

Report of the 57th Colloquium on the Law of Outer Space Toronto, Canada, 2014

Contributed by Rapporteurs Andreas Loukakis, Timiebi Aganaba-Jeanty, Anita Rinner and Edmond Boullé

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

Session 1: Nandasiri Jasentuliyana Keynote Lecture on Space Law & 6th Young Scholars Session

Chairs: Asst. Prof. Tanja Masson-Zwaan and Prof. Milton Smith

Rapporteur: Ms. Ashleigh Tomlinson

In the first session of the 2014 Colloquium on the Law of Outer Space, a total of six papers were presented.

The Colloquium was opened with the 6th Nandasiri Jasentuliyana Keynote Lecture. This year's keynote was given by Yvon Henri, Chief of the Space Services Department (SSD) at the Radiocommunication Bureau of the International Telecommunication Union (ITU). The keynote highlighted the numerous legal issues involved with satellite spectrum coordination by the ITU. Henri specifically highlighted frequency coordination issues related to pico, nano, and other smallsats.

The keynote was followed by several excellent papers presented on the occasion of the 6th Young Scholars Session. The first of those papers received the 2014 Isabella H.Ph. Diederiks-Verschoor Award for best paper by a young author. It was titled "Legal Issues Relating to Unauthorised Space Debris Remediation" and was written by *Ms. Joyeeta Chatterjee* (McGill University). This paper covered a number of legal issues related to debris remediation, and using the example of *Envisat*, concluded that the current space law regime does not allow remediation without prior consent of the registering state.

The second paper was delivered by *Mr. Brendan Cohen* (Stanford University, USA) and was titled "Use versus Appropriation of Outer Space: The Case for Long-Term Occupancy Rights." Cohen's paper discussed how long term occupancy rights could be used to enable the use of extraterrestrial resources consistent with the Article 2 of the Outer Space Treaty. The paper analyzed both

the prospect of long term occupancy and the legal effect of abandonment of such occupancy.

Mr. Andreas Loukakis (University of Luxembourg) delivered the next paper titled “The New PCA’s Optional Rules for Arbitration and Their Relevance To Disputes Arising from Erroneous Navigational Signals.” This paper gave an in depth analysis of the Permanent Court of Arbitration’s Optional Rules for Arbitration of Disputes Relating to Space Activities and their applicability to GNSS services. Specifically, this paper sought to understand how the rules would apply in scenarios in which navigational signals result in damages, especially since these damages might fall outside the scope of the 1972 Liability Convention.

The next paper was “To orbit and beyond: Present risks and liability issues from the launching of small satellites” which gave an analysis of liability issues related to smallsats. Presented by *Ms. Ntorina Adoni* and coauthored by *Mr. Federico Bergamasco* (both from University of Leiden, the Netherlands), the paper examined how the current space law regime allocates risks for the emerging trend of smallsats. The authors argued that states need to establish national regimes to ensure that international obligations are met with respect to smallsats.

Ms. Neta Palkowitz (Isis, The Netherlands) presented the final paper “Exploring the Boundaries of Free Exploration and Use of Outer Space – Article IX and the Principle of Due Regard, Some Contemporary Considerations.” This paper examined Article IX of the Outer Space Treaty and its relationship with the Liability Convention in the context of contemporary technology and geopolitics. The Young Scholars Session continued the tradition of starting the IISL Colloquium with forward looking papers that explored emerging legal issues and suggested the legal innovations needed to keep pace with technological innovations.

Session 2: Up, Up and Away: Future Legal Regimes for Long-Term Presence in Space

Chairs: Prof. Francis Lyall and Mr. Jean-François Mayence

Rapporteur: Mr. Andreas Loukakis

The second session of the 57th IISL Colloquium, entitled “Up up and away: Future legal regimes for long-term presence in space”, addressed a number of topical space law and policy related issues. A total number of 11 papers were presented during this session, covering a wide range of topics and analyzing the subjects of the session under different perspectives.

The starting point of the session was that current space law provisions may be inadequate to meet the challenges of human presence and long-term activities in space. In light of this, authors in their presentations attempted to review and evaluate current law, both public and private, in that regard. Others also tried

to consider how future activities in outer space could or should be regulated. Finally, some of the authors also addressed in their presentations the problems inherent in space colonization and space governance.

Professor Francis Lyall (University of Aberdeen) and *Mr. Jean-Francois Mayence* (Belgian Science Policy Office) opened the session by giving a brief introduction on the topics.

