



71st INTERNATIONAL ASTRONAUTICAL CONGRESS

12–16 October 2020 | Dubai, United Arab Emirates

Call for Papers & Registration of Interest

Inspire, Innovate & Discover for the Benefit of Mankind

IAC2020.ORG









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1. Message from the International Astronautical Federation (IAF)

Greetings!

It is our great pleasure to invite you to the 71st International Astronautical Congress (IAC) to take place in Dubai, United Arab Emirates from 12 – 16 October 2020.

For the very first time, the IAC will open its doors to the global space community in the United Arab Emirates, the first Arab country to host the IAC since its establishment in 1950. The United Arab Emirates' interest in astronomy and space sciences dates back to the 1970's, when His Highness Sheikh Zayed bin Sultan Al Nahyan met with the NASA team responsible for the Apollo moon landing. This encounter sparked a national focus on space that began almost three decades ago, eventually leading to the birth of a national space sector.

The IAC 2020 Host Organization - the Mohammed Bin Rashid Space Center (MBRSC) - member of the IAF since 2012, was established by the Dubai Government to serve as one of the main pillars to drive the establishment of the knowledge economy and sustainable development in the UAE.

With the theme "Inspire, Innovate & Discover for the Benefit of Mankind", the IAC 2020 looks forward to making a contribution to humanity and to science by strengthening and enhancing cooperation between all countries in the space sector.

We are convinced that thanks to the dedicated work of all parties involved and the participation of each and every one of you, the 71st IAC will be of remarkable significance for the space sector.

We look forward to welcoming you in Dubai in October 2020!



President. International Astronautical Federation (IAF), France



Pascale Ehrenfreund President Elect. International Astronautical Federation (IAF), France

2. Message from the Local Organizing Committee

The International Astronautical Congress (IAC) — the world's largest space conference — is coming to Dubai for the very first time from 12 - 16 October 2020. It is with great pleasure that we invite you to be a part of it by submitting your abstracts for the 71st edition of the IAC.

Your participation at the IAC 2020 will have a two-pronged effect. First, the IAC is an ideal, unrivalled platform to communicate and showcase your latest research, innovations and vision to the global space community. Each year, the Congress attracts high profile representatives from several quarters of the global space sector, including top space agency officials, policymakers, scientists, and experts in the space and technology sector.

Second, this is your chance to inspire the next generation, to architect the further development and expansion of the space sector's growing ecosystem. In fact, the IAC 2020 could be your opportunity to contribute in breakthroughs that revolutionise the future of space exploration.

The IAC is designed to inculcate information sharing into its structure, to facilitate the exchange of insights and ideas, to foster the creation of new partnerships and collaborations. And we are looking forward to bringing you and your vision into the fold.

The IAC 2020 comes to the UAE at a fortuitous juncture: it will follow closely on the heels of the launch of the Emirates Mars Mission (Hope Probe), the Arab's first space exploration craft to Mars. It will also mark the anniversary of the return of the first Emirati astronaut from the International Space Station, and the second anniversary of the launch of KhalifaSat — the first Earth-observation satellite to be produced wholly by Emiratis. These achievements are symbolic of the beginning of a new era in the region; the IAC 2020 will be an opportunity to shed light on how space science and technology can contribute to a nation's progress.

We invite you to join us at the IAC 2020 and help us in making this an unparalleled experience.



Shaihani Higher Committee Chair, IAC 2020 Local Organizing Committee. United Arab Emirates



Chair. IAC 2020 Local Organizing Committee, United Arab Emirates

Adnan Al Rais Co-Chair, IAC 2020 Local Organizing Committee, **United Arab Emirates**

3. Message from the International Programme Committee (IPC) **Co-Chairs**

On behalf of the International Programme Committee, it is a great pleasure to invite you to submit an abstract for the 71st International Astronautical Congress IAC 2020 that will be held in Dubai, United Arab Emirates. The IAC is an initiative to bring scientists, practitioners, engineers and leaders of space industry and agencies together in a single platform to discuss recent research breakthroughs, technical advances, existing opportunities and emerging space technologies. Such platform will provide the participants with a holistic and upto-date view of science, engineering and space technology fields and offer an access to space knowledge for professionals and experts from around the world. IAC 2020 presents an opportunity to highlight the evolutionary role of international partnerships in exploration, research, and development. It is a time to envision the discoveries to be made and knowledge to be gained to move forward together. Participating in the IAC 2020 will enrich the youth's knowledge in space science and technology. It will act as an accelerator for STEM education, and will be a source of enormous pride and inspiration for the ambitious younger generations. As IAC 2020 comes to Dubai, along with more than 5,000 leading figures in the international space industry from 70 countries, a platform will be developed that further cements space as one of the seven key sectors for the UAE. The year 2020 will be a significant milestone in the UAE's history as it will witness accommodating EXPO 2020 in Dubai, and the launch of the Emirates Mars Mission - Hope Probe, synchronized with the hosting of the International Astronautical Congress (IAC), the largest specialized gathering in the space sector worldwide.

We hope you take the opportunity to contribute one or more of the 180 technical sessions to present your research and network with colleagues working within your domain. All abstracts will be peer reviewed, and a limited number of papers will be selected as oral or interactive presentations. We are looking forward to receiving your contribution to be presented at IAC 2020 in Dubai.

The IAC in Dubai is your gateway to be in touch with new actors, pioneers, experts and leaders of space industry and agencies. Together in a single platform, research breakthroughs, technical advances, existing opportunities and emerging space technologies will be discussed, hoping to construct perpetual relationships and again meet in Paris, the following year during IAC 2021.



Saeed Al Mansoori IPC Co-Chair, Mohammed Bin Rashid Space Centre (MBRSC) United Arab Emirates









Jean-Paul Berthias IPC Co-Chair, Centre National d'Études Spatiales (CNES), France



4. Messages from the Partner Organizations

Message from the International Academy of Astronautics

The International Academy of Astronautics (IAA) is pleased to invite you to attend the IAA Academy Day open meeting on Sunday and the various IAA symposia throughout the week. In addition to organizing around 20 conferences a year, worldwide, the Academy is organizing 13 symposia at next year's IAC in Dubai, UAE, representing about one third of the IAC technical program, and will cohost some interesting sessions with the IAF and the IISL. On the occasion of the Academy Day, newly elected Academicians will be introduced and the major IAA Awards will be given.



Peter Jankowitsch President. International Academy of Astronautics (IAA)

Message from the International Institute of Space Law

On behalf of the International Institute of Space Law, I am pleased to invite you to attend our 63rd Colloquium on the Law of Outer Space in Dubai, United Arab Emirates. This year's Colloquium consists of seven exciting sessions and explores a range of highly relevant issues including space law and cyber law, settlements on the Moon and Mars, and the interface between remote sensing technology applications and the law. Relevant legal questions raised by current public and private space activities will be addressed and debated by the world's finest space lawyers as well as students and young professionals. IISL will also co-host a session with the IAA. The 35th IAA-IISL 'Scientific-Legal Roundtable' will provide an opportunity for lawyers, scientists and engineers to address digitalization in an interdisciplinary setting. These are all issues, to which, we believe, IISL can and should contribute to. No other Institution has this global inclusive reach and such a top-level experienced expert membership paired with bright young scholars, which guarantees relevant contributions.

The World Finals of the 29th Manfred Lachs Space Law Moot Court Competition will take place in Dubai, welcoming university students from Africa, the Asia Pacific, Europe and North America, and we are proud and honoured that they will, as always, be judged by sitting members of the International Court of Justice.

The IISL is proud to be an integral part of the Congress and its Technical Programme and to further the discourse between disciplines so fundamental to our shared ways forward in this new era of the use of space. UNISPACE+50 again impressively demonstrated that space is a Province of all humankind. This is a clear signal for organizations like IISL to provide global, inclusive perspectives.

We are greatly looking forward to welcoming you in Dubai!



Kai-Uwe Schrogl President. International Institute of Space Law (IISL)



Founded in 1951, the International Astronautical Federation is the world's leading space advocacy body. The IAF has more than 360 members from 68 countries, including all leading space agencies. companies, societies, associations and institutes worldwide.

