



Austrian Space Law Newsletter

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EDITORIAL

Irmgard Marboe



On 25 February 2015, it was two years that the first Austrian satellites, TUGSAT-1 and UNIBrite, were launched into outer space. From the interview with Prof. Otto Koudelka in this issue we learn that the two satellites are "in good health" and performing their tasks. This is a great success and anything but self-evident. The University of Vienna, which celebrates its 650th anniversary this year, has proudly advertised that "The sky is not the limit. Since 1365". It is good news for these celebrations that nothing seriously happened so far to the two satellites, even though pieces of space debris have come alarmingly close several times. The increasing dangers of space debris and the failure of one Canadian satellite, which was also part of the BRITE constellation, show that small satellite missions are still a rather precarious endeavour. This is why the NPOC Space Law Austria dedicated a conference to the topic of "Small Satellites: Chances and Challenges" which is briefly summarised in the current issue.

In 2014, Dr. Mazlan Othman, the highly respected director of the UN Office for Outer Space Affairs retired. After a remarkable career as Malaysia's first female PhD and professor of astrophysics at the National University of Malaysia (UKM), the founder and first director of the Malaysian National Planetarium, the founder and first director of the Malaysian National Space Agency and the first woman as director of UNOOSA. In the interview with Michaela Hinterholzer in this issue, she gives a message to young women who want to achieve something in their lives: "What you need to know is where you want to go". It is good news in this respect that her successor in the position of the director of UNOOSA is also a woman, Dr. Simonetta di Pippo, a former ESA director from Italy and president and co-founder of the international association Women in Aerospace Europe (WIA-E).

The activities of the UNOOSA in the area of capacity building in space technology and space law are also portrayed in this issue. By way of example, we report about the Uni-

ted Nations/Mexico Symposium on Basic Space Technology "Making Space Technology Accessible and Affordable" in Ensenada, Mexico in October 2014, and the United Nations/China/APSCO Workshop on Space Law "The Role of National Space Legislation in Strengthening the Rule of Law" in Beijing, China in November 2014.

The NPOC Space Law Austria also follows closely the activities of other institutions dealing with space law and policy. Cordula Steinkogler visited some of them and reports about notable highlights. This issue also shows that in Graz, the birth place of the NPOC Space Law Austria, the very active group of the "Subpoint Graz" engages in bringing outer space closer to the people by a number of activities. Finally, space law teaching and learning has continued over the past months. Austrian students, tutors and professors participated in the 23rd ECSL Summer Course on Space Law and Policy in Geneva, Switzerland in September 2014. The seat of the ITU and the 50th anniversary of European space cooperation there added important impulses to the programme. The Austrian team to the Manfred Lachs Space Law Moot Court was particularly successful in the past European Rounds as it could reach the semi-finals. It is therefore with a certain proud that we present our readers the latest issue of the Austrian Space Law Newsletter No. 14/2015 with its review over past events, interesting insights and exciting prospects.

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RÜCKBLICK *review*

What You Need to Know Is Where You Want to Go

Interview with Mazlan Othman, former head of the United Nations Office for Outer Space Affairs (UNOOSA)

Michaela Hinterholzer



At the occasion of the end of her second term of office as the director of the UN Office for Outer Space Affairs (UNOOSA), we had the chance to talk to Dr. Mazlan Othman, the world's first woman in this position. She was director of UNOOSA between 1999 and 2002 and between 2007 and 2014. Before that, she was the first director of the Malaysian National Planetarium in Kuala Lumpur. In 2002, she set up and headed the Malaysian National Space Agency. She told us about her career, the challenges she faced and what is necessary to support women.

One of the last big events you initiated as the director of UNOOSA was the commemoration of 50 Years of Women in Space. How did you celebrate the big milestone and was the celebration a success?

Mazlan Othman: There was an exhibition at the Rotunda of the Vienna International Center and also a special panel during the 2013 session of UNCOPOUS with Valentina Tereshkova, the first woman in space, which was the only invitation she accepted for the whole year outside of Russia. It was important to give women a reason to celebrate the milestone of being in space for 50 years. Now, after the celebration, it is the best

time for women to look back and see if we have really made a mark in 50 years. I reckon that it was not enough. Compared to how much the space sector as such has evolved in 50 years, it hasn't been matched by strong contributions by women, especially if you look at high ranking positions. I was the first female head of a national space agency and there were no others in 50 years!

What is necessary to change the situation?

Mazlan Othman: We need more role models. A role model can be a trigger. For instance, when I became head of the Malaysian Space Agency or even before, when I became an astrophysicist, more and more girls became interested, because once you see a path, you can also see a career.

What about education?

Mazlan Othman: In Austria there is nothing to stop a young woman from learning. The only one stopping you in this situation, is you yourself. The question is what makes you choose astrophysics? Why are girls not interested in space, or are they? Maybe they don't see a career path and therefore don't choose it in the first place. Another reason might also be, that the country does not offer enough job opportunities.

What is necessary to support women?

Mazlan Othman: As I already said, role models are very important. Space agencies are behind in the concept of nurturing women. For instance, in the UN we are conscious about the fact that a lot of women enter the job competition with less experience when it comes to management skills. This is not entirely their fault, because the playing field was not level-

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led. In the UN, we would give a woman who has the potential but not the experience a chance and this is what we mean by nurturing. We should not only look at the so-called glass ceiling, but there are also glass walls, in the sense that women are not given the chance to do management.

Can you tell us a bit more about your own career?

Mazlan Othman: When I started my career, after coming home from New Zealand with my PhD in Astrophysics, there was definitely no career path. I was told very clearly by the head of the department that Astrophysics will not be a research priority at the National University of Malaysia (UKM), and he recommended me to change my field of research. Nevertheless, I decided to start teaching undergraduate courses, because there research was not necessary. I started off with some students, but after three years there were too many students also from other fields of studies, who all wanted to learn more about Astronomy.

I was also giving public lectures, and this is really how it all started in Malaysia in 1986. I organised a big exhibition in the Islamic museum, and I used the religious foundation to underline the importance of astronomy. So, I started off with the relation of astronomy to religion and predictions for religious rites which led to the actual science. The exhibition was so popular that it caught the attention of the Prime Minister and the Minister of Education, who also came to see it.

Then, one day, I got a phone call from the Prime Minister's Department saying that the Minister was planning to set up a planetarium and that I should join the Prime Minister's office. At that time I had to make a choice, because I was already planning on spending a second sabbatical leave at Harvard University. So I needed to decide between the choice to push Astronomy forward in my country or doing something for myself only. I chose the planetarium, and it changed me entirely. When I had the interview for the UN, after they had invited me to apply, I told them that it was not sure that I could take this job, because my Prime Minister had to agree. So, the UN did not choose me, because this uncertainty was not acceptable. Then, one night, I got a call from the Malaysian ambassador in New York, telling me that he had received a call from Kofi Annan's office, to ask if I was still available for the job. The Malaysian Prime Minister's first response was no, because in his opinion, the UN had the whole world to choose from, so why should he give up Mazlan. I persuaded him that I needed the

experience, and that this would be good for Malaysia, too, in order to move it further ahead. In the end, he agreed, but only for two years.

When you look back, how would you describe your time at the UN and in Malaysia?

Mazlan Othman: I think, I did more good than I would have done at Harvard, because I could change people's mindsets, and I think that is a more far-reaching and more permanent outcome. I was able to give something to humanity. During my first term at the UN, I knew I would only be there for two years, so it was a completely different perspective. After that, I had the feeling that I haven't finished my job in Malaysia. So, when I came home, I pushed two things: the continuation of the satellite programme and teaching students about basic space technology. After I set up the Malaysian National Space Agency, I was always asked when we would have the first Malaysian astronaut in space. Everyone thought now we were NASA. However, that was not our aim; we had more imminent issues to deal with, such as capacity building, building satellites, bringing the benefits of space for agriculture, for disaster management or for food to Malaysia. Then I realised, that despite my conviction that we didn't need an astronaut programme, we were missing something. I talked to the Malaysian Prime Minister, and we agreed that we needed something to inspire people, especially the young generation, and that we needed a symbol so that we all feel we belong together. An astronaut would be such a symbol, because sending a Malaysian astronaut to space has all the ingredients and more. It was a difficult aim, but in the end, the first Malaysian astronaut flew to space in 2007, the year of Malaysia's 50th anniversary of independence.

After my time back in Malaysia I had the feeling that I still had to finish my job at the UN. So, I came back with a mission and a vision. I knew the value of basic space technology, of having young people involved in satellite design and building, not just the industry or the government, but the "grass root level". That is why we had the Basic Space Technology Initiative and why we were also involved in the Human Space Technology Initiative. It is all about developing countries being given the chance to do science in space. So, I thought if I could achieve the same for other developing countries as I did in Malaysia, imagine how this would snowball. Looking back, I think and I know that I have done enough to embed the initiatives within

the system, so that they are not going to die only because I am leaving.

As the fields of science and space can challenge religious beliefs, have you ever experienced any difficulties in this area?