The first paper entitled “Space Traffic Management Options” was presented by *Mr. James Rendleman*, from California, US. In his presentation, Mr. James Rendleman introduced and defined the concept of space traffic management. Thereafter, he centered upon different issues associated with the concept of space traffic management. He, *inter alia*, attempted to examine several questions relating to the possible legal underpinnings of space traffic management, the technical obstacles, the economic considerations, and ultimately the role of governments and the private sector. He concluded by underlying the fact that performing any form of space traffic management would be technically daunting, and the security and proprietary concerns would be significant. It is interesting to add that during his presentation Mr. Rendleman also commented on whether a privately performed space traffic management framework might provide a more flexible, responsive, and evolutionary process, and whether this in turn could reduce space operator compliance costs.

The next paper entitled “In-Space Maneuvering, Servicing, and Resource Use: The Commercial Need for Legal Assurances” was presented by *Professor Henry Hertzfeld* (Space Policy Institute, George Washington University, Washington DC, USA). Dr. Hertzfeld attempted to address different legal approaches to a number of new ventures that will be carried out in outer space in the near future and that will likely require major changes to the way state entities will approach space law. In particular, Dr. Hertzfeld focused on four current government and commercial ventures namely, active debris removal, satellite servicing, diverting near earth objects, and resource extraction and processing. He, then, pointed out that all these ventures raise similar major and unresolved legal issues. He, thereafter, stressed the need that all these issues should be considered together in a consistent, logical, and rational way, ensuring that solutions are coordinated and uniform in the near future. Finally, Dr. Hertzfeld drew some conclusions by highlighting the fact that the current legal system in space is oriented towards launch and satellite operations, not towards active private sector initiatives in space and on celestial bodies. He, therefore, emphasized the need that a balance between governmental objectives and commercial assurances on financing and profits will have to be made for the near future.

The third paper of this session, entitled “Chasing Ghost Spaceships: The Law of Salvage as Applied to Space Law”, was presented by *Professor Olavo Bittencourt Neto* (Catholic University of Santos, Brazil). This paper addressed interesting space law related issues, namely space debris

remediation, from a different point of view, the law of the maritime salvage. Dr. Bittencourt presented briefly the alarming state of affairs for the current space debris situation and subsequently, he tried to find solutions by an attempt to draw analogies from the law of maritime salvage. After having presented briefly the maritime law of salvage (mainly a discussion of the International Convention on Salvage, 1989), he reached the conclusion that under certain conditions, an analogical approach might be adopted; thereby, the law of maritime salvage may effectively prove to be an invaluable instrument to *de lege ferenda* perspectives for future regulation of space debris remediation.

Following this presentation, the focus of the session centered upon the issue of intellectual property rights and of patent protection within the field of Outer Space activities. In that regard, Mr. Steven Wood (XCOR Aerospace, USA) presented a paper entitled “Encouraging the Innovation and Technological Advancement Requisite for Greater In-Depth Exploration of Outer Space through Patents”. At the beginning of his presentation, Mr. Wood stressed the need to encourage patent protection for outer space activities in general. He argued that this consequently will increase innovation and technological advancement for space activities. Subsequently, Mr. Wood focused on the different legal-jurisdictional bases for patent protection within the field of space activities. To this end, existing international space law provisions, several international agreements as well as some national law provisions were discussed by Mr. Wood in more detail. After having underlined the flag of convenience problem with regard to patent protection, Mr. Wood concluded by advocating a future unified outer space patent regime. According to his viewpoint, a uniform solution for patent protection in outer space can disruptively accelerate the technological advancement and development of new abilities in the exploration and use of outer space in the near future.

The fifth paper of the session, entitled “Private International Law (Conflict of Rules) for Human Presence of Long Term in Space” was co-authored by Professor Souichirou Kozuka (Gakushuin University, Tokyo, Japan) and Associate Professor Fumiko Masuda (Kyoto University, Japan). Presented by Professor Kozuka, the paper demonstrated the importance of private international law (i.e. conflict of rules) for future private disputes that might arise in the era of long-term human presence in space. During his presentation, Mr. Kozuka pointed out that the long-term presence of human beings in space will be accompanied by an increase in the number of disputes involving private entities. For such kinds of potential disputes, no explicit answers are given by the existing space law treaties. Mr. Kozuka, by using a number of hypothetical case studies (i.e. a fictional collision in space, a case including security interests in space, as well as a case based upon a contract for a future suborbital flight) attempted to demonstrate the different problems connected with the issue of the conflict of laws in outer space. He

argued that current space law provisions (in particular, the law of the state of registry as provided by the Outer Space Treaty) do not address in a concrete way the problem of conflict of rules for future private disputes in space. He, then, evaluated other provisions of private international law (conflict of rules). Finally, he came up to the conclusion that the issue of conflict of laws in outer space needs to be further explored. According to Mr. Kozuka, a possible satisfactory solution from a private international law perspective would be establishing a uniform set of rules.