Following its theme - "A space-faring world cooperating for the benefit of humanity" and its motto "Connecting @ll Space People" - the Federation advances knowledge about space and fosters the development and application of space assets by advancing global cooperation.

As organizer of the annual International Astronautical Congress (IAC), and other meetings on specific subjects, the IAF actively

Members of IAF Bureau 2018 – 2019



nal d'Études Spatiales

Austria



Sergio Marchisio Full Professor of International Law. Sapienza University of Rome,



VP: COMMUNICATIONS, PUBLICATIONS AND GLOBAL CONFERENCES

Pascale Ehrenfreund Chair of Executive Board German Aerospace Center (DLR), Agency (SANSA), outh Africa



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VP: SOCIETIES AND MUSEUMS

Chinese Society of Astronautics (CSA)

and China Aerospace Science and

Technology Corporation (CAST),







encourages the development of space for peaceful purposes and supports the dissemination of scientific and technical information related to space.



International Astronautical Federation

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Gabriella Arrigo Head of International Relations, Italian Space Agency (ASI),

VP: SCIENCE & ACADEMIC

RELATIONS AND GOBAL

NETWORKING FORUM

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Peter Jankowitsch Former Ambassador and Minister of Foreian Affairs. Austria

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Ecuadorian Civilian Space Agency (EXA)

Dniprotekhservice, SPF, LLC

Department of Space Studies, University of North Dakota

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Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

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Czech Republic Switzerland France Austria The Netherlands France Turkey

United States

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Bulgaria

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IAF Member Organizations 2019

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| Aexa Aerospace LLC | United States | California Polytechnic State University | United States | Euro Space Center |
| Agence Spatiale Algérienne (ASAL) | Algeria | Canadian Aeronautics & Space Institute (CASI) | Canada | Euroconsult |
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| Agrupacion Astronautica Espanola | Spain | Canadian Space Commerce Association (CSCA) | Canada | European GNSS Agency (GSA) |
| Airbus Defence and Space GmbH | Germany | Canadian Space Society | Canada | European Organization for Nuclear Research (CERN) |
| Airbus Defence and Space Netherlands B.V. | The Netherlands | Center for Innovation in Aerospace Technology (CINAE) | Spain | European Space Agency (FSA) |
| Airbus Defence and Space SA | Spain | Center for Planetary Science and Exploration, Western | Canada | European Space Policy Institute (FSPI) |
| Airbus Defence and Space SAS | France | Center of Space Exploration, Ministry of Education (COSE) | China | European Test Services (FTS) B V |
| Airbus Ltd. | United Kingdom | Central American Association for Aeronautics and Space | Costa Rica | |
| Alma Mater Studiorum - University of Bologna | Italy | (ACAE) | | Eurospace |
| American Astronautical Society (AAS) | United States | Central Research Institute for Machine Building (FGUP TSNIIMASH) | Russian Federation | University |
| American Institute of Aeronautics and Astronautics (AIAA) | United States | Centre for Mechanical and Aerospace Science and | Portugal | Federal Aviation Administration Office of Commercial Space |
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| Arianespace | France | Centre National d'Etudes Spatiales (CNES) | France | Flinders University |
| Asher Space Research Institute (ASRI) | Israel | Centre Royal de Teledetection Spatiale | Morocco | Fraunhofer Alliance Space |
| Association Aéronautique & Astronautique de France (3AF) | France | Centro de Investigacion y Difusion Aeronautico Espacial | Uruguay | Friedrich-Schiller-Universität Jena |
| Association Dedicated to Development in Astronautics | Romania | China Head Aerospace Technology Co. | China | Future Space Leaders Foundation |
| (A.D.D.A) | United States | Chinese Society of Astronautics (CSA) | China | G.A.U.S.S. Srl |
| Association of space explorers (ASE) | United States | CIRA Italian Aerospace Research Centre | Italy | General Organization of Remote Sensing (GORS) |
| Associazione italiana di Aeronautica e Astronautica (AIDAA) | Malauria | Colombian Space Agency | Colombia | Geo-Informatics and Space Technology Development Agency |
| | Ivididysid | Comision Nacional de Actividades Espaciales (CONAE) | Argentina | (GISTDA) |
| Astronautical society of India | india | Commission d'Astronautique de l'Academie Roumaine | Romania | German Aerospace Industries Association (BDLI) |
| Astrosat Ltd | United Kingdom | Cosmoexport Aerospace Research Agency | Russian Federation | GIFAS |
| Astroscale Holdings Inc. | Japan | Croatian Astronautical and Rocket Federation (HARS) | Croatia | GKN Aerospace Engine Systems |
| ALUCOM - Tunisian Association for Communication and Space Sciences | Tunisia | CSIRO Astronomy & Space Science | Australia | Global Student Commercial Space Society (GSCSS) |
| Auspace Pty Ltd | Australia | CSL (Centre Spatial de Liège) | Belgium | GMV Aerospace & Defence SAU |
| Australian Space Agency, Department of Innovation, Industry | Australia | Curtin University | Australia | GomSpace Aps |
| & Science Austrian Research Promotion Agency (FEG) | Austria | CVA (Community of Ariane Cities) | France | Graz University of Technology (TU Graz) |
| AUSTROSPACE | Austria | Cyprus Astronautical Society | Cyprus | Gumush Aerospace & Defense |
| Axiom Space LLC | United States | Cyprus Space Exploration Organisation (CSEQ) | Cyprus | HE Space |
| Azercosmos | Azerbaijan | Czech Space Alliance | Czech Republic | Hermann-Oberth-Raumfahrt Museum e.V. |
| Bauman Moscow State Technical University | Russian Federation | Czech Space / Internet | Czech Republic | Hermes Engineering |
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| Beihang University | China | Danish Astronautical Society | Denmark | Hungarian Astronautical Society (MANT) |
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| Beijing Sunwise Space Technology Ltd. | China | Delit University of Technology | Spani | Incomspace |
| Belgian Federal Science Policy Office (BELSPO) | Belgium | Dent University of Technology | The Metheriands | |