Mazlan Othman: In my mind, it was never a challenge. To others, this can easily seem like a big conflict, but I got both scientists and religious representatives sitting together and agreeing that there actually is no conflict. Back in Malaysia, Islamic scholars were afraid that if I only taught Astronomy from a scientific point of view, people would not believe in religion. However, I always say that, if you study Astronomy and Astrophysics, you will know that we don't know anything. 95% is still unknown, and even if you don't believe in the mysteries of the universe, there still remains the question of how we came about? Why are we made out of carbon atoms, and how did they come about? They are not only created inside the stars, but there must be so many things come into place to create even one carbon atom. Therefore, you as a scientist can also ask yourself, how did this happen? There might be something more than just probabilities or quantum mechanics, there is still enough room to believe, not everything is proven and closed.

What most people don't know is that my name, Mazlan, is actually a boy's name in Malaysia. So, when the religious representatives heard my name, they assumed that I was a man. Nevertheless, they invited me and listened to me. In the end, I got a very strong standing with the religious community. I managed to explain them the beginning of the Muslim New Year and all the festivities in a scientific way. So, we calculated the dates of the festivities with scientific methods instead of visual sightings.

Religion is also an issue in connection with the astronaut programme. How can a Muslim astronaut carry out the religious rituals? How is he going to pray? How to face Mekka in space? You also experience 14 sunrises and sunsets in 24 hours, and you need to pray five times between sunrise and sunset. We organised an international meeting together with international scientists and religious representatives in order to discuss what it means for a Muslim to be in space. [Note: The discussion resulted in a Fatwa for conducting Muslim religious rites in space]

What would you recommend young graduate students?

Mazlan Othman: If you love what you do, if you are passionate about what you do, you can overcome the inevitable ups and downs in every career. You need strength, commitment, and dedication. This is most important for having a good career. The other thing I advise young people is to always think ten years ahead. If you are doing something now, think what you will be doing in 10 years and work towards it. Most people I ask don't know the answer right away. Well that's okay, then think about it. In 10 years where will I be? Then you might realise, maybe I should not be here right now, if I want to be there in 10 years.

What you need to know is where you want to go. Then you will be getting there. Don't worry if you don't know how to get there but you must know where you want to go, so that you won't be running in different directions. The best way is to examine your heart and yourself and not what people think of what would be nice or useful.

What about your own future plans?

Mazlan Othman: There are many things I want to do during my retirement. However, there is one thing that I am most dedicated to pursue in the next 15 years, and that is to chase after solar eclipses. I've already told my son that this will be my plan and that I am going to bring my grandson to Chile, to Africa, to the US.

The next one will be in 2015, and a big solar eclipse will be in the US in 2017. I was told that you need a long-term plan for your retirement, because otherwise you might become depressed or lose your energy. So, I wondered what this long-term plan should look like, because I didn't want to work all the time. That is when I came up with the plan to chase solar eclipses, which is already a 50 year plan.

The Malaysian Academy of Science asked me to write a biography two years ago, and now I have time for it. I will also write about the mysteries of science, because most of the current unsolved scientific questions concern space and Astronomy. So I will write a book trying to answer those questions, the way I see it. Since I started learning to play the cello recently, I have to learn how to read music. I also want to climb mountains in exotic places. So you see, I'll be very busy.

In der Liga der Weltraumstaaten mitspielen

Interview mit Otto Koudelka, Professor an der Technischen Universität Graz

Michaela Hinterholzer



Die Satelliten TUGSAT-1/BRITE-Austria befinden sich seit zwei Jahren im All. Wir baten Prof. Otto Koudelka von der TU Graz, uns über seine bisherigen Erfahrungen mit der BRITE Mission Näheres zu erzählen.

**Nun sind zwei Jahre vergangen seit dem Satellitenstart:
Wie würden Sie das Projekt für sich persönlich in einem
Wort beschreiben?**

Otto Koudelka: Als großen Erfolg. Am 25. Februar 2013 war der Start, und von Beginn an hat alles gut funktioniert. Was uns sehr gefreut hat, war, dass bereits nach dem ersten Überflug über Graz – drei Stunden nach dem Start – Kontakt aufgenommen werden konnte. Das war zwar erhofft, aber nicht erwartet, denn es ist normalerweise sehr schwierig, den Satelliten gleich zu finden. Der Einschuss durch die ISRO war aber perfekt.

Wie ist das Projekt überhaupt entstanden?

Otto Koudelka: Alles hat 2004 begonnen, als uns die FFG gefragt hat, ob wir am Bau eines kleinen Satelliten interessiert wären, bei dem auch Studierende zu Ausbildungszwecken involviert werden sollten. Dann haben wir an einer Missionsdefinition gearbeitet und im Zuge dessen auch mit der ESA diskutiert, um eine Technologiemission zu definieren. Ziel war

es, einen Single Cube mit einem konfigurierbaren Prozessor an Board zu bauen, bei dem vom Boden aus Software variiert und auch die Hardware konfiguriert werden kann.

BRITE-Austria wurde dann mit der TU Graz als Konsortialführer zur Ausschreibung ASAP III eingereicht, einem Programm der FFG. So sind der BRITE-Austria und die BRITE Mission entstanden.

Später hat dann auch die Canadian Space Agency zwei BRITE Satelliten finanziert. Dann sind von der polnischen Akademie der Wissenschaften noch zwei BRITE kompatible Satelliten, LEM und Heveliusz, gebaut worden, womit die Konstellation vollständig war.

Wie verliefen die ersten Wochen nach dem Start?

Otto Koudelka: Nach dem Start haben wir begonnen alle Subsysteme auszutesten, zuerst Computer, dann alle Einzelsysteme, dann das Lageregelungssystem – das nennt man die Kommissionierungsphase. Ziemlich genau ein Monat nach dem Start konnten wir das erste Sternenbild aufnehmen. Zwar entstand die Aufnahme noch nicht mit Feinlageregelung, wie sie für die wissenschaftliche Datensammlung notwendig ist, aber wir konnten verifizieren, dass das Teleskop einwandfrei funktioniert. Über den Sommer 2013 wurde das Lageregelungssystem ausgetestet und optimiert. Das hat einige Zeit in Anspruch genommen, aber seit Herbst 2013 sammeln TUGSAT-1 und UniBRITE Daten.

Wie ist es Ihrem Team in den Wochen nach dem Start gegangen und wie wird jetzt weitergearbeitet?

Otto Koudelka: Mein Operationsteam war ganz schön gefordert, speziell die Kommissionierungsphase war sehr anstrengend, da hatten wir Schichtbetrieb, und es ist wirklich rund um die Uhr gearbeitet worden.

TUGSAT-1/BRITE-Austria: Nanosatellit der TU Graz

UniBRITE: Nanosatellit der Universität Wien

BRITE: Name der Mission bestehend aus den Satelliten BRITE-Austria, UniBRITE, den beiden polnischen Satelliten Lem und Heveliusz und dem kanadischen Satelliten BRITE-Toronto.

Die Überflüge finden immer abends und sehr früh am Morgen statt. Für die Abendüberflüge muss auch jetzt immer noch Personal im Büro sein, weil konfiguriert werden muss und die Messwerte „untergeholt“ werden müssen. Es wird geschaut, ob alles funktioniert, ob irgendwelche Werte nicht im grünen Bereich sind. Es muss gewissermaßen immer der „Gesundheitszustand“ überprüft werden. Das BRITE Executive Science Team, das aus österreichischen, polnischen und kanadischen Astronomen besteht, definiert welche interessanten Zielsterne anvisiert werden sollen. Unser Ziel ist es, diese Sterne regelmäßig über längere Zeit zu beobachten. Die Daten werden dann gesammelt und ausgewertet. Wenn nun alle österreichischen, polnischen und kanadischen Satelliten Daten liefern, kann auch die Genauigkeit dadurch erhöht werden.

Wir würden Sie die Mission einem Laien in einfachen Worten erklären?

Otto Koudelka: Das wissenschaftliche Ziel ist die Messung der Helligkeitsschwankungen von sehr massereichen, hellen Sternen. Daraus können die Astronomen Rückschlüsse über physikalische Vorgänge ziehen, wie etwa über die Rotationsgeschwindigkeit oder den Massenausstoß der Sterne. Das sind grundlegende Dinge, die letztendlich dazu dienen, im weitesten Sinne, die Theorien über die Entstehung des Universums besser zu verstehen, eine Grundlagenforschungsangelegenheit also.

Könnten diese Phänomene nicht auch vom Boden aus erforscht werden?

Otto Koudelka: Die Sterne, die wir vom Boden aus sehen, funkeln zwar, aber das liegt an der Turbulenz der Atmosphäre. Diese Turbulenzen sind allerdings größer, als das, was ich eigentlich messen möchte. Genau deshalb muss man in den

Weltraum hinaus, um die Helligkeitsschwankungen auch wirklich messen zu können. Das vielen bekannte Hubble-Weltraumteleskop wurde gebaut, um sehr weit entfernte, sehr schwache Objekte zu untersuchen. Wir machen genau das Gegenteil, nämlich relativ nahe und dafür aber sehr helle Sterne zu untersuchen. Die BRITE Satelliten sind die einzigen Satelliten, mit Ausnahme eines kanadischen Nanosatelliten, der als Vorläufer anzusehen ist, die Pulsationen messen. Außerdem ist es auch die erste Nanosatellitenmission mit einer Sechs-Satelliten-Konstellation, die einer wissenschaftlichen Zielsetzung gewidmet ist.

Gab es bisher auch Probleme bei der Mission?