Following this presentation, the focus of the session shifted to the problems inherent in space colonization and governance. In that regard, the paper entitled “Mars Treaty Workshop Results from the ISU SSP ‘14” addressed interesting issues of space colonization and space governance with respect to Mars. This paper was authored by a number of participants to the International Space University (ISU) Space Studies Program (SSP) and was presented by *Mr. Ian Stotesbury* from United Kingdom. The basic objective was to show the results of the so-called “Mars Treaty-making Workshop”, which was carried out by ISU with an aim to assess a potential Treaty for Mars. As Mr. Stotesbury explained in his presentation, some nations have ambitious plans for Mars colonization, while others intend to commercially mine the Red Planet’s mining resources. He, thereafter, presented the findings of the participants in this ISU SSP workshop, including their impressions and lessons learned from the simulation of an international intergovernmental negotiation, including drafting, adoption, and related treaty-making experiences, and the substantive legal innovations they found applicable for a future legal regime for Mars.

The next paper was presented by *Ms. Anita Rinner* (University of Graz, Austria). In her paper “Space Exploitation: Digging in a Legal Vacuum?”, Ms. Rinner attempted to answer the question of whether there is a need for a future legal regime for space exploitation, particularly for space mining activities. After reviewing different existing legal provisions (*de lege lata* analysis) coming from the branches of international space law but also national law, she reached the conclusion that space mining activities should be better regulated in the future. Ms. Rinner proposed *de lege ferenda* possibilities for the regulation of space mining activities, including the potential idea of an international legal regime for those activities by means of an international organization, which could be named “International Resources in Space Organization”.

The next paper of the session, entitled “Legal Uncertainties Related to Additive Manufacturing in Space”, was co-authored by *Dr. Michael Mineiro* and *Dr. Bhavya Lal*, both coming from the Science and Technology Policy Institute, USA. Presented by Dr. Mineiro, the paper studied the legal issues relating to the novel concept of Additive Manufacturing in space. Dr. Mineiro introduced, explained and defined the concept of Additive Manufacturing. He underlined the fact that the Additive Manufacturing industry is likely to grow in the near future with

important implications for outer space activities. Dr. Mineiro, then, attempted to identify selected questions under public international space law provisions involving Additive Manufacturing in space by discussing several legal issues connected, *inter alia*, with jurisdiction and control, ownership, registration, and last but not least liability.

The ninth paper of this session entitled “The Legal Implications of Space Weather Awareness and the Need for International Dissemination of Space Weather Forecasts” was presented by *Mr. Georges Anthony Long*, from Arizona, USA. In his presentation, Mr. Long underlined the fact that space weather awareness will be necessary for long-term presence in space. He, subsequently, stressed the fact that disruption of satellite services due to space weather is part of the everyday reality of the satellite world. The long term human engagement in space activities will not only escalate the hazards of space weather but will also increase the need for awareness of space weather. Finally, he examined briefly the legal implications of space weather awareness and addressed the need for the international space community to develop or recognize an authority in charge of developing and disseminating space weather forecasts in the future.

The paper entitled “International GNSS Regulation and Collaboration” was presented by *Professor Paul Larsen* (Georgetown University Law Center, Washington D.C., USA). At the beginning of his presentation, Professor Paul Larsen discussed the specificities of the GNSS technology, by emphasizing, in particular, its inherent international dimension. He, then, underlined the fact that GNSS technology is currently having dual uses with many civilian applications. Subsequently, he described the different GNSS structures such as the Global Positioning System, the GLONASS, the BEIDOU and the GALILEO. Finally, he came up to some conclusions by advocating the view that due to the inherent international dimension of the GNSS technology, GNSS services will need to be regulated internationally in the near future.

The last paper of the session, entitled “Providing for Sustainable Exploration and Use of Outer Space Environments”, was co-authored by *Professor John Rummel* (East Carolina University, USA) and *Professor Pascale Ehrenfreund* (George Washington University, USA). Presented by Dr. Rummel, the paper addressed the various regulatory and legal challenges associated with human long-term presence in space, especially with activities conducted by private entities. At the beginning of his presentation, Professor Rummel underlined the fact that with the rise of private actors in a number of space activities, legal and regulatory regimes associated with the use of extraterrestrial planetary environments seem to be necessary. Additionally, Dr. Rummel suggested that it is time to clarify and complement the current legal space regime. According to his viewpoint, a new framework is needed to enable both greater legal protection for outer space environments and a consistent and predictable legal landscape for commercial space endeavors. Finally, he attempted to reach some conclusions for *de lege ferenda* solutions. In particular, based partially on

several workshops held under the auspices of COSPAR during the last three years and a 2010 report from the International Academy of Astronautics on “Protecting the Environment of Celestial Bodies”, he discussed an approach to the development, adoption, and implementation of a new convention subordinate to the Outer Space Treaty.