| Indian Space Research Organization (ISRO) | India |
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| Indonesian National Institute of Aeronautics and Space (LAPAN) | Indonesia |
| Infostellar | Japan |
| Institut Français d'Histoire de l'Espace | France |
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| International Association for the Advancement of Space Safety | The Netherlands |
| International Institute of Space Commerce | Isle of Man |
| International Lunar Observatory Association | United States |
| International Space Center - Space Park Israel Ashkelon | Israel |
| International Space University (ISU) | France |
| International Space Oniversity (ISO) | Germany |
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| Communications Invap S.E. | Argentina |
| Iranian Space Agency | Iran |
| ispace, inc | Japan |
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| Italian Space Agency (ASI) | Italy |
| Japan Aerospace Exploration Agency (JAXA) | Japan |
| Japan Manned Space Systems Corporation (JAMSS) | Japan |
| Japan Society for Aeronautics and Space Sciences (JSASS) | Japan |
| Japanese Rocket Society | Japan |
| Joanneum Research | Austria |
| ISC Glavkosmos | Russian Federation |
| ISC NPQ Energomash | Russian Federation |
| ISC SRC Progress | Russian Federation |
| KBRwyle | United States |
| Kenya National Space Secretariat | Kenva |
| Khrunichev State Research & Production Space Center | Russian Federation |
| King Abdulaziz City for Science & Technology (KACST) | Saudi Arabia |
| Kongsherg Satellite Services AS | Norway |
| Korea Aerospace Industries 1td | Korea Benublic of |
| Korea Aerospace Recearch Institute (KAPI) | Korea, Republic of |
| Korea Association for Space Technology Promotion (KASP) | Korea, Republic of |
| Korea Astronomy and Space Science Institute | Korea, Republic of |
| Kviv Politechnic Institute (NTLILI "KPI") | Ukraine |
| Kyushu Institute of Technology | lanan |
| LandSpace Technology | China |
| Lavochkin Science and Production Association | Russian Federation |
| Law Offices of Sterns and Tennen | United States |
| | Lithuania |
| Lockheed Martin Cornoration | |
| Marc Danot | Italy |
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| Max-Planck-Institute for Ornithology | Germany |
|---|-------------------------|
| McGill Institute for Aerospace Engineering (MIAE) | Canada |
| MDA Corporation | Canada |
| MEDES - IMPS | France |
| Microcosm, Inc. | United States |
| Mitsubishi Electric Corporation | Japan |
| Mitsubishi Heavy Industries, Ltd. | Japan |
| Mohammed Bin Rashid Space Centre (MBRSC) | United Arab Emirates |
| Moon Village Association (MVA) | Austria |
| Moscow Avlation Institute | Russian Federation |
| MT Aerospace AG | Germany |
| MX Space A.C. | Mexico |
| National Aeronautics and Space Administration (NASA) | United States |
| National Aerospace Agency (NASA) of Azerbaijan Republic | Azerbaijan |
| National Institute of Information and Communications Technology (NICT) National Oceanic and Atmospheric Administration (NOAA) | Japan United States |
| Malaysian Space Agency (MYSA) | Malavsia |
| National Space Centre | Ireland |
| National Space Research and Development Agency (NASRDA) | Nigeria |
| NEC Corporation | lanan |
| Nentec Design Group | Canada |
| Netherlands Aerospace Centre (NLR) | The Netherlands |
| Netherlands Space Office (NSO) | The Netherlands |
| Netherlands Space Society (NVR) | The Netherlands |
| New Zealand Space Agency | New Zealand |
| NGC Aerospace Ltd | Canada |
| Nigerian Meteorological Agency | Nigeria |
| Norsk Astronautisk Forening | Norway |
| Northron Grumman Corporation | United States |
| Norwegian Space Agency (NOSA) | Norway |
| Novesnace | France |
| Office National d'Etudes et de Recherches Aérosnatiales | France |
| (ONERA) OHB Italia SpA | Italy |
| OHB System AG - Munich | Germany |
| OHB System AG-Bremen | Germany |
| Orbital Access Ltd | UK |
| Pakistan Space and Upper Atmosphere Research Commission | Pakistan |
| Paraguayan Space Agency | Paraguay |
| Peoples's Friendship University of Russia | Russian Federation |
| PJSC "Elmiz" | Ukraine |
| Planet Labs Germany GmbH | Germany |
| Polish Academy of Sciences | Poland |
| Polish Astronautical Society (Polsa) | Poland |
| Polish Space Agency | Poland |
| Politecnico di Milano | Italy |
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| RHEATECH LTD |
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| Rocket Research Institute, Inc. |
| Romanian Space Agency (ROSA) |
| ROSCOSMOS |
| Rovsing A/S |
| RUAG Space |
| Russian Academy of Sciences |
| S.P. Korolev Rocket and Space Corporation Energia |
| Safran Aircraft Engines |
| Samara National Research University (Samara University) |
| Sapienza University of Rome |
| Satrec Initiative |
| Secure World Foundation |
| SEMECCEL Cité de l'Espace |
| SENER Ingenieria y Sistemas, S.A. |
| Sergio Arboleda University |
| SES |
| Shaanxi Engineering Laboratory for Microsatellites |
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| Shoal Group |
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| State Space Agency of Ukraine (SSAU) | Ukraine |
| Stellenbosch University | South Africa |
| STM (Savunma Teknolojileri Muhenislik ve Ticaret A.S.) | Turkey |
| Surrey Satellite Technology Ltd (SSTL) | United Kingdom |
| Swedish Society for Aeronautics and Astronautics | Sweden |
| Swiss Space Office (SSO) | Swizerland |
| SwissSpace Association | Switzerland |
| Tallinn University of Technology | Estonia |
| TAMSAT - The Society of Amateur Satellite Technologies of Turkey | Turkey |
| Tartu Observatory | Estonia |
| Techno System Developments S.R.L. | Italy |
| Technology and Engineering Center for Space Utilization, Chinese Academy of Sciences | China |
| | United States |
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| Testes Alagia Cases France | Germany |
| | France |
| Thales Alenia Space Italia | Italy |
| The Aerospace Corporation | United States |
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| The British Interplanetary Society | United Kingdom |
| The Chinese Aeronautical and Astronautical Society located in Taipei | Taiwan, China |
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| The Ohio State University College of Engineering | United States |
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| The University of Sydney | Australia |
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| TÜBITAK | Turkey |







| Turkish Aerospace Industries |
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| U.S. Geological Survey |
| UAE Space Agency |
| UK Space Agency |
| Universiti Teknologi Mara (UITM) |
| University of Adelaide |
| University of Alabama in Huntsville |
| University of Colorado, Colorado Center for Astrodynamics Research |
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6. International Academy of Astronautics (IAA)

The International Academy of Astronautics is a community of leading experts committed to expanding the frontiers of space. the newest realm of human activity. To foster the development of astronautics, the Academy undertakes a number of activities, including the recognition of outstanding contributors through elections and awards. It also facilitates professional communication, develops and promotes new ideas and initiatives, engages the public and fosters a sense of community among the members. The IAA is a unique independent non-governmental organization established in 1960 and recognized by the United Nations in 1996.

It is an honorary society with an action agenda. With 1177 elected members and corresponding members from 91 nations, the International Academy of Astronautics works closely with space agencies, industry, the academic community and the national science and engineering academies to determine needs and objectives and to help shape policy and forge cooperation by means of studies, position papers, conferences and publications. The IAA has published more than 70 studies to date and is engaged in the preparation of 40 others. The Academy also publishes four book series and the journal Acta Astronautica ranked 4th in the world and containing each year about 3500 refereed papers.

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The Academy organizes about 20 conferences and regional meetings per year focused on the development and promotion of all space activities and covering all continents including space developing countries. In addition, the Academy activity also includes, in cooperation with the International Astronautical Federation and the International Institute of Space Law, the traditional contribution to the International Astronautical Congress (IAC), where the Academy organizes 13 symposia.

The Academy also continues to enjoy its participation in the COSPAR Assemblies and the International Society for Photogrammetry and Remote Sensing (ISPRS) congress. Although the IAA has many connections to these and other similar organizations, it is distinctive as the only International Academy of elected members in the broad area of astronautics and space.



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7. International Institute of Space Law (IISL)

Founded in 1960, the International Institute of Space Law (IISL) is an independent non-governmental organization dedicated to fostering the development of space law. The membership of the Institute is composed of individuals and institutions from more than fourty countries, elected on the basis of their contributions to the field of space law or other social sciences related to space activities. Additionally, prospective membership is open to students and young professionals with a demonstrated interest in space law.

Since 1992, the IISL has organized the annual Manfred Lachs Space Law Moot Court Competition. The competition is based on a hypothetical space law case, and is written by IISL members. Approximately sixty student teams from universities in Africa, the Asia Pacific, Europe, and North America participate. The competition is an important part of the organization 's outreach programme, and is its principal mechanism for engaging future generations of space law experts. The regional champions compete in the World Finals, which take place at the IAC and are judged each year by judges of the International Court of Justice. This unique feature makes the Manfred Lachs Moot Court one of the most prestigious moot court competitions in the world.

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The IISL is an officially recognized observer at sessions of the United Nations Committee on the Peaceful Uses of Outer Space, and its Scientific & Technical and Legal Subcommittees. In cooperation with the European Centre for Space Law (ECSL), the IISL organizes an annual space law symposium for the delegates and staff attending the sessions of the UNCOPUOS Legal Subcommittee. In addition the Institute organizes a variety of conferences on space law throughout the year in locations all over the world. It publishes an annual volume of IISL Proceedings with papers and reports of all these activities during the year.