Otto Koudelka: Durch die Verzögerung des Starts gab es vorab wesentlich mehr Zeit alles auszutesten und zu verbessern. Es hat natürlich das eine oder andere kleinere Problem gegeben, aber das ist normal und konnte durch Softwareänderungen relativ rasch beseitigt werden. Die Missionsziele sind alle erreicht, denn der Satellit liefert alle Daten, die er liefern soll.

Das Projekt wird von zwei Universitäten betrieben, wie hoch ist die Studentenbeteiligung an dem Projekt?

Otto Koudelka: Ein sehr schöner Aspekt des ganzen Projektes ist, dass drei Dissertationen, einige Diplomarbeiten und unzählige Projektarbeiten entstanden sind, wobei es sich bei dem Projekt nicht per se um einen Studentensatelliten handelt.

Diese Entscheidung, die Mission nicht als Studentenprojekt aufzubauen, wurde bewusst getroffen, weil dafür die Mission zu komplex ist. Außerdem handelt es sich um ein längerfristiges Projekt, bei dem der Abschluss von Studenten und damit der Abgang von der Universität ein Problem darstellt. Zu Spitzenzeiten waren ungefähr 10-12 Leute allein bei uns an der TU Graz beschäftigt. An der Universität Wien haben zusätzlich noch bis zu 10 Personen an der astronomischen Datenauswertung mitgearbeitet.

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Wie haben Sie den behördlichen Genehmigungsprozess erlebt?

Otto Koudelka: Gleich zu Beginn des Projekts haben wir mit der Fernmeldebehörde Kontakt aufgenommen, um den Frequenzkoordinierungsprozess sehr früh starten zu können. Denn für diesen Prozess, der auch über die International Telecommunication Union läuft, müssen ca. zwei Jahre einge-rechnet werden.

Auch die Registrierung innerhalb Österreichs war völliges Neuland, und wir sind ein bisschen stolz darauf, der Anlass für die Implementierung des Weltraumgesetzes gewesen zu sein, das am 28.12.2011 in Kraft getreten ist. Das ist sich zeitgerecht für den Start gut ausgegangen, und damit war der rechtliche Rahmen für das Projekt abgesteckt. Es ist auch schön, ab nun in der Liga der Staaten mitspielen zu dürfen, die ein nationales Weltraumgesetz implementiert haben. Etliche größere Staaten, die auch oft schon länger in Weltraumaktivitäten involviert sind, können so ein Gesetz nicht vorweisen.

Waren Sie an dem Prozess auch beteiligt?

Otto Koudelka: Ja, ich hatte mit Frau Prof. Marboe sehr en-gen Kontakt in dieser Phase und habe mich auch am Begut-achtungsverfahren beteiligt. Nachdem das Weltraumgesetz implementiert wurde, gab es auch noch zwei oder drei tech-nische Arbeitsgruppensitzungen im Hinblick auf die Durch-

führungsbestimmungen, zu denen ich eingeladen wurde, um meine Inputs zu geben. Ich muss sagen, das war ein sehr spannender Prozess, weil hier Techniker und Juristen so zu-sammengearbeitet haben, dass das gemeinsame Verständnis aller gewachsen ist. Das war eine wunderbare interdisziplinäre Aktivität.

Wie sehen Ihre Zukunftspläne aus?

Otto Koudelka: Wir hoffen dass die Satelliten möglichst lan-ge im All sind, um noch möglichst lange Daten sammeln zu können. Je mehr Daten wir haben desto besser wird die Qua-lität der wissenschaftlichen Auswertung. Ein Operationszyklus dauert in etwa 100 Tage, und es gibt bereits eine lange Liste von Zielobjekten, die wir möglichst alle abarbeiten möchten. Gleichzeitig arbeiten wir aber auch wieder an einer neuen Mission, genannt OPS-SAT. Wir haben jetzt unsre Unterlagen für eine ESA Mission abgegeben, die einen Triple Cube Satelliten mit rekonfigurierbarer Nutzlast zum Ziel hat. Dabei will die ESA neue Betriebskonzepte im All testen, die normalerweise während einer Weltraummission als no-go gelten, nämlich die komplette Abänderung der Software. Unter normalen Umständen wird aus Sicherheitsgründen nach dem Start keine Softwareänderung mehr durchgeföhrt, obwohl das natürlich oft sinnvoll und gut wäre, um etwa die Funktionalität des Satelliten zu erhöhen. Mit risikoarmen „Lowcost“-Missionen möchte ESA dieses neue Konzept nun eben ausprobieren.



“Weltraum-Land Österreich – Pioniere der Raumfahrt erzählen”, Book Presentation, ESPI, 15 December 2014

Peter Habison



On 15 December 2014, the new publication “Weltraum-Land Österreich – Pioniere der Raumfahrt erzählen” by Peter Habison was presented at the European Space Policy Institute (ESPI) in Vienna.

The book was published in September 2014 and features **interviews with 17 Austrian space pioneers** from the second half of the 20th century to the beginning of 21st century. The presentation included a welcome statement by publisher **Maria Seifert**, introductory words by ESPI director **Peter Hulsroj**, a **keynote address by the author** and a short discussion featuring the ideas behind the scenes. Finally, a historic picture of 12 space pioneers was taken.

Mitte Dezember 2014 fand am ESPI, die Präsentation des Buches „Weltraum-Land Österreich – Pioniere der Raumfahrt erzählen“ statt. Im **Buch von Peter Habison**, das im September 2014 im **Seifert Verlag** erschien, kommen **17 Pioniere der österreichischen Raumfahrt** und Raumfahrtpolitik zu Wort. 12 von ihnen kamen zur Präsentation ans ESPI und feierten das neu erschienene Buch sowie ein Treffen unter Welt- raum-Freunden.

Doch blicken wir etwas weiter zurück: Am 2.10.1991 startete Sojus TM-13 vom Weltraumbahnhof Baikonur zum Flug ins All. Mit an Bord war der Elektrotechniker **Franz Viehböck**,

der erste Österreicher im All, unser „Austronaut“, wie ihn die Leute mit fast zärtlichem Stolz nannten. Heute fliegen europäische, amerikanische, russische und japanische Astronautinnen und Astronauten zur Internationalen Raumstation, Franz Viehböck blieb der einzige österreichische Raumfahrer. Auch wenn heute keine Österreicherinnen und Österreicher zur Internationalen Raumstation fliegen, **Österreich etablierte sich in der Raumfahrt und den Weltraumwissenschaften**.



Es war im Frühjahr 2011, als der Autor das Angebot erhielt, im Rahmen des **ESA Oral History Projektes**, Interviews mit sechs österreichischen Raumfahrtionieren zu führen. Das Projekt erstreckte sich über zahlreiche Mitgliedsstaaten der ESA, Interviews mit österreichischen Pionieren fehlten damals jedoch. Während der Zusammenarbeit mit der ESA in Paris entwickelte sich die Idee, die Ergebnisse nicht nur im Projekt am European University Institute digital zu veröffentlichen, sondern auch ein **Buch über österreichische Raumfahrtioniere** zu gestalten. Grund dafür waren einerseits zahlreiche bisher unveröffentlichte Bilder, andererseits die Tatsache, dass Interviews von sechs Personen ein nur sehr unvollständiges Bild der österreichischen Raumfahrtgeschichte ergeben hätten. So versucht das Buch dem Weltraum in Österreich im wahrsten Sinne des Wortes „ein Gesicht zu geben“. Geworden sind es schließlich **17 Gesichter und Porträts** von Österrei-

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cherinnen und Österreichern, welche die **heimische Raumfahrt in den letzten 50 Jahren** maßgeblich prägten und dies zum Teil noch immer tun. So ist das Buch vielfach personen- und standortbezogen, es beinhaltet Bausteine in Form von Gedanken und Erzählungen von Menschen, die zwischen 2012 und 2014 über ihre Erlebnisse und Erfahrungen aus 50 Jahren Raumfahrt berichteten.

In vielfältiger Weise erzählen sie von ihrer **Liebe und Begeisterung zum Weltraum**, von den Anfängen in den 1960er Jahren in Paris, Kiruna und New York sowie von ersten Schritten und Erfolgen, die Raumfahrt in den 70er und 80er Jahren in Österreich zu etablieren. Wir erfahren, wie Österreich Mitglied der Europäischen Weltraumorganisation ESA wurde, blicken zurück auf das **Projekt AUSTROMIR** und die organisatorischen und technologischen Herausforderungen der 2000er Jahre, um schließlich über neue Weltraumkonzepte und Strategien sowie über den Start und Betrieb der **ersten österreichischen Satelliten** im Erdorbit zu hören. Diese ganz spezifische Rückschau ergab sechs Kapitel, die unterschiedliche Blicke auf das Thema werfen: Wissenschaft, Verwaltung, Weltraumrecht, Technologien und Anwendungen, Forschungspolitik und nicht zuletzt bemannte Raumfahrt. Aber immer und im Besonderen geht es um die Menschen: „**Die Menschen sind das Wichtigste**“ finden wir in einem Zitat im Buch.