The second session of the 57th IISL Colloquium 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 questions in relation to the subject matters of the presentations.

Session 3: The ISS IGA: Lessons Learned and Looking to the Future

Chairs: Prof. Joanne Irene Gabrynowicz and Mr. Motoko Uchitomi

Rapporteur: Ms. Timiebi Aganaba-Jeanty

Session 3 of the 57th IISL Colloquium focused on lessons learned and legal issues related to the International Space Station (ISS) and the Intergovernmental Agreement (IGA) that governs it. A total of six papers were presented in this session, covering a variety of topics, including challenges and issues for consideration in the development of future multilateral space programs.

The first paper presented was “A European perspective on lessons learned from the Intergovernmental Agreement (IGA) on International Space Station (ISS) Cooperation” by *Mr. Marco Ferrazzani* and *Mr. André Farand* (Legal Department, European Space Agency). The paper, presented by Dr. Ferrazzani, gave a European viewpoint on the ISS IGA, and argued that the ISS IGA is a useful model for structuring future multilateral space cooperation.

Dr Ferrazzani highlighted the structure of the ISS legal arrangements and explained the approach for negotiations of the ISS legal framework. Following identification of the key lessons learned, he discussed a variety of issues including the requirements for a valid implementing agreement, the adoption of ISS rules in domestic legal systems, the potential for new partners, and the issue of jurisdiction and control.

Following the presentation it was asked if the IGA framework could be modified for exploration to which the speaker answered that it was designed for a specific purpose. He acknowledged however that attempts are made to fit other cooperation initiatives outside the ISS under the IGA, because of the benefits derived through this framework.

Professor Setsuko Aoki (Keio University, Japan) presented the next paper, “Analysis of the Legal Instruments Operating the ISS as the Most Complex Space Program Ever Undertaken.” Following an introduction to the mechanisms of the ISS agreements, Prof. Aoki presented a historical survey of the development of the ISS legal framework. The paper emphasized the successful cooperation regime that produced the ISS by focusing on the

cooperative relationship established between the United States and Russia. More specifically, she proposed what should be preserved from the IGA agreements and what provisions should be modified, including criminal jurisdiction, registration, duration and renewal clauses. The historical perspective used in this paper sheds light on opportunities for the legal framework in future collaborations.

A member of the audience raised the issue of the interpretation of peaceful purposes to which the speaker highlighted that the interpretation could be dependent on each partner.

The third paper of the session, “Criminal Jurisdiction in International Space Law: Future Challenges in view of the ISS IGA,” was co-authored by *Mr. Michael Chatzipanagiotis* (Marinos and Partners Law Firm, Greece) and *Mr. Rafael Moro-Aguilar* (OrbSpace, Austria). After providing a general background on the issue of criminal jurisdiction in international space law, Dr. Chatzipanagiotis used the specific rules on criminal jurisdiction, extradition, and disciplinary authority set up by the ISS legal framework to identify how criminal jurisdiction might be established in future space activities. Specifically, this paper examined how criminal jurisdiction could apply on private orbital stations as well as in multilateral interplanetary missions. He concluded that while the IGA can serve as a model for future space exploration projects, it is foreseeable that private missions will not follow IGA rules but will revert back to the basic rule of quasi-territorial jurisdiction provided by Article VIII of the Outer Space Treaty.

The presentation raised several questions and comments. The speaker was asked if suborbital flights should be governed by air law or the IGA agreement to which he opined that Art VIII of the Outer Space Treaty would apply, as long as the flight only involves one state. The discussion continued with comments with respect to the difference between the first and second IGA, the factual changes that occurred when the Russians came on board, and the feasibility of extradition from suborbital flights given the short duration thereof.

Mr. Sam Scimemi (NASA) was the next speaker. His presentation, entitled “An Emerging Marketplace: Low Earth Orbit And The International Space Station”, examined legal issues related to commercial technologies being used on the ISS and in low earth orbit. The paper examined the intersection of the growing commercial transportation and research markets, as well as the ways in which the transition from government to commercial activity in LEO might unfold. Following a description of activities in the commercialization of LEO, the main proposal of the presentation was the suggestion of the creation of an economic development zone in LEO.