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8. Message from the IAF Vice President for Technical Activities

The International Programme Committee is pleased to invite you to submit an abstract for consideration for the 71st International Astronautical Congress to be held in Dubai, United Arab Emirates from 12 to 16 October 2020. The Congress is organized by the International Astronautical Federation (IAF), hosted by the Mohammed Bin Rashid Space Centre (MBRSC), and will be supported by the International Academy of Astronautics (IAA), the International Institute of Space Law (IISL) and the Space Generation Advisory Council (SGAC) who contribute to the IAC through their particular events and symposia.

Join the global space community at this exciting international gathering – and play an active role in the Technical Programme by presenting your recent work. Submitted abstracts can be considered for oral presentations (as 'Short Talks' in the Symposia) and for interactive presentations.

The theme of the Congress – "Inspire, Innovate & Discover for the Benefit of Mankind" – has been formulated broadly to enable the programme to cover a wide variety of established fields and current trends across space. This is reflected in the abstract topics, which can be viewed in this first announcement of the Call for Abstracts.

This "Call for Abstracts" is a precursor to a subsequent submission of a final paper, which may be presented at the 71st IAC. Authors are invited to submit an abstract regarding an original, unpublished paper that has not been submitted in any other forum. Abstracts must fit into one of the following IAC categories: Science and Exploration; Applications and Operations; Technology; Infrastructure; Space and Society. Abstracts must be written in English and the length shall not exceed 400 words. Tables or drawings are not allowed in the abstract. Submit your abstract through the online IAF portal at <u>www.iafastro.net</u> no later than 11:59 PM CEST on 28 February 2020.

Submitted abstracts will be evaluated by the Session Chairs on the basis of technical quality and relevance to the session topics. Selected abstracts may be chosen for oral or interactive presentation. Any such choice is not an indication of quality of the submitted abstract. Their evaluation will be submitted to the International Programme Committee, which will make the final decision during the IAF Spring Meetings to be held in March 2020 in Paris, France. Please note that any relevance to the Congress main theme will be considered as an advantage. Accepted abstracts will be displayed on the Congress website and published in the IAC Congress Proceedings.

We look forward to receiving your abstracts for IAC 2020 and please check the IAF website regularly to get the latest updates on the Technical Programme!



S. Somanath

Vice President, Technical Activities International Astronautical Federation (IAF)

IAC 2020 Technical Sessions

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A1.4 Medicine in Space and Extreme Environments

Over the last decades numerous space missions and experiments have taken place. The use of microgravity as a tool to study new fundamentals of life revealed a substantial number of new scientific insights and surprises. Space is the most famous extreme environment but different extreme environments also exist on Earth, such as high altitudes, confined and isolated environments like Antarctica and Arctica or even submarines. Results from research in these environments can be successfully applied for the benefits of human beings both in space and on Earth. This session will cover the latest scientific results and technological achievements from medical-physiological or psychological research in extreme environments for the benefit on Earth.

Co-Chairs

Rapporter

Jeffrey R. Davis

Oleg Orlov SSC RF-Institute of Biomedical Problems RAS — RUSSIAN FEDERATION

Exploring 4 Solutions — UNITED STATES

Rapporteur Alexander Chouker UNIVERSITY OF MI





space exploration, space debris and SETI

ES SYMPOSIUM

XTRATERRESTRIAL INTELLIGENCE (SETI) – THE NEXT STEPS FION OF THE SOLAR SYSTEM

IOMY AND SPACE PHYSICS MISSIONS

Alenia Space Italia, Italy

rtics (IAA) and the International Astronautical Federation (IAF) addresses all aspects of space life Earth Orbit (LEO) to the universe beyond, and from the Big Bang to the lives of future explorers on

of Biomedical Problems RAS - RUSSIAN

, circadian rhythm and human factors issues and countermeasures related to human spaceflight and

rgen — NORWAY

Rapporteur

Vadim Gushin Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS) — RUSSIAN FEDERATION

ceflight, and how this affects general health. Research into mitigation (countermeasures) of space

ospace Medicine (DLR) — GERMANY

- FRANCE

edicine aspects, countermeasure development and applications, as well as needs for future care Aoon and Mars. A further focus will lie on medical care for passengers and operators of commercia