Auf Einladung des Verlages kamen am 15. Dezember 2014 über 80 Personen zur Präsentation des Buches ans ESPI. Nach einer **Begrüßung durch Maria Seifert** vom Verlag, sprach **ESPI Direktor Peter Hulsroj** einleitende Worte über die Bedeutung von Oral History in der Raumfahrt und den Bezug des Buchprojektes „Weltraum-Land Österreich“ zur ESA. Danach stellte der Autor einige **Highlights aus dem Buch**

Bibliographical Data

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vor. Im Anschluss fand eine **Podiumsdiskussion mit Portraitphotograph Stefan Seip und Peter Habison** statt, die von Blandina Baranes vom ESPI geleitet wurde. Die Diskussion beleuchtete den **Hintergrund zur Entstehung des Buches** und der Portraits der Protagonisten. In einem „**Historischen Moment**“ wurde im Anschluss ein gemeinsames Photo aller anwesenden Raumfahrtponiere aufgenommen. Ein Büchertisch mit der Möglichkeit, die Bücher signieren zu lassen, ein Buffet und Musik rundeten die Veranstaltung ab.

Wie heißt es so schön in einem Zitat: „**The Sky is not the Limit**“. Für Österreichs Raumfahrtponiere trifft dies in besonderem Maße zu, war doch der Himmel über ihren Köpfen nicht die Grenze ihres Denkens, Schaffens und Tuns. Wenn auch zu Beginn der 60er Jahre völlig unvorstellbar, so wurden ihre Träume Wirklichkeit, und Österreich zu einem wichtigen und geschätzten Partner in der internationalen Raumfahrt des 21. Jahrhunderts. **Österreich wurde zum „Weltraum-Land“**.



NPOC Space Law Austria Symposium "Small Satellites: Chances and Challenges", 29 March 2014

Cordula Steinkogler

Small satellites are a rather **new phenomenon** in the area of outer space activities. They are **increasingly developed** by universities, private companies and emerging economies. But also the established space nations, such as the United States and Russia, have invested in this innovative technology. Under the title "Small Satellites: Chances and Challenges" **experts from various fields** in the area of space technology and space law talked about small satellite missions from **the practical, the legal, and the economic perspectives**.

The conference took place at the margins of the 53rd session of the **UNCOPUOS Legal Subcommittee**, held from 24 March to 4 April 2014 in Vienna. The symposium was organised with the support of the **Austria Research Promotion Agency** (FFG) and the **Austrian Ministry for Transport, Innovation and Technology** (BMVIT). An edited volume which will contain the presentations as well as some additional contributions is in preparation.



After an **introduction** and opening remarks by **Irmgard Marboe**, who chaired the conference, the first series of presentations focused on the specificities of small satellite missions from the **practical perspective**. **Otto Koudelka**, professor at the Technical University in Graz, spoke about small satellite activities from a technical perspective, focusing on

the experience with the first two Austrian satellites **TUG-SAT-1/BRITE-Austria and UniBRITE**. **Werner Balogh** from the United Nations Office for Outer Space Affairs (UNOOSA) presented the aims and achievements of UN initiatives supporting small satellite projects. **Neta Palkovitz**, legal advisor at the private company ISIS (Innovative Solutions In Space), focused on the industry perspective with a special emphasis on the case of the Netherlands. **Roberto Becerra** from the Bolivarian Space Agency in Venezuela spoke about small satellites as a chance for developing countries.



The second set of presentations was dedicated to the **legal perspective**. In his presentation, **Frans von der Dunk**, professor at the University of Nebraska, discussed the issue of liability for damage caused by small satellites. The authorisation of small satellites under national space legislation was presented by **Sa'id Mosteshar**, director of the London Institute of Space Policy and Law. The presentation of **Tanja Masson-Zwaan**, president of the International Institute of Space Law, was dedicated to the registration of small satellites. **Jean-François Mayence** from the Belgian Federal Office for Science Policy focused on the EU small satellite project QB50 and its legal implications. **Attila Matas**, head of the Space Publication and Registration Division at ITU, presented the ITU policy on small

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satellites. **Daniel Sagath**, doctoral candidate at the Amsterdam Business Research Institute, focused on frequency management of small education satellites. **Anita Rinner** from Muhri & Werschitz Attorneys in Graz spoke about the impact of technology and export control on small satellite missions. The essential elements of launch contracts for small satellites were presented by **Hiroyuki Kishindo** from JAXA (Japan Aerospace Exploration Agency).



The last two presentations focused on the **economic perspective**. **Peter Platzer**, CEO of Spire, a start-up company headquartered in San Francisco, spoke about crowd financing for small satellites. **Cécile Gaubert** from Marsh, France, focused on the topic of insurance for small satellites. The conference was concluded with remarks by **Kai-Uwe Schrogl** the current chair of the UNCOPUOS Legal Subcommittee.

The presentations demonstrated that small satellites have become **more and more popular** in recent years, as the **development of technology** has made it possible to build, launch, and operate satellites at rather **low cost**. They are therefore attractive for research and educational institutions, provide opportunities for small business start-ups, and are a welcome way for developing and emerging countries of engaging in space activities.

Yet, the speakers also highlighted that there is sometimes the **misunderstanding** that such **low-cost satellite missions** are not as relevant as large space programmes and as mere **"amateur" activities** not subject to the same strict conditions and regulations. The conference made clear that **international space law** does not distinguish between "small" and "large" space objects or activities and that the **states' responsibility and liability** must be taken into consideration. It is therefore necessary to be aware of the need to include small satellite missions in the scope of application of **national and international regulatory frameworks** to ensure the safe and responsible use of outer space.



ESPI Event: "Earth Observation Data as the Source and the Keeper of Regulation", 02 April 2014

Cordula Steinkogler

On the occasion of the UNCOPUOS Legal Subcommittee in April 2014, the European Space Policy Institute (ESPI) organised an evening event entitled "Earth Observation Data as the Source and the Keeper of Regulation". The two invited speakers, Alan Belward and Stephen Briggs, discussed the topic of Earth observation and regulation from two different angles.

In his presentation, **Alan Belward**, head of the Land Resource Management Unit at the Joint Research Centre of the European Commission, focused on **how Earth observation causes regulation**. After giving an overview of the long tradition of using Earth observation data in Europe, he presented the many different purposes for which Earth observation data is used, ranging from marine, atmosphere and land monitoring to emergency management, security and climate change. Earth observation data is regularly used by policy makers around the world as **basis for regulation and decision-making**. Until today the USA have launched 56 land imaging civilian satellites, the Russian Federation has launched 32, the European Union 31, China 19 and India 17.

Against the background of **rising population numbers** the importance of land monitoring is increasing. The rapid growth of population in many parts of the world puts pressure on

the environment and poses **humanitarian and economic challenges**.

In this context, Earth observation is used to detect and estimate deforestation and **degradation of biodiversity** as well as for monitoring, reporting and verification of **climate change**. Earth observation data has proven to be very useful to give an accurate picture of the real scale and seriousness of these issues and has thus contributed to the **conclusion of international agreements** in the area of climate change and biodiversity, such as the United Nations Framework Convention on Climate Change or the UN Convention on Biodiversity.



Stephen Briggs, senior adviser at the Earth Observation Programmes Section at ESA, focused on **Earth observation data as evidence for regulation and legislation**. In his presentation, he demonstrated that information derived from satellite imagery is increasingly used for monitoring compliance with legislation as well as for **law enforcement activities**.

Earth observation data is for instance used by NGOs to demonstrate **non-compliance** with international agreements or to highlight actions of concern. Furthermore, governmen-

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tal entities use Earth observation as a component of their operational **monitoring responsibilities**. Many lawyers and prosecutors are also increasingly aware of satellite observation but to date there is limited experience of actual inclusion of Earth observation derived information in **court proceedings**. Currently, the data is mainly used to direct additional focused inspection or evidence collection.



Land and marine monitoring are two of the main areas where Earth observation data is increasingly used for law enforcement and compliance monitoring. Examples of the use of Earth observation data in the area of **marine monitoring** include **oil spill detection** and polluter identification, oil disaster management, the rescue of icebound ships and the detection of **illegal fishing**.

In the area of **land monitoring**, the detection of agricultural subsidy fraud is an example of the use of Earth observation data to detect non-compliance with stated land use and **habitat preservation measures**. Another use of satellite imagery in the area of land monitoring is the identification of **illegal crop farming**, as for instance the cultivation of poppies in Afghanistan.

Earth observation is also used for the **detection of land motion** due to engineering works. In this context high precision satellite measurements of land motion over the area of interest have been presented in actual court cases to assign the cause of local land motion. Furthermore, insurances have used Earth observation data to measure the development, extent and effects of floods.



In conclusion it was highlighted that although Earth observation data is increasingly used as basis for regulation and decision-making as well as in law enforcement and compliance monitoring, **operational best practices** are not fully agreed and **mechanisms for utilisation** remain unclear. In the future new developments in satellite capability will expand the range of law enforcement and legislative compliance situations where satellite derived information can be applied. Therefore, it would be important to agree upon best practices and develop clear mechanisms for utilisation.



United Nations/China/APSCO Workshop on Space Law “The Role of National Space Legislation in Strengthening the Rule of Law”, Beijing, China, 17-20 November 2014

Irmgard Marboe

The **United Nations Office for Outer Space Affairs** (UNOOSA) regularly organises “**Workshops on Space Law**” in different parts of the world, according to a mandate it received by the Member States of UNCOPUOS in the wake of the UNISPACE III Conference in Vienna in 1999. The workshop in China, organised in cooperation with the **Chinese government and the China National Space Administration (CNSA)**, was the ninth of its kind since 2002. The **Asia-Pacific Space Cooperation Organization (APSCO)**, the space organization of the region, acted as co-organiser and co-host. Approximately 100 experts from 30 countries participated in this event.