Some members of the audience appeared to be skeptical about the proposal. A participant commented that the market demand is vague, questioning the existence of a killer application. Another comment questioned the appetite for tax credits for space.

The final two papers sought to establish the use of space, and particularly low earth orbit, to benefit humans through technologies that lead to better terrestrial governance and increased human rights.

Prof. José Monserrat-Filho (Brazilian Space Agency) presented “Governance with Transparency and Confidence in the Sky As Well As On Earth”, which examined how transparency is critical in maintaining a safe, secure, and sustainable space environment. The presentation examined the Report of the United Nations’ Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities. Prof. Monserrat-Filho highlighted the political changes that have stimulated more efforts and advancements towards space governance, the criteria and categories of efficient TCBMs, how to enhance transparency in outer space activities and the disparity in the space capabilities of states. He declared that one of the supreme space issues currently is the possibility of space warfare, and the solution is more transparency and confidence building measures. The speaker concluded that the report is positive despite the difficulties in its application.

Following the presentation, a discussion ensued about what must happen to ignite political will for institutions to respond to this and whether the UN and other international space organizations needed to be strengthened.

The paper “What’s Human Rights got to do with Outer Space? Everything!”, co-authored by *Professor Steven Freeland* (University of Western Sydney, Australia) and *Professor Ram Jakhu* (McGill University, Canada), addressed how human rights should be a central factor in the use and exploration of outer space, in order to ensure that space utilization is for the benefit of all. The presentation explained how our fundamental rights and freedoms can and should represent a very important factor in shaping the international legal regulation of outer space through both ‘hard’ and ‘soft’ law instruments. The presentation highlighted areas of convergence including the right to peace, privacy, freedom of expression, prohibition of propaganda, and international cooperation.

In reference to international cooperation, the question was asked how to make cooperation a binding obligation, to which Prof Jakhu stated that there is no obligation to cooperate if there is no political will.

Session 4: Legal Issues Associated with Private Human Flight, Including Space and Ground Facilities, Traffic Management and Spaceports

Chairs: Prof. Diane Howard and Prof. Lucy Stojak

Rapporteur: Ms. Anita Rinner

During this session, nine authors presented legal issues associated with private human space flight.

The first speaker of this session was *Professor Mark Sundahl* (Cleveland State University, USA) who presented the paper “Standards, Standards Everywhere! Assessing Current Initiatives for Human Spaceflight Standards and Their Potential Effect on Future Regulations”. The main question was how far government should be involved in the design of a private space mission. Dr. Sundahl’s paper states the concern that government agencies may over-regulate the space industry in a manner that could create unnecessary administrative burdens and interfere with technological innovation. Instead, multiple initiatives have been undertaken to develop voluntary operational and design standards that would establish best practices for the industry, such as the the FAA issued Draft Established Practices for Human Space Flight Occupant Safety. He also mentioned non-governmental organizations that are also developing operational and design standards, such as the Commercial Spaceflight Federation, the International Standards Organization, and the IAASS, which initiated a working group on suborbital flights. Multiple questions arise from this situation: Do these standard-setting processes have sufficient participation from industry to render the resulting standards legitimate? Do some standards rely excessively on legacy government program practices at the expense of innovative future practices? Could voluntary adherence to safety standards forestall excessive government regulation? Of course, the ultimate question is whether these standards will have a beneficial influence on the success of the human spaceflight industry. Finally he highlighted the need for having a broad industry input, since it is industry that needs to meet safety agreements.

Professor Frans von der Dunk (University of Nebraska College of Law, USA) also focused his presentation, titled “From Space Tourists to Unruly Passengers? The US Struggle with ‘On-Orbit Jurisdiction’”, on commercial spaceflight. The need remains to develop a proper legal system addressing all relevant parameters, scenarios and events. This is particularly true for the United States, where so far the major developments in private manned spaceflight are concentrated. Flights may soon move from relatively straightforward up-and-down sub-orbital trajectories to longer-duration sub-orbital and/or orbital flights, or even long-duration presence in (potentially private) space stations. As a result, the somewhat haphazard and multi-faceted approach US national space law has taken so far threatens to result in major gaps, notably in the exercise of domestic jurisdiction for the purpose of compliance with US international responsibilities and liabilities under the outer space treaties. In between the regulatory competencies of the FAA (to license launch and re-entry), FCC (to license and regulate satellite operations as far as the use of radio-frequencies and attendant orbits is concerned), NOAA (to license and regulate remote sensing satellite operations) and NASA (to regulate life on board manned US civil space vehicles and the ISS, at least as far as the US modules and/or US astronauts is concerned), questions arise for example as to how to legally address a future space tourist turned unruly passenger. The