of Biomedical Problems RAS - RUSSIAN

Hanns-Christian Gunga Charité Universitätsmedizin Berlin — GERMANY

Alexander Chouker UNIVERSITY OF MUNICH — GERMANY





| | systems, countermeasures to radiation and radiation risk | assessment. | Provention of the second se | |
|------------------|---|---|---|---------------|
| | Co-Chairs | | Rapporteur | |
| | Guenther Keitz Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | Lawrence Pinsky University of Houston — UNITED STATES | Preinkumar Saganti Prairie View A&M University — UNITED STATES | |
| 6 | Astrobiology and Exploration Space exploration planning now includes ambitious goals such as the Mars subsurface and the primary ocean work measurements of habitability and the presence of life of protection. | like human missions to the Moon and Mars, and sophist ds Europa, Enceladus, and Titan. Astrobiology is, therefor Earth in many places. The session invites papers related | ticated robotic exploration of targets relevant for astrobiology re, becoming a space flight science, ready for direct to astrobiology, biomarkers, life detection, and planetary | , |
| | Co-Chairs | | Rapporteur | |
| | Petra Rettberg Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | Nicolas Walter European Science Foundation— FRANCE | Stefan Leuko DLR (German Aerospace Center) — GERMANY | |
| .7 | Life Support, Habitats and EVA Systems This session will address strategies, solutions and techno | logies in providing for human requirements during future | e deep space and planetary/lunar surface exploration. | , |
| | Co-Chairs | | Rapporteur | |
| | Klaus Slenzka OHB System AG-Bremen — GERMANY | Khalid Badri Mohammed Bin Rashid Space Centre (MBRSC) — UNI ARAB EMIRATES | Hong Liu TED Beihang University — CHINA | |
| .8 | Biology in Space This session focuses on all aspects of biology and biologi sessions of this symposium. | al systems related to gravity in ground-based and space | flight experiments as well as on topics not covered by other | |
| | Co-Chairs | | Rapporteur | |
| | Cora S. Thiel University of Zurich — SWITZERLAND | Fengyuan Zhuang Beihang University — CHINA | Jancy McPhee The Aerospace Corporation — UNITED STATES | A |
| | This session offers a unique opportunity to deliver your la The presentation will be displayed on a digital screen in a afternoon is dedicated exclusively for the attendees to vi topic and interact with the attendees present. The Intera links, pictures, audio and video clips, etc. An award will a that follows the standard format must be submitted by t Co-Chairs | ey messages in an interactive presentation on any of the a dedicated location and available for view by all Congress ew the Interactive Presentations, and the author will be a ctive Presentation may take advantage of all electronic d los be presented to the author of the best Interactive Pre ne deadline for standard IAC abstracts. | subjects of Space Life Sciences addressed in the classic Sessions. s attendees for the entire Congress week. In addition, one assigned a specific eight minute slot to personally present the isplay capabilities, such as: PowerPoint charts, embedded hot esentation in the A Category at a special ceremony. An Abstract | |
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| | Cora Thiel University of Zurich — SWITZERLAND | Klaus Slenzka OHB System AG-Bremen — GERMANY | | |
| A2 | Cora Thiel University of Zurich — SWITZERLAND IAF MICROGRAVITY SCIENCES AND PRC The objective of the Microgravity Science and Processes in microgravity (reduced-gravity) physical sciences and p (material science, fluid physics, combustion science, fund | Klaus Slenzka OHB System AG-Bremen — GERMANY OCESSES SYMPOSIUM Symposium, organized by the International Astronautical roccesses, as well as to prepare for future orbital infrastru lamental physics), current results and research perspectit | Federation (IAF), is to highlight and discuss the state of the art cture. Session topics cover all microgravity science disciplines ves, together with relevant technology developments. | |
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| 2 1 2 3 | Cora Thiel University of Zurich — SWITZERLAND IAF MICROGRAVITY SCIENCES AND PRC The objective of the Microgravity Science and Processes in microgravity (reduced-gravity) physical sciences and p (material science, fluid physics, combustion science, func Coordinator Gabriel Pont Centre National d'Etudes Spatiales (CNES) — FRANCE Gravity and Fundamental Physics This session is devoted to the search for new fields of res principle, atomic clock and plasma crystals. Co-Chairs Hanns Selig GERADTS GMBH — GERMANY Fluid and Materials Sciences The main focus of the session is on perspective research simulations, and results of pathfinder laboratory and spa Co-Chairs Nickolay N. Smirnov Moscow Lomonosov State University — RUSSIAN FEDERATION Microgravity Experiments from Sub-Orbit This session presents recent results of microgravity expe rockets and capsules. Co-Chairs | Klaus Slenzka OHB System AG-Bremen — GERMANY Symposium, organized by the International Astronautical roccesses, as well as to prepare for future orbital infrastru- lamental physics), current results and research perspection Vice-Coordinator Valentina Shevtsova Université Libre de Bruxelles — BELGIUM earch in condensed matter physics and gravitational physic Antonio Viviani Università degli Studi della Compania "Luigi Vanvitelli" ITALY fields in fluid and materials sciences, multi-phase and che ce experiments. Satoshi Matsumoto Japan Aerospace Exploration Agency (JAXA) — JAPAN finents from all disciplines using different microgravity p | Federation (IAF), is to highlight and discuss the state of the art cture. Session topics cover all microgravity science disciplines ves, together with relevant technology developments. sics including cryogenic fluids, critical fluids, equivalence Rapporteur Qi Kang " — Qi Kang " — National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences — CHINA emically reacting flows including theoretical modeling, numerical Rapporteur Thomas Driebe DLR (German Aerospace Center) — GERMANY latforms, including drop towers, parabolic aircrafts, sounding | A |
| 2 1 2 | Cora Thiel University of Zurich — SWITZERLAND IAF MICROGRAVITY SCIENCES AND PRC The objective of the Microgravity Science and Processes in microgravity (reduced-gravity) physical sciences and p (material science, fluid physics, combustion science, func Coordinator Gabriel Pont Centre National d'Etudes Spatiales (CNES) — FRANCE Gravity and Fundamental Physics This session is devoted to the search for new fields of res- principle, atomic clock and plasma crystals. Co-Chairs Hanns Selig GERADTS GMBH — GERMANY Fluid and Materials Sciences The main focus of the session is on perspective research simulations, and results of pathfinder laboratory and spa Co-Chairs Mickolag N. Smirnov Moscow Lomonosov State University — RUSSIAN FEDERATION Microgravity Experiments from Sub-Orbitt This session presents recent results of microgravity exper- rockets and capsules. Co-Chairs Raffaele Savino University of Naples "Federico II" — ITALY | Klaus Slenzka OHB System AG-Bremen — GERMANY Symposium, organized by the International Astronautical roccesses, as well as to prepare for future orbital infrastru- lamental physics), current results and research perspection Vice-Coordinator Valentina Shevtsova Université Libre de Bruxelles — BELGIUM earch in condensed matter physics and gravitational physic Antonio Viviani Université degli Studi della Campania "Luigi Vanvitelli" ITALY fields in fluid and materials sciences, multi-phase and cho ce experiments. Satoshi Matsumoto Japan Aerospace Exploration Agency (JAXA) — JAPAN fients from all disciplines using different microgravity pl Rainer Willnecker Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) GERMANY | Federation (IAF), is to highlight and discuss the state of the art cture. Session topics cover all microgravity science disciplines wes, together with relevant technology developments. sics including cryogenic fluids, critical fluids, equivalence Rapporteur Qi Kang * - Notional Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences - CHINA emically reacting flows including theoretical modeling, numerical Rapporteur Inomas Driebe DLR (German Aerospace Center) - GERMANY | A |
| 2 1 2 3 | Cora Thiel University of Zurich — SWITZERLAND IAF MICROGRAVITY SCIENCES AND PRO The objective of the Microgravity Science and Processes in microgravity (reduced-gravity) physical sciences and p (material science, fluid physics, combustion science, func Coordinator Gabriel Pont Centre National d'Etudes Spatiales (CNES) — FRANCE Gravity and Fundamental Physics This session is devoted to the search for new fields of res principle, atomic clock and plasma crystals. Co-Chairs Hanns Selig GERADTS GMBH — GERMANY Fluid and Materials Sciences The main focus of the session is on perspective research simulations, and results of pathfinder laboratory and spa Co-Chairs Nickolay N. Smirnov Moscow Lomonosov State University — RUSSIAN FEDERATION Microgravity Experiments from Sub-Orbit This session presents recent results of microgravity exper rockets and capsules. Co-Chairs Raffaele Savino University of Naples "Federico II" — ITALY Science Results from Ground Based Reseace This session is focused on the results of ground based pr | Klaus Slenzka OHB System AG-Bremen — GERMANY Symposium, organized by the International Astronautical rocesses, as well as to prepare for future orbital infrastrulamental physics), current results and research perspective vice-Coordinator Vice-Coordinator Valentina Shevtsova Université Libre de Bruxelles — BELGIUM earch in condensed matter physics and gravitational physics Antonio Viviani Université degli Studi della Campania "Luigi Vanvitelli" ITALY fields in fluid and materials sciences, multi-phase and charce experiments. Satoshi Matsumoto Japan Aerospace Exploration Agency (JAXA) — JAPAN al to Orbital Platforms riments from all disciplines using different microgravity pl Rainer Willnecker Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) GERMANY | Federation (IAF), is to highlight and discuss the state of the art cture. Session topics cover all microgravity science disciplines wes, together with relevant technology developments. sites including cryogenic fluids, critical fluids, equivalence Rapporteur Qi Kang " — Autional Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences — CHINA emically reacting flows including theoretical modeling, numerical Rapporteur Thomas Driebe <i>DLR (German Aerospace Center) — GERMANY</i> latforms, including drop towers, parabolic aircrafts, sounding | Α: |
| 2 1 2 3 4 | Cora Thiel University of Zurich — SWITZERLAND IAF MICROGRAVITY SCIENCES AND PRO The objective of the Microgravity Science and Processes in microgravity (reduced-gravity) physical sciences and p (material science, fluid physics, combustion science, func Coordinator Gabriel Pont Centre National d'Etudes Spatiales (CNES) — FRANCE Gravity and Fundamental Physics This session is devoted to the search for new fields of res principle, atomic clock and plasma crystals. Co-Chairs Hanns Selig GERADTS GMBH — GERMANY Fluid and Materials Sciences The main focus of the session is on perspective research simulations, and results of pathfinder laboratory and spa Co-Chairs Nickolay N. Smirnov Moscow Lomonosov State University — RUSSIAN FEDERATION Microgravity Experiments from Sub-Orbit This session presents recent results of microgravity exper rockets and capsules. Co-Chairs Raffaele Savino University of Naples "Federico II" — ITALY Science Results from Ground Based Reseace This session is focused on the results of ground based pr | Klaus Slenzka OHB System AG-Bremen — GERMANY Symposium, organized by the International Astronautical roccesses, as well as to prepare for future orbital infrastru- lamental physics), current results and research perspection Vice-Coordinator Valentina Shevtsova Université Libre de Bruxelles — BELGIUM earch in condensed matter physics and gravitational physic Antonio Viviani Università degli Studi della Campania "Luigi Vanvitelli" ITALY fields in fluid and materials sciences, multi-phase and che ce experiments. Satoshi Matsumoto Japan Aerospace Exploration Agency (JAXA) — JAPAN al to Orbital Platforms iments from all disciplines using different microgravity pl Rainer Willnecker Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) GERMANY rch eparatory experiments from all disciplines. | Federation (IAF), is to highlight and discuss the state of the art cure. Session topics cover all microgravity science disciplines was, together with relevant technology developments. sites including cryogenic fluids, critical fluids, equivalence Rapporteur Qi Kang " - Artonal Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences - CHINA emically reacting flows including theoretical modeling, numerical Rapporteur Thomas Driebe DLR (German Aerospace Center) - GERMANY latforms, including drop towers, parabolic aircrafts, sounding | , A: A: |