National Space Law in Focus

It is not a coincidence that the title of this workshop made reference to a topic, which has been in the focus of UNCOPUOS during the last years: **national space legislation**. Also previous Workshops on Space Law had dealt with this **new area of space law** which became increasingly important since **commercialisation** and **privatisation** of space activities started in the 1990ies. The UN/China/APSCO Workshop could build on insights and experiences gained in Daejeon, Republic of Korea, in 2003 (“United Nations treaties on outer space: actions at the national level”), Rio de Janeiro, Brazil, in 2004 (“Disseminating and developing international and national space law: the Latin American and Caribbean perspective”), Kyiv, Ukraine, in 2006 (“Status, Application and Progressive Development of International and National Space Law”) and Bangkok, Thailand, in 2010 (“Activities of States in Outer Space in Light of New Developments: Meeting International Responsibilities and Establishing National Legal and Policy Frameworks”). The novelty for the present Workshop was that it was the first that could discuss the **result of the work of UNCOPUOS and its Legal Subcommittee** in this respect that had lasted for many years. In December 2013, the UN General Assembly had adopted the newest **resolution** on outer space entitled

“Recommendations on National Legislation relevant to the Peaceful Exploration and Use of Outer Space” (No 68/74). It was thus most timely to discuss the outcome of this work and its implication for the practice of developing, implementing and adapting national space legislation in the future.



China's Interest

The particular interest of China in the topic was related to the fact that the country had started major efforts to **develop a legal and regulatory basis** for its booming space activities. China has extensive plans, **programmes and projects** for various types of space activities, which were impressively presented by **Prof. Haifeng Zhao**, Director of the Institute of Space Law, Harbin Institute of Technology, and **Mr. Li Guoping**, Deputy Director of the Department of System Engineering of CNSA, at the Workshop in Beijing. In addition to the more operative applications of space technology, such as meteorology, Earth observation, telecommunication and global navigation, these plans include expanding **manned space flight**, building China's own **space station** by 2020, **excursions to the Moon**, and several projects in the area of deep space exploration. All these different types of activities involve many **different actors at different levels**, including governmental and non-governmental agencies, academia, and private industry. Several programmes and projects are carried out with

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international partners. In order to support these developments, **a secure, transparent, reliable and practicable legal framework** is necessary. Prof. Haifeng Zhao pointed out that China's "White Papers" on space policy of 2000, 2006 and 2011 all emphasized the importance of constituting a national space law system. After the election of President Xi Jingping, the topic of "Space Law" was officially put on the agenda of the legislative plan of the National People's Congress in 2013.



Prof. Zhan Zhenjun, Secretary General of the China Institute of Space Law, shared some highlights of the recent efforts of **internationalisation of China's Space Law Community**, such as the **Manfred Lachs Moot Court Competition** whose World Finals were held in Beijing in 1996 and in 2013, and the impressive list of internationally renowned professors, who were visiting scholars in China in the past two years. The role of **international agreements** to complement national efforts and to facilitate international cooperation was highlighted by **Prof. Zhao Yun**, Director of the Center for Chinese Law at the Faculty of Law at the University of Hong Kong. All in all, the Chinese presentations gave witness of the **vibrant space community** that is currently active and willing to change China **from a "big space country" to a "space power"**.

APSCO

A novelty of the Workshop was the presence and active participation of APSCO, the **Asia-Pacific Space Cooperation Organisation**. This regional space organisation was established in 2005 and is headquartered in Beijing since 2009. It aims at **promoting cooperation in the area of space** among its Member States, which currently are Bangladesh,

China, Indonesia, Iran, Mongolia, Pakistan, Peru, Thailand and Turkey. **Murat Yasar Bayrak**, the Director General of the Department of External Relation and Legal Affairs, explained that APSCO had 14 different **collaborative projects** and numerous different education and training activities, which have facilitated and improved **regional space collaboration** in the past five years. In his presentation he concentrated on the **role, objective, and legal structure of APSCO**, with a focus on the decision-making process, working methods, and funding. Also the functioning of the APSCO secretariat with its four sections was explained in detail. The structure and working methods of APSCO are reminiscent of those of the European Space Agency (ESA), the regional space organisation in Europe, which to a certain extent has served as a model. Certainly, several important States of the Asia-Pacific region are not yet members, and the difference in space capacity amongst the existing members is remarkable. In view of these challenges, the **role of APSCO** for space activities carried out in the region will be further defined in the future.



International Expertise

The speakers at the Workshop were **international and Chinese experts**. They highlighted different aspects relating to the most important issues of international and national space law, in particular **safety, liability, and insurance**. These corresponded to the expectations of the audience who consisted of experts and practitioners from international, regional and national institutions, government entities, research and academic institutions, intergovernmental or non-governmental organizations, and industry. In addition, two round table discussions were dedicated to space law teaching. The newly

published "**United Nations Curriculum on Space Law**" was presented and conveyed to the audience for further discussion.

After an insightful **keynote speech by Prof. Sergio Marchisio** (Italy), the sessions provided an overview over "Space law treaties and soft law development", presentations about "**Responsibility and liability** for national space activities", "**Registration** of space objects with the United Nations", and "Legal issues related to satellite launch". More specialised sessions dealt with space traffic management, transparency and confidence building measures, and the legal regime of small satellites. Presentations about **national legal regimes** were given by experts from Australia, China, Japan, Russian Federation, United States of America, Iran, Pakistan, Republic of Korea, and Thailand. This provided a unique opportunity to receive this information first-hand. **Regional and international cooperation** was discussed at the examples of ESA, ICG (International Committee on Global Navigation Satellite Systems), ISEF (International Space Exploration Forum) and APSCO.

The Future

The UN/China/APSCO Workshop on Space Law has certainly shown that **capacity in space technology in the Asia-Pacific region** has developed to a notable level and with impressive ambition, most importantly in China, but also in other member countries of APSCO. There is a remarkable **awareness of the need for an accompanying legal and regulatory regime**. This is noteworthy insofar as the **cooperation between technical and legal experts** in the area of space activities is not always granted. The UN/China/APSCO Workshop on Space Law was a further successful effort of building the bridge between these two fields in the space sector. It can be hoped that future endeavours will strengthen **transparency and predictability of the legal framework** of outer space activities, some of the most important features of the rule of law, both on Earth and in outer space.

For further information see:

www.unoosa.org/oosa/en/SpaceLaw/workshops/index.html
www.apSCO.int



United Nations/Mexico Symposium on Basic Space Technology “Making Space Technology Accessible and Affordable”, Ensenada, Baja California, Mexico, 20-23 October 2014

Irmgard Marboe

The “**Basic Space Technology Initiative**” (BSTI) of the United Nations (UN) aims at supporting capacity-building in basic space technology and promoting the use of space technology and its applications. It was launched in 2009 and is carried out in the framework of the **UN Programme on Space Applications** to enhance access to space application tools for sustainable development. It seeks to respond to the increasing interest in many countries to establish indigenous capacities in basic space technology, to address the growing role of small (nano-) satellites for education, basic space science and operational applications, to assist countries to assure adherence to the relevant regulatory frameworks and to promote the use of standards as well as international cooperation and information exchange. The BSTI’s particular focus has been the development of affordable, small-satellite platforms with mass below 150 kg and on their associated technical, managerial, regulatory and legal issues (see www.unoosa.org/oosa/en/SAP/bsti/index.html).

The **symposium in Ensenada, Baja California, Mexico**, entitled “Making Space Technology Accessible and Affordable” was the **third in a row of international symposiums** to be held in the regions corresponding to the UN Economic Commissions for Africa, Asia and the Pacific, Latin America and the Caribbean, and Western Asia (Dubai, UAE in 2011, and Nagoya, Japan in 2012). It was co-hosted by the **Mexican Space Agency** on behalf of the Mexican Government and took place at the premises of CICESE (Centro de Investigación Científica y de Educación Superior de Ensenada). Around **160 experts and practitioners** from governmental institutions, academia and the private sector participated in the symposium.

Exchange of Experiences

An important part of the programme was the exchange of experiences with past and ongoing **projects involving small satellites in the region**. Several presentations dealt with space technology development activities in Latin America and the Caribbean and with international projects. **Colombia**, for example, after the launch of its first nano-satellite, Libertad-1, in 2007, is presently developing Libertad-2, which shall be used for Earth observation. In **Mexico**, CICESE focuses on tele-epidemiology applications and on the development of SATEX-2, a 50-100 kg experimental micro-satellite project. In addition, CICESE participates in two **Cubesat projects** for the Mexican Space Agency. The Universidad Nacional Autónoma de México (UNAM) is developing a Cubesat compatible nano-satellite bus, which should accommodate numerous Cubesats to be launched together. The **satellite educative project** (SATEDU) was started in 2008 to develop a multipurpose Cubesat to support satellite activities in Mexico and various applications in the area of remote sensing, climate change research and environmental monitoring. In **Chile**, the Universidad Austral developed a Dendelion Cubesat-based mobile exploration platform. It is designed as a rover that can also get over rugged terrain, which even attracted the attention of NASA. The **NASA Ames Research Center** was also represented and put the optimisation of **distributed small-satellite networks** into the discussion. The idea of a distributed network is that the payload capabilities, which are normally part of one single spacecraft, could be separated over a number of heterogeneous satellites that are connected by a wireless data network. Thereby an inexpensive and less risky Earth-orbit infrastructure could be established.