focus in his presentation was put on the legal issues of non-professionals onboard space missions. He explicitly mentioned space-marriages or a private contract concluded in outer space. Furthermore, he referred to Art. VIII OST and the Registration Convention highlighting the principle of territorial jurisdiction and also brought up the question of criminal jurisdiction, bearing in mind that there is only one state, that exercises jurisdiction on board. Definitions of ‘launch’, ‘re-entry’, ‘sub-orbital’, ‘orbital’ and ‘outer space’ might ultimately have to be clarified before an effective legal regime for exercising US national jurisdiction as appropriate and necessary can be developed. At the time Dr. von der Dunk was still hoping to see the first space tourist take off on a Virgin Galactic spacecraft, not knowing of the unfortunate incident to happen later in 2014, further pushing Virgin Galactic’s timetable back.

The next paper was “The Intersection of Insurance Markets and Liability Regimes Regarding Third-Parties and Space Flight Participants in Commercial Space Activities”, authored by *Professor Matthew Schaefer* (University of Nebraska College of Law, USA). In his presentation he gave an overview on the actual figures in space markets. There are currently 34 major brokers and 30 to 35 underwriters. He highlighted the need for an insurance market for third-party liability. However, there are still gaps to be filled. The intersection of insurance markets and liability regimes regarding third-parties and space flight participants (SFPs) in commercial space activities is important because of the potential impact on the development of an industry that is important for national economic and security reasons. If the U.S. Congress enacts third-party liability caps, or, alternatively, a long-term extension of the promise of government indemnification for large loss events, this would benefit industry and not impact insurance capacity or prices to any significant degree. Otherwise, insurance premium outlays would increase, particularly for sub-orbital companies. Similarly, a clear federal rule establishing immunity for space operators from negligence suits by SFPs would likely create a more efficient insurance market. A uniform rule placing the liability on industry for SFP death and injuries should be avoided as it would greatly increase the cost of tickets, leaving the US at risk of the nascent industry making future investments in more favorable regulatory jurisdictions. He concluded with the statement that one cannot be charged for the inherent risk by charging an extra fee on ticket prices.

Ms. Olga Stelmakh (Parliament of Ukraine) presented the next paper, titled “Legal Bases for Securing Human Presence in Space”. Ms. Stelmakh’s paper investigates existing initiatives, practices, and mechanisms that directly or indirectly have impact on establishing a secure environment for human presence in space. Although spaceflight constitutes an ultra-hazardous activity, human security in space is not directly mentioned in international space law. A special emphasis is placed on legal instruments of those countries that have enabled human spaceflight, independently or within specific international space programmes. In addition, she considers the

difference in the legal regime of a human in the outer space depending on the legal status provided to him (envoy of mankind, astronaut, tourist, etc). The author highlights that no laws exist, that directly refer to human security in space. Only the Moon Agreement draws attention to the safeguard of human activity in space. Finally, the author states that the issue of human security in outer space has not been fully addressed in COPUOS so far. She concludes by stating that the development of a harmonized (or even standardized) approach to the problems of security of human life in outer space would be desirable.

Mr. Jean-Marie de Poulpiquet (National Centre for Space Studies, Université Toulouse, France) delivered the next presentation, titled “New Perspectives on International Administrative Cooperation in Regard of the Development of Private Human Spaceflight”. At the beginning, the author presented a structure of international cooperation. A model for international cooperation in space is the International Space Station (ISS). A good example for institutional cooperation is the European Space Agency (ESA). He then discussed new perspectives in international administrative cooperation in multinational space operations, focusing on launching authorizations. As one of the characteristics of the space sector is that it is multinational, it will be necessary to look at the question of multi-authorizations, as well as possible ways to improve the existing system of authorizations by simplifying procedures, achieving procedural harmonization, and the eventual possibility of mutual recognition of launching authorizations. States are still the main actors in space but the international community needs to promote a global framework.