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| Co-Chairs | |
| Rainer Willnecker Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | Gabriel Pont Centre National d'Et |
| Microgravity Sciences on board ISS and b This session focusses on the presentation of scientific ar the ISS. Papers on planned or newly developed research preparation scenarios for further long term flight opport | eyond nd operational results ob topics and experiment tunities beyond the low |
| Co-Chairs | |
| Stefan Van Vaerenbergh Université Libre de Bruxelles — BELGIUM | Angelika Diefenbach Deutsches Zentrum f — GERMANY |
| Life and Physical Sciences under reduced This session focusses on the presentation of scientific ar the ISS. Papers on planned or newly developed research preparation scenarios for further long term flight opport | Gravity Ind operational results ob topics and experiment st tunities beyond the low |
| Co-Chairs | |
| Satoshi Matsumoto Japan Aerospace Exploration Agency (JAXA) — JAPAN | Angelika Diefenbach Deutsches Zentrum f GERMANY |
| Peter Graef Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | |
| Interactive Presentations - IAF MICROGR/ This session offers a unique opportunity to deliver your the classic Sessions. The presentation will be displayed o In addition, one afternoon is dedicated exclusively for th present the topic and interact with the attendees presene embedded hot links, pictures, audio and video clips etc. An Abstract that follows the standard format must be su | AVITY SCIENCES Al key messages in an inter on a digital screen in a de e attendees to view the tt. The Interactive Prese An award will also be pr ibmitted by the deadline |
| Co-Chairs | |
| Gabriel Pont Centre National d'Etudes Spatiales (CNES) — FRANCE | Qi KANG National Microgravit Chinese Academy of |
| IAF SPACE EXPLORATION SYMPOSIUM This symposium, organized by the International Astrona of the Solar System. | utical Federation (IAF), c |
| Coordinators | Remard Fains |
| Christian Saliaberger Canadensys Aerospace Corporation — CANADA | ESA/ESTEC, ILEWG & NETHERLANDS |
| Space Exploration Overview This Session covers Space Exploration strategies and arc papers dealing with the emerging area of commercial sp | hitectures, as well as tec bace exploration activitie |
| Co-Chairs | |
| Christian Sallaberger Canadensys Aerospace Corporation — CANADA | Kathy Laurini — UNITED STATES |
| rapporteurs | |
| Keyur Patel National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES | Norbert Frischauf TU GRAZ – AUSTRIA |
| Moon Exploration – Part 1 This session will address current and future lunar missio utilisation and preparatory activities for future solar syst | ns. The session will addr tem exploration. |
| Co-Chairs | |
| Bernard Foing ESA/ESTEC, ILEWG & VU Amsterdam — THE NETHERLANDS | David Korsmeyer National Aeronautics UNITED STATES |
| Rapporteur | |
| Nadeem Ghafoor Canadensys Aerospace Corporation — CANADA | Sylvie Espinasse European Space Age |
| Moon Exploration – Part 2 This session will address current and future lunar missio utilisation and preparatory activities for future solar syst | ns. The session will addr em exploration. |
| | |
| Co-Chairs | |
| Co-Chairs Bernard Foing ESA/ESTEC, ILEWG & VU Amsterdam — THE NETHERLANDS | David Korsmeyer National Aeronautics UNITED STATES |
| Co-Chairs Bernard Foing ESA/ESTEC, I.LEWG & VU Amsterdam — THE NETHERLANDS Rapporteurs | David Korsmeyer National Aeronautic UNITED STATES |

Pierre-Alexis Journel

Airbus Defence and Space — Germany

Nadeem Ghafoor





inition and concepts for the future, ground and flight operation (telescience, robotics, hardware &

Rapporteur

'Etudes Spatiales (CNES) — FRANCE

Satoshi Matsumoto Japan Aerospace Exploration Agency (JAXA) — JAPAN

obtained from microgravity sciences research conducted on large orbital platforms, in particular nt scenarios are also invited. The session is not limited to the usage of the ISS but comprises the w earth orbit such as Deep Space Gateway.

m für Luft- und Raumfahrt e.V. (DLR)

s obtained from life and physical sciences research conducted on large orbital platforms, in particular ent scenarios are also invited. The session is not limited to the usage of the ISS but comprises the w earth orbit such as Deep Space Gateway.

ach Cora Thiel m für Luft- und Raumfahrt e.V. (DLR) — University of Zurich — SWITZERLAND

AND PROCESSES SYMPOSIUM

teractive presentation on any of the subjects of Microgravity Sciences and Processes addressed in a dedicated location and available for view by all Congress attendees for the entire Congress week. the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally esentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, e presented to the author of the best Interactive Presentation in the A Category at a special ceremony. ine for standard IAC abstracts.

wity Laboratory, Institute of Mechanics, of Sciences - CHINA

), covers the current and future robotic missions and material plans for initiatives in the exploration

G & VU Amsterdam — THE

technology roadmaps. Papers of both national and international perspectives are invited, as are ties.

ddress orbital missions, robotic surface missions, as well as life sciences on the Moon, resource

itics and Space Administration (NASA) —

Agency (ESA) — THE NETHERLANDS

dress orbital missions, robotic surface missions, as well as life sciences on the Moon, resource

