rocket is expected by 2020. The audience showed interest in the conditions about the privatization process and any issues in connection with registration, liability, indemnity and insurance.

Professor Frans von der Dunk made the following presentation entitled "The Second African National Space Law: The Nigerian NASRDA Act and The Draft Regulations on Licensing and Supervision." The author analyzed the 2010 National Space Research and Development Agency Act and the 2015 Draft Regulations on the Licensing and Supervision of Space Activities of Nigeria from the perspective of international obligations, such as Articles VI, VII and VIII of the Outer Space Treaty, the Liability Convention and the

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Registration Convention. In this case, the audience's interest was focused on the definition of space activities and the compliance of Nigerian laws with international obligations.
Next, Fabio Tronchetti made a presentation entitled "UNGA Resolution 70/27 'No first placement of weapons in space: a positive contribution to prevent an arms race in outer space?" The author analyzed the content of Resolution 70/27 and assessed its positive and negative features, as well as its chances to provide a meaningful contribution to a more secure outer space. The main topic of interest in this presentation was the definition of a weapon and whether it is possible to identify them in space.
Li Shouping presented the following paper about "The International Space Soft Law and its Roles in International Space Governance." In relation to this presentation, the audience discussed the legal value of soft law.
The last presentation was made by Sylvia Ospina. Her presentation was entitled "Latin American Space Activities In the 21st Century: To What Musical Beat: Samba or Salsa?" The author reviewed some of the major space-related accomplishments that have taken place in Latin America since 2000 and offered recommendations to overcome the way of regional cooperation. The audience made some considerations about the 1979 Moon Treaty.
Concluding remarks were made by Dr. Olavo de Oliveira Bittencourt Neto and Dr. Sylvia Ospina, congratulating all participants for a successful session.

Session 7: Joint IAF-IISL Session on the Legal Framework for Collaborative Space Activities

Co-Chairs: Mr. Cristian Bank and Bernhard Schmidt-Tedd
Rapporteur: Dr. Olga Stelmakh-Drescher

At this session 5 papers were presented highlighting legal framework governing collaborative space programmes, in particular governmental exploration programmes and their preparations. The Co-Chair Bernhard Schmidt-Tedd commenced the session by welcoming the audience, introducing the Co-Chair, Rapporteur, and himself. He also provided introduction to the general topic of the session and gave the floor to the first speaker.
Xiaodan Wu from China Central University of Finance and Economics, China presented a paper on "International Cooperation in China's Space Undertakings: Melting Down Political Obstacles through Legal Means." She stated that China's space cooperation grew over the years but encountered some limitations due to the lack of mutual confidence caused by ideological and military concerns and faced certain political obstacles both domestically and internationally. She provided an overview of China's space cooperation and highlighted main features of related agreements. Dr. Wu was of the view

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that existing barriers of China's space cooperation can be removed through appropriate legal instruments. In addition, she emphasized that the national space governance structure of China should become more coherent with increased transparency of decision-making and improved coordination mechanisms between concerned governmental and military departments.

Philippe Clerc from Centre National d'Etudes Spatiales (CNES), France presented then his paper titled "Building blocks for international cooperative agreement in the space sector." In his presentation Mr. Clerc made assessment of the rationales, framework and practices in building public-private partnership in the realm of space activities. He also analyzed the institutional and legal mechanisms that design such cooperative initiatives. As a CNES representative, he primarily focused on the CNES and ESA practices. He analyzed a number of requirements imposed on space cooperation and contractual clauses that are critical for its proper implementation. Finally, he considered new cooperative schemes with industry such as the Future Investment Program (PIA), the Co-Space and the Collective for Space Care. He concluded that French competition law to a certain extent limits the ability of CNES to support industry and that initiation of space policy's design and implementation remains the prerogative of governmental space agencies.

The next presentation titled "The Challenges of the Legislative Base as Applied to the Collaborative Space Programs in Multisectoral Economy" was co-authored by Yuri Makarov from Peoples' Friendship University of Russia, Dmitry Payson from the United Rocket and Space Corporation, and Mikhail Simonov from Roscosmos, Russian Federation, and presented by Dmitry Payson. Payson provided an overview of current challenges of the Russian space legislation applicable to international and intersectoral space projects. He emphasized that Russian economy, in which such projects are implemented, is characterized by a strong public sector and transitional nature of space activities' management. Particular emphasis has been placed on legal prerequisites for establishment and operation of the State Space Corporation Roscosmos, the entity in charge of the national space program implementation. He mentioned that structural changes in management of space program lead to amendments to major national space acts of the Russian Federation. Payson was of the view that progressive development of the national space regulation should strengthen the national space industry's position at the international space market. Moreover, he discussed the issues of the public-private partnership (PPP) development needed to attract the private actors to specific forms of the national space programs implementation. Finally, he examined space industry entry barriers for private enterprises and SME, and concluded that the key element in lowering those barriers is the improvement of the national licensing system.

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Alexander Soucek, ESA, presented the paper titled: "The Inter-agency Space Debris Coordination Committee: A Collaborative Effort and its Effects on Norm-making" that he co-authored together with Holger Krag, ESA Space Debris Office, Germany. In his presentation Mr. Soucek considered the IADC from the perspective of international law and examined the implications and effects of its work for the development of space law. He noted that IADC executes two roles essential to international collaboration: it facilitates coordination through a recognised modus operandi and it issues technical recommendations based on consensus reached among its members. Combination of IADC's membership, structure, functioning and impact it has on agency and State practice in space debris mitigation, makes it an international technical cooperation model sui generis. He specified that the genesis of the IADC is linked to the growing apprehension of various problems that orbital debris poses to spaceflight which were not evident at the dawn of space era when the UN space treaties were drafted. He stated that the IADC's work allows space actors to understand, react to and reduce the growth in number of non-functional space objects. Soucek provided an outlook on future challenges for the IADC's work with focus on small satellites and large constellations. He specified that the IADC Space Debris Mitigation Guidelines provide for a more uniform State practice and ultimately contributes to capacity-building of space law in this specific domain.

Adam Greenstone, NASA, presented the paper drafted by Robin J. Frank, NASA, on "National Aeronautics and Space Administration Cooperation with Latin America, the Middle East and Africa." In his presentation, Greenstone discussed cooperation between NASA and countries in Latin America as well as the Middle East and Africa. He also provided an overview of the key elements of the US domestic legal regime for concluding binding international civil space cooperation agreements. Furthermore, he analyzed mechanisms for concluding binding agreements under international law, domestic legal authorities and processes for civil space cooperation of partner States. Finally, he concluded that understanding of differences and similarities between the legal systems that affect international civil space cooperation will foster space cooperation in the future.

The Co-Chairs thanked speakers and the audience, and adjourned the session with some concluding remarks. Overall there was a great interaction between the audience and authors. A great atmosphere was created for further debates and discussions on the topics presented.

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