As regards experiences in concrete **areas of application**, the use of small satellites for **Earth observation** and **disaster management** as well as for early warning systems was particularly highlighted. Mexico currently has no remote

sensing satellites of its own so that it has to rely on international cooperation for obtaining satellite images. It is therefore considering developing a small satellite constellation to fill this gap. In collaboration with Russia, Mexico is part of the Condor UNAM-MAI project, which will monitor the Earth's atmosphere for the study of ionospheric precursors of earthquakes. The UN BSTI supports the HUMSAT constellation led by the **University of Vigo, Brazil**, which provides global low data-rate transmission services for data gathered by ground based sensor networks. In **Venezuela**, the VRSS-1 System (Satellite Miranda) shall be completed by 2017 and support the country's e-government initiative allowing access to data by the public through a dedicated website. A panel discussion dealt with prospects, plans and visions for **regional cooperation** in space technology development among countries in **Latin America and the Caribbean**.

In addition to the technical sessions, a **selection of posters** was presented at the margins of the symposium. In a dedicated poster session, participants were invited to ask questions and discuss with the authors.

Capacity Building

An important focus of the conference was capacity building. Several presentations dealt with the role of small satellites for **capacity building in basic space technology development** and for **engineering education**. It was pointed out that working on small satellite projects provides an excellent opportunity for hands-on training and for the development of skilled workforce, which can be employed in a variety of industries. **Prof. Jordi Puig-Suari** from the California Polytechnic State University (CalPoly), who, together with scientists at Stanford University, invented the **Cubesat** quasi-standard, highlighted the role of small satellites in **workforce development**. He demonstrated how the Cubesat activities in California resulted in the creation of start-up companies, which specialize in offering various satellite services.

While small satellite projects at universities have become more common in the last years, the question was advanced whether also **high school students** could design and **build a satellite**. The Herzliya Science Center and the Israel Space Agency reported about the efforts to develop the Duchifat project, which is about the design, development and operation of a nano-

satellite by high school students and shall be part of the QB50 constellation mission to be launched in June 2015.

However, it was also pointed out that small satellite capacity building and technology transfer is not always successful. A representative of **Berlin Space Technologies** (BST) reported that a systematic in-depth analysis had shown that many capacity building efforts had not entirely achieved their objectives. As a consequence, BST is now offering complete training packages to make the **small satellites programmes more sustainable**. In the panel discussions on best practices to develop capacity building it was highlighted that small satellite missions needed to **improve their performance** and to reduce their mission failure rates in order to make them competitive with larger satellites mission. This is particularly important for their **commercial applications**.

Controversial Discussions

The symposium had a dedicated session to deal with **regulatory and legal issues**, which triggered some controversies. On the one hand, it was highlighted that **size did not matter** in terms of regulating space activities. Small satellites clearly fall under the definition of "space objects" and small satellite projects are therefore subject to the same legal and regulatory framework as any other satellite mission. On the other hand, several participants questioned whether small satellite projects should be subject to the **same rules** as those designed for much **larger missions**. In particular, the question was raised whether they should be obliged to comply with **space debris mitigation guidelines**. It was argued that this could be **prohibitive for developing countries** because full compliance often meant considerably **higher costs** and/or specific knowhow. In view of the fact that the more advanced spacefaring nations, most importantly the United States and Russia, had not been subject to the limitations that are now asked from newcomers, this was inherently unfair and could not be accepted.

The "**observations and recommendations**" at the end of the symposium did not really resolve this controversy (the full text at <http://www.unoosa.org/oosa/en/SAP/bsti/mexico2014.html>). They rather highlighted that all space activities, including those involving small satellites, should be

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conducted in **full compliance with national and international space law** and with relevant General Assembly resolutions and that those involved in small satellite activities should commit to fully implement the voluntary guidelines for the long-term sustainability of outer space activities, once those guidelines were published. In addition, they considered the usefulness of developing **guidelines for operators** of satellites, in particular for **constellations and swarms** consisting of dozens or even hundreds of space objects, with short operational lifetime regarding the optimal orbital regimes that could be used to be compliant with existing and developing practices for **space debris mitigation and safe on-orbit operations**. Furthermore, designers of small satellites were called to consider measures to **enhance the detectability** of their satellites in order to allow them to be tracked by radar and/or optical facilities. As a conclusion, the symposium recommended that every space project should plan to include **legal management** in addition to technical and administrative management.

This strong emphasis of the UN/Mexico symposium on the importance of the legal and regulatory framework is certainly welcome. Due to the increasing number of space objects in orbit, the **risk of collision** rises and is considerably augmented with the launch of "swarms" of dozens or even hundreds of small satellites. However, the legal framework should not be regarded as hostile against small satellites. On the contrary, the **safe and sustainable use of outer space** is in the interest of all. The attitude towards regulation should not be defensive but rather proactive. The development of a small satellite project may even trigger the development of national space law, as was for example the case in Austria. A **proactive attitude towards regulation** and active involvement of satellite operators can help to avoid that the legal framework is prohibitive. It could rather turn out to be **supportive and protective**. An appropriate legal framework can even facilitate and encourage non-governmental space activities, including small satellite projects.



Paris-Saclay Air & Space Law International Colloquium, Paris, France, 30-31 October 2014

Cordula Steinkogler

From 30-31 October 2014, the Institut de Droit de l'Espace et des Télécommunications (IDEST) organised the first Paris-Saclay Air & Space Law International Colloquium. A number of international experts were invited to discuss current challenges and recent developments in international air and space law. The conference took place at the Ministry of Higher Education and Scientific Research in Paris, France.

Six high-level panel discussions were dedicated to some of the most **challenging current issues** posed by air and space activities. The panels consisted of experts from academia, international and European organisations, national institutions as well as air and space industry. The three main issues discussed were **security challenges**, **institutional challenges** and **environmental challenges**.

The two panels dedicated to **security issues** mainly focused on the need to continuously **adapt existing air and space law** to new technological developments. Furthermore, the challenges posed by the gradual **increase and diversification** of air and space activities were addressed. The topics discussed included suborbital flights, space planes and space tourism, the use of drones, radio frequency interference and space debris.

Especially in the field of space law, **new applications and technologies** make continuous adaptation of the existing legal framework indispensable in order to guarantee the **security of devices** and appliances. The constant increase in space activities also endangers the **safety of third parties** who could be adversely affected by threats such as harmful interference, collisions and space debris. As states increasingly shy away from the adoption of binding treaties in this area, transparency and **confidence building measures**, non-binding guidelines and **international cooperation** and information sharing were suggested as most appropriate means to address current and future security challenges posed by space activities.

Yet, it was also emphasised that with a continuous **increase in space activities** and a further deterioration of safety in outer space, **comprehensive regulations**, including effective implementation and control mechanisms, will be necessary in order to guarantee the safety and security of space activities on the long term.



The international nature of air and space activities implies several **institutional challenges**. The discussions concentrated on the possible ways and means of enabling an efficient **coordination of different levels of decision-making** in order to create and implement a coherent and homogenous set of legal rules. The **European situation** was presented as an example of coordination between national, European and international organisations and institutions, enabling efficient regulation at multiple levels.

In the field of space activities, presentations mainly focused on the **cooperation between ESA and the EU**. While EU-ESA cooperation has been ongoing for over 20 years, a legal basis was established in 2004 with the entry into force of a Framework Agreement under which EU and ESA coordinate their actions through a Joint Secretariat and the Member States of the two organisations meet at ministerial level in the Space

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Council. In 2007 the **European Space Policy**, jointly prepared by the European Commission and ESA's Director General, was adopted in a resolution of the Space Council. It sets out the basis for a **common strategy** as well as for **increasing coordination** in the space sector. Current **joint projects** include the European Geostationary Navigation Overlay Service (**EGNOS**), the European Global Navigation Satellite System (**Galileo**), and the Global Monitoring for Environment and Security initiative (**Copernicus**).



While it was argued that the **differences between the two institutions** - different competences, different Member States and different rules and procedures - can make co-operation difficult, it was also emphasised that **closer ties** and an increase in cooperation between ESA and the EU are necessary, as Europeans strongly rely on satellites services and space plays an increasing role in supporting Europe's social, political and economic policies.

The panels dedicated to **environmental challenges** mainly focused on the issue of space debris as well as on the polluting effects of air traffic. Possible strategies and mechanisms to address these challenges were discussed. In the panel dedicated to **space debris** the current situation as well as the main causes of space debris, such as the Cosmos-Iridium collision in 2009 or the anti-satellite missile test carried out by China in 2007, were presented. Furthermore, the importance of space debris **mitigation guidelines** and standards, as well as the development of an International Code of Conduct for Outer Space Activities and the discussions in the **Working Group on the Long-term Sustainability** of Outer Space Activities in the UNCOPUOS Scientific and Technical Subcommittee were highlighted.