Dr. George D. Kyriakopoulos (National and Kapodistrian University of Athens, Greece) presented “Jurisdiction and Control over Installations and Facilities Serving Space Tourism Activities”. This paper focuses on the possible legal consequences regarding the status of installations and facilities (“spaceports”, “space hotels”) that will serve space tourism activities. At the beginning the author gave an overview about the interpretation of the term space object laid down in the Outer Space Treaty and the Registration Convention. Since there is no definition of the legal term space object, there is a need to find new interpretations of the term space object with regards to sub-orbital flights. The second part of his presentation focused on a roadmap for space tourism. The author named four categories of tourism: short sub-orbital flights, short Earth-orbital tourism, space hotels, and the establishment of permanent tourism on Moon and Mars. According to Dr. Kyriakopoulos, the existing international space law framework does not adequately cover the creation of “space hotels” on the Moon and other celestial bodies, particularly issues such as such as jurisdiction over a hotel on the Moon. Therefore, there is an urgent need either for a dynamic interpretation of the existing rules and regulations or for a radical update of the current legal framework.

Professor Gabriella Catalano Sgrosso (University of Rome, Italy) presented the next paper on “Suborbital Flights: Applicable Law”. She in fact addressed in her presentation a variety of objects: not just suborbital vehicles, but also other aerospace vehicles such as orbital and suborbital spaceplanes, and also commercial space transportation spacecraft. Her paper aims to identify the applicable national and international law for each of these categories of vehicles, at times suggesting changes in the regulations to better regulate these new means of transport. The presentation drew attention to the functional criteria adopted to identify international air law provisions best suited to regulate sub-orbital flights. Finally, the author stated that private space operators will likely be regulated by private law as well. Certain clauses can be found in space transportation and insurance contracts.

Ms. Yu Takeuchi (JAXA/McGill University) presented the paper “Regulatory Regime for Tomorrow’s Suborbital Space Flights: Point-to-point International Flights”. This paper examines the current and prospective regulatory framework for future international point-to-point suborbital flights. Given its complexity, the basic framework will involve both international space law, international air law, and domestic regulations. The author also emphasizes the potential role of bilateral agreements between states initially conducting international point-to-point suborbital flights. He concluded that all of these regimes are to be applied for sub-orbital space-flights. Nevertheless, unifying all the necessary regulations as an international treaty is always the ideal measure to reduce risks from haphazard treatments and enhance and facilitate the industry to grow further.

The final speaker of this Session was *Ms. Sylvia Ospina* (Coral Gables, USA), who presented the paper “Outer Space and White Space: Promoting the Efficient Use of These Resources”. Her paper explored some of the legal issues that are likely to arise with the use of white spaces, and their implications for emerging economies. She introduced the term white space which refers to certain radio frequencies which were used by (now defunct) TV broadcasters decades ago, and which are now available due to the change-over from analog to digital transmissions. They may be used for a variety of services, ranging from inexpensive broadband services, to location-based services, and monitoring the movement of goods and people. Several major corporations already have run pilot programs and reached agreements with a few governments in Africa and Asia to use white spaces for inexpensive broadband communications in rural areas, while the International Telecommunication Union (ITU) has undertaken studies on how best to utilize these frequencies. Ms. Ospina explained the legal issues that arise with the use of white space, and she highlighted the need for licensing the use of white space. Finally the author asked whether satellite communications and other space-related activities, as well as humankind itself, could benefit from the use of these radio frequency bands, for instance by facilitating economic and social development by bringing low-cost broadband services to digitally disadvantaged areas.

Session 5: Recent Developments in Space Law

Chairs: Mr. Philippe Clerc and Ms. Sylvia Ospina

Rapporteur: Mr. Edmond Boullé

A total of 6 papers were presented in this session. Dr. Ospina kindly agreed to step in as a co-chair of the session to replace Professor Dr. Lesley Jane Smith who was unfortunately not able to participate.

Dr. Yuri Takaya-Umehara (Kobe University, Japan) opened the session with her paper entitled “Computer network attacks in outer space: The case of harmful interference to satellite-based communications”. Dr. Takaya-Umehara addressed the application of space law and international telecommunications law, specifically the ITU Radio Regulations, to Computer Network Attacks against vulnerable satellite communications systems. As Computer Network Attacks involve the corruption or disruption of data, rather than a physical attack, the law of armed conflict has been slow to recognize them as a use of force. Dr. Takaya-Umehara argued that Computer Network Attacks are contrary to several principles contained in the Outer Space Treaty. She went on to consider the efficacy of transparency and confidence building measures and the draft EU Code of Conduct as a means of redressing instances of such attacks. Dr. Takaya-Umehara also outlined the ITU’s attempts to promote the criminalization of this kind of attacks through the establishment of harmonized national law mechanisms and data sharing.

Discussion followed on the importance of identifying the actors in cases of Computer Network Attacks. Space law and ITU law are state-orientated. However Computer Network Attacks do not necessarily involve state actors or persons whose actions are attributable to a state. Computer Network Attacks may be committed by individuals in circumstances where it is very difficult to identify them or track their whereabouts.