itics and Space Administration (NASA) —

Canadensys Aerospace Corporation — CANADA





| A3.2C | Moon Exploration – Part 3 This session will address current and future lunar missio utilisation and preparatory activities for future solar syst | ns. The session will address orbital missions, robotic surface missions, as well as life sciences on the Moon, resource tem exploration. | A4 | 49 TH IAA SYMPOSIUM ON THE SEARCI This symposium, organized by the International Acade Intelligence (SETI) including a discussion of all kinds of | H FOR EXTRATERRESTRIAL I emy of Astronautics (IAA), deals with the contacts. The technical side is not limit |
|-------|--|--|--------------|--|--|
| | Co-Chairs | | | The interdisciplinary aspects include all societal implic | ations, risk communication and philoso |
| | Bernard Foing ESA/ESTEC, ILEWG & VU Amsterdam — THE NETHERLANDS | David Korsmeyer National Aeronautics and Space Administration (NASA) — UNITED STATES | | Coordinator Claudio Maccone International Academy of Astronautics (IAA) and | |
| | Rapporteurs | | | Istituto Nazionale di Astrofisica (INAF) — ITALY | |
| | Sylvie Espinasse European Space Agency (ESA) — THE NETHERLANDS | Nadeem Ghafoor Canadensys Aerospace Corporation — CANADA | A4.1 | SETI 1: SETI Science and Technology All technical aspects involved in the search for extrate | rrestrial intelligence, including current |
| A3.3A | Mars Exploration – Missions Current and The planet Mars is being explored now and in the comin missions and the designs for proposed Mars missions. | Future g years with multiple robotic missions from a variety of nations. This session will cover current results from ongoing Mars | | Co-Chairs Michael Albert Garrett University of Manchester — UNITED KINGDOM | Bill Diamond SETI Institute — UNITED STATES |
| | Co-Chairs Vincenzo Giorgio Thales Alenia Space Italia — ITALY | Pierre W. Bousquet Centre National d'Etudes Spatiales (CNES) — FRANCE | A4.2 | SETI 2: SETI and Society All aspects concerning the societal implications of extr impacts on society. | raterrestrial intelligence are considered |
| | Rapporteurs | | | Co-Chairs | |
| | Cheryl Reed The Johns Hopkins University Applied Physics Laboratory — UNITED STATES | Amalia Ercoli Finzi Politecnico di Milano — ITALY | | John Elliott Leeds Beckett University — UNITED KINGDOM | Michael A.G. Michaud International Academy of Astrono |
| A3.3B | Mars Exploration – Science, Instruments a The planet Mars is being explored now and in the comin technologies for Mars missions including expected experi- contamination are particularly welcome. | and Technologies Ig years with multiple robotic missions from a variety of nations. This session will cover science, instruments and riments. Papers on any aspects of the search for evidence or extinct Martian life, and forward and backward | A4.IP | Interactive Presentations - 49 th IAA SYM This session offers a unique opportunity to deliver you presentation will be displayed on a digital screen in a is dedicated exclusively for the attendees to view the interact with the attendees present. The Interactive P | POSIUM ON THE SEARCH FO ur key messages in an interactive preser dedicated location and available for vie interactive Presentations, and the auth resentation may take advantage of all e |
| | Vincenzo Giorgio Thales Alenia Space Italia — ITALY | Pierre W. Bousquet Centre National d'Etudes Spatiales (CNES) — FRANCE | | pictures, audio and video clips etc. An award will also follows the standard format must be submitted by the | be presented to the author of the best e deadline for standard IAC abstracts. |
| | Rapporteurs | | | Claudio Maccone | |
| | Cheryl Reed The Johns Hopkins University Applied Physics Laboratory — UNITED STATES | Amalia Ercoli Finzi Politecnico di Milano — ITALY | | International Academy of Astronautics (IAA) and Istituto Nazionale di Astrofisica (INAF) — ITALY | |
| A3.4A | Small Bodies Missions and Technologies (This session will present the missions and technological | Part 1) aspects related to the exploration of small bodies including a search for pre-biotic signatures. | A5 | 23 RD IAA SYMPOSIUM ON HUMAN EX This symposium, organized by the International Acade | PLORATION OF THE SOLAR my of Astronautics (IAA), covers the str |
| | Co-Chairs | | | Coordinators | NEO 3. |
| | Susan McKenna-Lawlor Space Technology (Ireland) Ltd. — IRELAND | Stephan Ulamec Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | | Christian Sallaberger Canadensys Aerospace Corporation — CANADA | Maria Antonietta Perino Thales Alenia Space Italia — ITALI |
| | Rapporteurs | | A5.1 | Human Exploration of the Moon and Ci | slunar Space |
| | Norbert Frischauf TU GRAZ – AUSTRIA | Marc D. Rayman NASA Jet Propulsion Laboratory — UNITED STATES | | This session will examine the scenarios and infrastruct roadmaps as well as interfaces to allow international of | ture required to support human explore cooperation. |
| A3.4B | Small Bodies Missions and Technologies (| Part 2) asperts related to the evoloration of small bodies including a search for pre-biotic signatures | | Co-Chairs | Michael Paftery |
| | Co-Chairs | aspects related to the exploration of small boards including a scarch for pre-bload signatures. | | Canadensys Aerospace Corporation — CANADA | Boeing Defense Space & Security |
| | Stephan Ulamec Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GFRMANY | Susan McKenna-Lawlor Space Technology (Ireland) Ltd. — IRELAND | A5.2 | Human Exploration of Mars This session will examine the scenarios and infrastruct roadmaps as well as interfaces to allow international | ture required to support human exploration. |
| | Rapporteurs | | | Co-Chairs | |
| | Marc D. Rayman | Norbert Frischauf | | Maria Antonietta Perino | Kathy Laurini |
| | NASA Jet Propulsion Laboratory — UNITED STATES | TU GRAZ – AUSTRIA | | Thates Alenia Space Italia — TTALY | - UNITED STATES |
| A3.5 | Solar System Exploration including Ocean This session covers robotic missions for Solar System exp bodies covered in other sessions of this symposium. Spe covering both new mission concepts as well as the assoc | I Worlds ploration (inner and outer planets and their satellites, and space plasma physics) except the Earth, Moon, Mars, and small cial emphasis on papers addressing missions to so-called Ocean Worlds (Enceladus, Europa, Titan) is sought. Papers ciated specific technologies are invited. | A5.3 B3.6 | Human and Robotic Partnerships in Exp This session seeks papers on new systems and techno such as onboard robotic assistants, habitat / infrastru to human spaceflights for test, validation, and demon systems are likely to evolve in the coming years and th | loration - Joint session of the logies for current human spaceflight an cture construction support, human mol stration of systems. This session also wi e corresponding impact on complex m |
| | Co-Chairs Mariella Graziano GMV Aerospace & Defence SAU — SPAIN | Junichiro Kawaguchi Japan Aerospace Exploration Agency (JAXA) — JAPAN | | Co-Chairs Christian Sallaberger | Mark Hempsell |
| | Rapporteurs | | | Canadensys Aerospace Corporation — CANADA | The British Interplanetary Society |
| | Charles E. Cockrell Jr National Aeronautics and Space Administration (NASA) — UNITED STATES | Alain Ouellet Canadian Space Agency — CANADA | A5.4 D2.8 | Space Transportation Solutions for Dee This session will explore space transportation capabili demonstrations as well as the issues of scientific and | o Space Missions ties, existing or under study, for human |
| A3.IP | Interactive Presentations - IAF SPACE EXP This session offers a unique opportunity to deliver your | LORATION SYMPOSIUM key messages in an interactive presentation on any of the subjects of Space Exploration addressed in the classic Sessions. | | potential missions enabled by deep space transportat | ion system. |
| | The presentation will be displayed on a digital screen in afternoon is dedicated exclusively for the attendees to v and interact with the attendees present. The Interactive pictures, audio and video clips etc. An award will also be | a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one iew the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, presented to the author of the best Interactive Presentation in the A Category at a special ceremony. An Abstract that | | K. Bruce Morris RUAG Space — SWEDEN | Josef Wiedemann DLR (German Aerospace Center) |
| | follows the standard format must be submitted by the d | eadline for standard IAC abstracts. | A5.IP | Interactive Presentations - 23 rd IAA SYM This session offers a unique opportunity to deliver you | POSIUM ON HUMAN EXPLO |
| | Co-Chairs | Remark Frida | | in the classic Sessions. The presentation will be displa | yed on a digital screen in a dedicated lo |
| | Crinistian Saliaberger Canadensys Aerospace Corporation — CANADA | Bernara roing ESA/ESTEC, ILEWG & VU Amsterdam — THE NETHERLANDS | | in augmon, one atternoon is gedicated exclusively for present the topic and interact with the attendees pres embedded hot links, pictures, audio and video clips et An Abstract that follows the standard format must be | ent. The Interactive Presentation may the sector of the se |
| | | | | - | |





EXTRATERRESTRIAL INTELLIGENCE (SETI) – THE NEXT STEPS

tronautics (IAA), deals with the scientific, technical and interdisciplinary aspects of the Search for Extra-Terrestrial s. The technical side is not limited to the microwave window, but includes also optical and any kinds of radiation. sk communication and philosophical considerations of any kind of discovery or contact.

ntelligence, including current and future search strategies.

Rapporteu Andrew Siemion

University of California — UNITED STATES

ial intelligence are considered, including public reaction to a discovery, risk communication and the possible

chael A.G. Michaud

Rapporteur

ernational Academy of Astronautics — UNITED STATES

J. Emilio Enriquez UC Berkeley / Radboud University Nijmegen — UNITED STATES

M ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps

essages in an interactive presentation on any of the subjects of SETI addressed in the classic Sessions. The d location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon re Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and on may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, nted to the author of the best Interactive Presentation in the A Category at a special ceremony. An Abstract that e for standard IAC abstracts.

ATION OF THE SOLAR SYSTEM

tronautics (IAA), covers the strategic plans, architectural concepts and technology development for future human

ria Antonietta Perino ales Alenia Space Italia — ITALY

ired to support human exploration of the Moon and Cislunar space. Papers are invited to discuss technology

Rapporteur

eing Defense Space & Security — UNITED STATES

Marc Haese DLR, German Aerospace Center — GERMANY

ired to support human exploration of Mars and the moons of Mars. Papers are invited to discuss technology

Rapporteur

Norbert Frischauf TU GRAZ – AUSTRIA

n - Joint session of the IAF Human Spaceflight and IAF Exploration Symposia

r current human spaceflight and exploration programmes, and the role of human and robotic partnerships in areas nstruction support, human mobility support systems (e.g. EVA mobility aids, rovers); and robotic precursor activities f systems. This session also welcomes papers considering how the roles of humans, machines and intelligent ponding impact on complex mission design, implementation, and operations.