The **audience** was composed of representatives from governmental entities, industry, international and European institutions as well as students and researchers in the field of air and space law. The participants had the possibility to engage in **discussions** with the speakers and to raise **questions** on the different topics. In his concluding remarks Prof. Philippe Achilleas, in his capacity as host of the conference, expressed his intention to organise a second edition of the Paris-Saclay Air & Space Law International Colloquium next year.

NPOC Austria Subpoint Graz Outreach Activities 2014

Hannes Mayer

The outreach activities of the NPOC Austria Subpoint Graz in 2014 included events on the occasion of the World Space Week 2014 as well as activities during the first Graz Space Day.

The first **Graz Space Day** (1. Grazer Weltraumtag) took place in the courtyard of the Universalmuseum Joanneum on 19 September 2014. The NPOC Austria Subpoint Graz, along with other institutions and organisations active in space research and space technology, had the opportunity to present themselves and their work to the broader public.

In the morning, school classes could visit the organisations' stalls and booths to gather information about the respective organisation's activities. In the afternoon, the **general public** could visit and see what was being presented. Representatives of the different organisations and institutions also took part in a **panel discussion**, together with the deputy mayor of Graz, Martina Schröck.

The ECSL Subpoint Graz and the Austrian Space Forum also co-organised **two events in schools** on the occasion of the **World Space Week 2014** under the motto "**Space: Guiding Your Way**". The one project, conducted together with Bernhard Weinberger of the **BORG Monsberger** in Graz, required students – in line with the topic of this year's World Space Week – to find certain spots on the school premises using sat-nav apps on their cell phones.

The other project was conducted at the **Ski-Akademie Schladming** by Ulrike Mayer. Her students could build a paper rocket, calculate the weight of objects in space and on planets and read texts on space tourism, a possible future on Mars and the Apollo missions – all of it in English. The day's reading comprehensions were also part of a read-a-thon, conducted throughout the province of Styria. Since a marathon is around 42km, Ms. Mayer and her colleagues came up with the project title "42.000 Miles through Space".

This project was the starting point for cooperation between the Subpoint Graz, the Austrian Space Forum and the Ski-Akademie Schladming. On a dedicated space day, students could learn about the operation of Mars rovers, the handling of space suits, the smells of space and the basics of space law and space policy.



ISU/CNES Parabolic Flight Campaign, 6-10 October 2014

Anita Rinner

From 6-10 October 2014 Anita Rinner from the NPOC Austria Subpoint Graz had the great chance to participate in the **International Space University** (ISU) and **Centre National d'Etudes Spatiales** (CNES) Parabolic Flight Campaign. It was a prize for a winning project submitted by a group of students during the **ISU Space Studies Programme** 2013 in Strasbourg.

The parabolic flight had **4 phases**. **Phase 1**: Starting with 1 G (Earth's gravity); **phase 2**: pull-up about 2 G; **phase 3**: zero G (weightlessness) and **phase 4**: pull-out (hypergravity) at 1.8 G. The zero G phase was about 20 seconds and more than 30 parabolae were performed.

The campaign took place aboard the **Airbus A300 Zero-G**, the largest aircraft used for parabolic flights and based at the Bordeaux-Mérignac International Airport. The experiments were flown over the Mediterranean and Atlantic Sea in the military zone with a duration of about 3 hours.

One **experiment** that was performed by the ISU students was a **grasping task**. Images of different shapes appeared on a touchscreen aboard the aircraft. The test subjects were shown a shape on the screen and had to choose the correct shape. They had to put the shape into the right fitter followed by pressing the touchscreen to proceed to the next task. This task was carried out with normal and inverted vision produced by special goggles without lenses. The difficulties with the task in the different flight phases will be evaluated and may contribute to the development of **astronauts' preparation** for space flights.



EINBLICK *insight*

23rd ECSL Summer Course on Space Law and Policy, Geneva, Switzerland, 1-12 September 2014

Maximilian Trautinger

The 23rd edition of the ECSL Summer Course on Space Law and Policy was organised in cooperation with the International Telecommunication Union (ITU). It took place at the ITU Headquarters in Geneva from 1-12 September 2014.

33 distinguished speakers, coming from a variety of countries and backgrounds, including academia, industry, the legal profession and international organisations, provided participants with an insight into various current and fundamental issues of space law and policy. Owing to the venue of the 2014 Summer Course, special emphasis was given to the **international regulatory framework governing telecommunications**. The participants were given the possibility to pose questions to the experts and have discussions after the lectures or during lunch breaks.

The participants, composed of **43 students**, 5 young professionals and 4 tutors, came from **23 different countries**, both ESA Member States (Austria, Netherlands, UK, France, Germany, Greece, Italy, Poland, Portugal, Romania, Spain, Sweden, Switzerland) and non-Member States (Bulgaria, Iran, Russia/Israel, Serbia, Slovakia, Slovenia, Turkey, Ukraine). Their **diverse professional, academic and cultural backgrounds** guaranteed interesting discussions and encouraged interdisciplinary and intercultural exchange.

In groups of six, the **participants worked on projects** which required them to think not only like space lawyers but also like entrepreneurs and engineers. Their task was to represent a consultancy group advising ESA on a comprehensive satellite programme in order to meet the objectives defined by the World Summit on Information Society related to the so-called "**digital divide**". The project required the students to understand the basic elements of **satellite communications**



architecture and to identify one or more potential **satellite applications** which could be used to address the digital divide. They were challenged to master relevant legal, economic and technological issues in order to develop appropriate advice. Each group was supported by a tutor. The participants were allowed to use the ITU premises, including the library, and to address ITU staff and other experts during a dedicated Q&A session. Finally, the groups presented their projects in front of a prestigious jury composed of representatives from the ITU, ESA and ECSL.

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The participants were accommodated in a Hotel-Residence in Ferney-Voltaire, a French city located just across the border between Lake Geneva and the Jura Mountains. The city was named after its most famous inhabitant Voltaire, who spent the last twenty years of his life there. During their **free time**, participants could follow the steps of Voltaire, explore the old town of Geneva, go for a hike in the Jura Mountains or visit the UN and other international organisations which have their seat in Geneva. Some participants also chose to profit from the marvellous weather in the hotel's pool and gardens.

One of the **highlights** of this year's summer course was the **excursion to CERN**, the European Organization for Nuclear Research. Before the participants explored the individual parts of the particle accelerators in detail, they were briefed on the basic principles of particle physics. In the end, the participants not only gained an insight into the functioning of the accelerator but also into the functioning and sub-atomic majesty of the universe. Participants also enjoyed a visit to the **ICT Discovery Museum**. This provided an overview of the history of information and communications technology. The participants learned how telecommunications technology developed globally, creating the need for universal standards and regulation, and the critical functions that satellite telecommunications fulfil in the modern day.

Another highlight was the participation of the entire summer course in a special event, organised by ESA, celebrating **50 years of European cooperation in space**, held on 12 September at the Geneva International Conference Centre. In the morning session, 200 students and scholars from all over Europe attended podium discussions and a "**science speed dating**" and met former ESA Astronaut André Kuipers. The participants had the opportunity to meet with high-ranking technical and legal experts in the space sector and were invited to play an active part in the subsequent discussions. Furthermore, with the help of the ITU Amateur Radiocommunications Bureau, a **live link-up** was established with ESA Astronaut Alexander Gerst on the **International Space Station**. He spoke to the students in real time, giving an insight into the tasks, experiences and sensations of an astronaut on board the ISS. At the main event, Nobel Prize winner Brian Schmidt and many other distinguished speakers explored the impact of space on science and international cooperation.

The Summer Course was brought to a close with a **closing ceremony**, where awards were given to the groups with the best written, best oral and best overall presentations. The closing ceremony was followed by a dinner in a nice restaurant with sumptuous food on an island in the middle of the Rhone river in central Geneva.



Manfred Lachs Space Law Moot Court Competition 2014, Wroclaw, Poland

Isolde Klinger

Space law, the jurisdiction of all activities relating to outer space... as big as the scope of the subject may be, it is clear that it escapes the narrow framework of what constitutes law in the mind of the inexperienced law student. It was thus with a certain degree of naivety but above all with a lot of curiosity that we, **Tom Svedberg and Isolde Klinger**, signed up to the space law classes at the University of Vienna in autumn 2013 and subsequently to the Manfred Lachs Space Law Moot Court Competition.



The **fictitious case of the competition in 2014** was about two rival neighboring countries that were causing each other disturbances within their navigational systems finally even leading to the destruction of one of the parties' satellites. We started preparing in the sense of writing detailed **memorials for both, the applicant's and the respondent's side** in mid-October 2013. Time passed by quickly and our workload had finally started to reap the fruits of all our efforts by January 2014. Thanks to the great and valuable guidance of **our two coaches, Sarah Germann and Anja Nakarada Pecujlic**, we were quickly heading for more technical aspects of the work such as correcting footnotes and bibliography by February. Eventually we were able to send in a comprehensive bundle of written pleadings by the beginning of March 2014. From that time on, we had the chance to focus our preparation on the oral performance. The framework for the

oral pleading was 30 minutes respectively for the applicant and the respondent which could be divided among the team members at their own choice. This was restricted, however, to the point that the pleading members must at the minimum speak 12 minutes consecutively. We had several weekly pleadings with our coaches and with other experts who were invited and keen to give us useful advice on how to perform during the pleadings. Thus eager to earn the fruits of all the previous months' work we couldn't wait for our journey to the competition.