The next speaker was *Ms. Elina Morozova* (Intersputnik), who introduced a Regulation containing two new procedures awaiting approval by the Government of the Russian Federation. The first procedure in the Regulation concerns activities undertaken to secure international protection for radio frequency assignments in the Russian Federation. The second procedure in the Regulation provides rules for accessing and using satellite networks in the territory of the Russian Federation. Ms. Morozova concluded that these procedures ensure that Russia fulfils its obligations arising from its accession to the World Trade Organisation in 2012, and they support the growth of its telecommunications sector by allowing foreign satellite operators to enjoy equal status with Russian operators in the domestic market.

Professor Diane Howard (Embry-Riddle Aeronautical University, Florida, USA) gave the next presentation entitled “Possible legal implications of disruptive technologies: Selected examples”. Dr. Howard focused on the

relationship between disruptive technologies and innovation, citing the recent demise of LightSquared in the US. She argued that the traditional focus on ‘frequency borders’ and a transmitter-oriented approach to allocating responsibility in cases of harmful interference can stifle useful innovations. Dr. Howard considered that there should be clear limits on the extent to which operators can constrain the transmissions of other operators based on claims of harmful interference. Private ordering and negotiation between operators, as opposed to regulation, could be used to resolve cases of conflicting adjacent frequency use without stifling innovation. Professor Howard also stressed the need for clear definitions of certain terms, such as “harmful interference.” She also suggested that a cost/benefit analysis might be helpful in arriving at better definitions of “harmful” and “interference.”

Ms. Juliana Macedo Scavuzzi dos Santos of the Brazilian Association of Air and Space Law (SBDA) presented the paper “The challenges in drafting national law for space activities – a Brazilian experience”, co-authored with SBDA colleagues *Ms. Ana Cristina van Oijhuizen Galhego Rosa* and *Ms. Tatiana Viana*. As Brazil develops its national space industry and makes advances towards becoming a launching state, Mrs. Scavuzzi outlined the project proposal for a Brazilian national space legislation currently being undertaken by the SBDA Space Law Working Group. The draft legislative proposal is formulated as a model of compliance with Brazil’s international legal obligations, especially those derived from the UN space treaties and UN General Assembly Declarations and Resolutions. It further attempts to align with Brazilian national space policy and the needs of the growing domestic space industry. However, Mrs. Scavuzzi reminded the audience that there was still a long way to go before the project could be realized as a piece of legislation. Mrs. Scavuzzi received questions about SBDA’s experience from persons from other space-developing states presently deliberating whether and how to enact national space legislation. Ms. Scavuzzi mentioned the China-Brazil Earth Resources (CBERS) program as a good example of international cooperation in space activities, particularly those related to earth-observation.

Mr. Phetole Sekhula (South African Council for Space Affairs) continued the theme of legal developments in developing nations with his presentation on “The law and regulation of dual use technology in the evolving South African outer space legal regime”. Mr. Phetole informed the audience that the South African Department for Trade and Industry was reviewing two current pieces of legislation dating back to 1993 in order to find an efficient and coordinated solution to the regulation and control of dual use technology. In particular, Mr. Phetole questioned whether the body responsible for licensing space activities should also be responsible for examining the technology proposed to be used in such activity. Mr. Phetole was asked about the interplay between South African space policy and the proposed national space act, and whether

South Africa was aligning with the EU Code of Conduct, which does not preclude benign military uses of space.

The final speaker of the session was *Dr. Yasuaki Hashimoto* from the National Institute for Defense Studies in Japan. Dr. Hashimoto addressed the audience on “The recent discussion in the Committee on National Space Policy in Japan”. The Committee was established in 2012 to advise the Japanese Prime Minister on national space activities. Dr. Hashimoto provided details on the composition of the Main Committee, the structure of its subcommittees, and the main discussion points arising in those committees to-date as well as the challenges they faced going forwards. When asked about the possible establishment of a National Space Agency of Japan and what the future role of JAXA might be in this scenario, Dr. Hashimoto responded that JAXA is currently under several ministries, and that a new space agency would involve the private sector, would have a broader mandate than JAXA, and likely would be part of another Ministry.

To conclude the session there followed a brief open discussion. The comments revolved around the proper role and function of the ITU in respect of Computer Network Attacks. One view was that such attacks should not be domain of the ITU as they do not directly concern frequency management. Furthermore, it was noted that the ITU does not issue laws but rather technical regulations, which cannot be used to penalize a country which hosts a hacker. Enforcement of these regulations is a matter for national administrations.