The European Rounds of the Manfred Lachs Moot Court Competition were held at the **University of Wroclaw, Poland**. Wroclaw turned out to be a surprisingly beautiful city with a great admixture of Central and Eastern European cultures. It was furthermore a blessing that the food was not only cheap but also very tasteful. Checking in at a nearby hotel, we soon found ourselves at the university grounds to meet the other participants and to receive the considerable **hospitality** that ESA and the university offered us in regards to guided tours and discounts at the local restaurant. The participants turned out to be arriving all the way from Bucharest and Paris, giving a broad and general **European feeling to the competition**. We found it to be easy to converse with the other participants and soon made good friends with several of them.

The **day of the contest** itself had finally arrived and we were handed the schedules and dates. Formally dressed with matching red and black colors, we arrived fully geared with a sea of nervousness beneath a mask of calm. The teams sat facing each other and the panel of **jurors** consisting of distinguished **space law professors** sat facing an empty table in the middle of the room. It is without exaggeration that we have to admit that only few moments have been as thrilling and adrenaline inducing in our students' lives as the moment when the president of the **panel called us forward to plead**. Exhibiting a high level of confidence we went up to speak our parts of the pleading so as shine evidence upon the

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innocence of the applicant in its dealing with the menacing neighbor, the respondent. Similarly, when acting as respondents, we sat across the applicant team waiting for them to finish their pleading. Considering the very inquisitive nature of our practice back in Vienna, we both found the sitting panel to be relatively quiet in comparison to any of the pleadings. Nevertheless, we were given notice on the second day that we made it to the **semi-finals as applicants against Paris**. We had a dinner at a local restaurant and scurried back to the hotel with a copy of the French memorial. To spare the reader of any trivial debriefings of our coffee consumption patterns that night, we'll jump to the next day. While we did our very best in the semi-finals, we were unfortunately caught off guard by questioning in our rebuttal to the respondent's pleading and subsequently lost the round. Nevertheless, it was a **great experience** and a lot of fun to participate in this great competition and we are convinced that **space law will play a very special role in our future lives.**



Publication: A Compact Access to Space Law

Space Law Essentials

(Vol. 1 Textbook & Vol. 2 Casebook)

presents the theory and practice of space law in a modern, user-oriented format. Both books stand apart from existing space law literature since they:

- introduce space law in a compact and comprehensible manner;
- explain the legal issues that may arise during the lifecycle of a space mission;
- present a collection of exciting space law cases;
- show how space law and technology intertwine;
- address law students and space practitioners alike.

- Alexander Soucek, Space Law Essentials, Vol. 1, Linde Verlag, 2015
- Anita Rinner/Hannes Mayer/ Yvonne Karimi-Schmidt/ Christian Brünner, Space Law Essentials, Vol. 2, Linde Verlag, 2015



NPOC Austria Subpoint Graz Excursion to Vienna, 23-25 March 2014

Technical Museum and Kuffner Observatory, 23 March 2014

Kathrin Schmidt and Lena Stenitzer

Our field trip to Vienna started on Sunday, the 23rd of March in the afternoon at the **Technical Museum**, where we visited the **Outer Space Exhibition**. It was very impressive to see both, the achievements of the past and the projects of the future, for example the Mars One mission. The exhibition was very interactive, so we were able to try out many things by ourselves, such as testing our knowledge in quizzes or regulating a mars rover and a docking station. We saw some **historical objects**, which were used as observing or measuring instruments, equipment that is needed in space, **models of rockets** from various countries, the ISS station, a mars rover and a few satellites, for instance the European mars express, one of the Galileo satellites and also Austria's first satellites, **UniBRITE and BRITE-Austria**, which are used to measure the brightness of stars. It was very interesting to see everything that close and discover outer space from a different perspective.

After the Outer Space Exhibition we visited **Kuffner Observatory**, which is located in the district of Ottakring. The Observatory was founded in 1884 and was originally financed by Moriz Kuffner as a private research institution but it is used as a **public observatory** today. It was one of the most important observatories in the Austro-Hungarian monarchy and many famous astronomers worked there, as for instance Karl Schwarzschild. We saw **astronomic instruments** from the 19th century such as a heliometer, a meridian circle, a vertical circle and a refracting telescope. The heliometer at the Kuffner Observatory is the largest of its type ever built. Due to the bad weather conditions observations were not possible but it was impressive to see instruments from the 19th century in such a good shape.

53rd session of the UNCOPUOS Legal Subcommittee, 24 March 2014, morning

Maximilian Eder, Jasmin Fink and Alexandra Schiffauer

On Monday, the 24th of March 2014, we attended the 53rd session of **the Legal Subcommittee** of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) at the Vienna International Centre.

First we needed to pass a few security checks to enter the UN-building, where we received our entrance permissions in the form of delegates passes that would allow us to walk around freely on the premises. After passing the famous square with the flags of all UN Member States and the fountain we went to the conference room.



The meeting started with a minute of silence for Professor Vladimir Kopal, who was an Honorary Director of the International Institute of Space Law (IISL) and had passed away in January 2014. Afterwards the previous **chair opened the meeting** with a speech and the delegates adopted the agenda for the following session. Three **working groups** were convened to discuss the status of the treaties, the definition and delimitation of outer space as well as international mechanisms for cooperation. The IISL/ECSL Symposium on "Regulatory needs for very small satellites" was also announced for the afternoon. Then a **new chair was elected**, a space law professor from Germany.

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After his speech present **Member States gave a short overview of their space activities** and plans for the future. Every presentation started with greetings and congratulations for the new chair.

It was very interesting for us to experience the international atmosphere and to see how the rules of diplomatic courtesy work in practice.

IISL/ECSL Symposium on "Regulatory needs for very small satellites", 24 March 2014, afternoon

Alexander Roders, David Glen and Lana Mrsia

In the afternoon we attended the IISL/ECSL Symposium on "Regulatory needs for very small satellites". A **panel of experts** was invited to discuss the positive and negative aspects of **Very Small Satellites (VSS)**. VSS are satellites which weigh 500kg or less and are therefore much smaller than those traditionally deployed in space.

The first speaker, Abe Bonnema from the private company ISIS (Innovative Solutions In Space), talked about the **benefits of VSS**. The principle benefit identified was the significantly **reduced cost**, which provides developing nations with the opportunity to become space-faring and allows non-governmental entities, such as universities, access to space and space technology. Furthermore, the **reduced weight** allows for piggy-back launches. VSS also provide a platform for testing new technologies before a major launch.



Other members of the panel subsequently tempered this, noting the negative aspects of VSS. The **drawbacks** include the potential for harmful **radio interference** or the obstruction of frequencies, the difficulty in controlling VSS after deployment due to the **lack of navigational ability** and the difficulty of monitoring them due to their small size. The panel also highlighted the issue of **space debris** and the potential for VSS to exacerbate this problem. The cost of insurance being greater than the cost of the VSS was also raised.

Despite these drawbacks the affordability of VSS means that they remain an attractive option for the utilisation of space. However, as the panel concluded, an urgent **need for VSS-specific regulation** exists.

European Space Policy Institute (ESPI), 25 March 2014

Panagiota Tenzoglidi

Our visit to the European Space Policy Institute (ESPI) took place during the last day of our excursion to a "Space Vienna". This means that by the time we visited ESPI we already had an overview of the most important space law issues, so that we were able to appreciate even more the **presentation on the Institute's activities** that members of the staff had prepared for us.

In a few words, since 2003 ESPI has been providing decision-makers in the space field with **independent analyses and advice** on how to manage mid- and long-term challenges in exploiting the potential of space, aiming at establishing space as a strategic area for Europe. ESPI's mission is accomplished mainly through its members' **publications**, its assignments and incorporations, as well as the organisation of "**space orbiting**" events.

ESPI offers a large variety of perspectives. It welcomes comments and innovative ideas in a wide range of space policy-related topics, regardless of the publisher's academic background. It is described as a **generalist "think tank"**, since the only condition for someone who wants to associate, is that the topic deals with outer space.

AUSBLICK *prospect*

27 March 2014	ECSL Practitioners' Forum 2015, ESA Headquarters, Paris, France
12 April 2015	Yuri's Night, Urania, Vienna, Austria
13-24 April 2015	54th session of the UNCOPUOS Legal Subcommittee, VIC, Vienna, Austria
13 April 2015	IISL-ECSL Symposium 2015 "Space Traffic Management", VIC, Vienna, Austria
15 April 2015	"Big Data and Space", ESPI, Vienna, Austria
28 May 2015	Symposium on the occasion of the 90th Anniversary of the Institute of Air and Space Law - University of Cologne, Germany
1-5 June 2015	Manfred Lachs Space Law Moot Court - European Rounds 2015, Union University Law School, Belgrade, Serbia
10-19 June 2015	58th session of the Committee on the Peaceful Uses of Outer Space, VIC, Vienna, Austria
June 2015	"Geospatial Data Policies –American and European Perspectives" Seminar organised by the NPOC Space Law Austria during the 58th UNCOPUOS, VIC, Vienna, Austria
7-10 September 2015	UN/Austria Symposium on Space Technologies for Climate Change, Graz, Austria
21-22 September 2015	9th ESPI Autumn Conference, ESPI, Vienna, Austria
12-16 October 2015	66th International Astronautical Congress, Jerusalem, Israel

ECSL

European Center for Space Law

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