Rapporteur

Juergen Schlutz

ark Hempsell e British Interplanetary Society — UNITED KINGDOM

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY

ting or under study, for human deep space exploration missions, new science, programme architectures, technology notivations and international cooperation. The session will also deal with worldwide needs, requirements and

Rapporteur

ef Wiedemann R (German Aerospace Center) — GERMANY Gerhard Schwehm European Space Agency (ESA) (retired) — THE NETHERLANDS

M ON HUMAN EXPLORATION OF THE SOLAR SYSTEM

ssages in an interactive presentation on any of the subjects of Human Exploration of the Solar System addressed digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. ndees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, ard will also be presented to the author of the best Interactive Presentation in the A Category at a special ceremony. d by the deadline for standard IAC abstracts.





| | Co-Chairs | | | | Co-Chairs | |
|--------------|---|---|--|----------------|--|---|
| | Christian Sallaberger Canadensys Aerospace Corporation — CANADA | Maria Antonietta Perino Thales Alenia Space Italia — ITALY | | | Heiner Klinkrad European Space Agency (ESA) — GERMANY | Juan Carlos Dolado Perez Centre National d'Etudes Spatiales (CNES) — FI |
| A6 | 18 TH IAA SYMPOSIUM ON SPACE DEBRI The Symposium will address the complete spectrum of t hypervelocity impacts and protection, mitigation and sta | S technical issues of space debris: measurements, modeling, risk andards, post-mission disposal, debris removal, Space Surveilla | assessment in space and on the ground, re-entry, nce, collision avoidance as well as non-technical topics. | A6.10 B6.10 | Joint Space Operations/ Space Debris Set This session facilitates discussions between Space Oper environment. Lessons learned from CAM operations, H operations in LEO are key challenges for the community | ssion ations and Space Debris communities for shared ur SF and PMD are especially welcome. Looking into th r and require the appropriate regulatory environme |
| | Coordinators Christophe Bonnal Centre National d'Etudes Spatiales (CNES) — FRANCE | JC. Liou National Aeronautics and Space Administration (NASA) — UNITED STATES | | | Co-Chairs Darren McKnight Integrity Applications Incorporated (IAI) — UNITED STATES | Igor Usovik Central Research Institute of Machine Building (TSNIIMASH) — RUSSIAN FEDERATION |
| A6.1 | Space Debris Detection, Tracking and Cha This session will address advanced ground and space-ba Co-Chairs | rracterization sed measurement techniques, relating processing methods, ar | nd results of space debris characterization. Rapporteur | A6.IP | Interactive Presentations - 18 th IAA SYMF This session offers a unique opportunity to deliver your presentation will be displayed on a digital screen in a du is dedicated exclusively for the attendees to view the In | OSIUM ON SPACE DEBRIS key messages in an interactive presentation on any edicated location and available for view by all Congr teractive Presentations, and the author will be assigned to the presentation of the second |
| | Thomas Schildknecht Astronomical Institute University of Bern (AIUB) / SwissSpace Association — SWITZERLAND | Mark A. Skinner The Aerospace Corporation — UNITED STATES | Vladimir Agapov Russian Academy of Sciences — RUSSIAN FEDERATION | | pictures, audio and video clips etc. An award will also b follows the standard format must be submitted by the o | e presented to the author of the best Interactive Pr Jeadline for standard IAC abstracts. |
| A6.2 | Modelling and Risk Analysis This session will address the characterization of the curr collision risk estimates based on statistical population m | ent and future debris population and methods for in-orbit and odels and deterministic catalogues, and active avoidance. | on-ground risk assessments. The in-orbit analysis will cover | | Co-Chairs Christophe Bonnal Centre National d'Etudes Spatiales (CNES) — FRANCE | Darren McKnight Integrity Applications Incorporated (IAI) — UNI |
| | Co-Chairs Carmen Pardini ISTI-CNR — ITALY | Daniel Oltrogge Analytical Graphics, Inc. — UNITED STATES | Rapporteur Marlon Sorge The Aerospace Corporation — UNITED STATES | Α7 | IAF SYMPOSIUM ON FUTURE SPACE ASTI The symposium, organized by the International Astrona insights, and planning for future space missions in exop | RONOMY AND SPACE PHYSICS MISSIO utical Federation (IAF), invites leaders from the scier lanets, astronomy, space physics and fundamental |
| A6.3 | Impact-Induced Mission Effects and Risk J This session addresses disruptions of spacecraft operatic up to mission loss. It includes risk assessments for impac studies, laboratory impact experiments, numerical simul | Assessments ons induced by hypervelocity impacts including spacecraft ano ct vulnerability studies and corresponding system tools. Furthe lations, and on-board diagnostics to characterize impacts such | malies, perturbation of operations, and component failures r topics are spacecraft impact protection and shielding as impact sensors, accelerometers, etc. | | papers in these four areas of scientific endeavour. For measurement and system technologies, including signifi and space agency strategies to prioritize and invest in b Coordinators | each, the Symposium solicits discussion of phen cant progress made by industry and research labora ringing them into reality. |
| | Co-Chairs | | Rapporteur | | Pietro Ubertini | Eric Wille |
| | Zizheng Gong | Darren McKnight | Jean-Claude Traineau | | INAF — ITALY | ESA — THE NETHERLANDS |
| A6.4 | - CHINA Mitigation - Tools, Techniques and Challer | Integrity Applications Incorporated (IAI) — UNITED STATES | 5 Office National d'Etudes et de Recherches Aérospatiales (ONERA) — FRANCE | A7.1 | Space Agency Strategies and Plans The first session includes invited talks by international s for the four fields (exoplanets, space astronomy, space | pace-agency division directors about their long-ter physics and fundamental physics). The mission scop |
| | This session will focus on the implementation of debris p tools to verify the efficiency of the implemented measur learned in the actual execution of mitigation actions. | prevention and reduction measures and vehicle passive protections. The session will also address practical experiences in the p | tion at system level including end of life strategies and lanning and verification of measures and issues and lessons | | class to smallsat platforms. The programme scope inclu relationship to community and guiding research panels Co-Chairs | des status updates on current programmes, near-te |
| | Co-Chairs | | Rapporteur | | Fric Wille | Pietro Ubertini |
| | Satomi Kawamoto Japan Aerospace Exploration Agency (JAXA) — JAPAN | Pierre Omaly Centre National d'Etudes Spatiales (CNES) — FRANCE | Holger Krag European Space Agency (ESA) — GERMANY | | ESA — The Netherlands | INAF — ITALY |
| A6.5 | Post Mission Disposal and Space Debris R This session will address post-mission disposal and active | temoval (1) e removal techniques "ground and space based", review poten | tial solutions and Identify implementation difficulties. | A7.2 | Science Goals and Drivers for Future Exo The second session includes invited and contributed tall and fundamental physics). New directions for measurer to pursue them will be discussed. | planet, Space Astronomy and Space P ss about scientific motivations, goals, opportunities, nents that are being opened by emergent results an |
| | Co-Chairs | Louvent Francillout | Rapporteur | | Co-Chair | |
| | Manipal Institute of Technology, Manipal Academy of Higher Education — INDIA | Centre National d'Etudes Spatiales (CNES) — FRANCE | University of Naples "Federico II" — ITALY | | Pietro Ubertini INAF — ITALY | Brent Sherwood — UNITED STATES |
| A6.6 | Post Mission Disposal and Space Debris R This session will address post-mission disposal and active Co-Chairs | temoval (2) e removal techniques "ground and space based", review poten | tial solutions and identify implementation difficulties. | A7.3 | Technology Needs for Future Missions, S The third session includes invited and contributed talk and characterization; astronomy throughout the electri | ystems, and Instruments s about the technology challenges and plans requ omagnetic spectrum and using gravitational waves; |
| | John Auburn Astroscale Ltd — UNITED KINGDOM | Nicolas Bérend ONERA - The French Aerospace Lab — FRANCE | Carsten Wiedemann TU Braunschweig, Institute of Space Systems — GERMANY | | fundamental physics including relativity. Topical focus in and associated technology developments. | cludes measurement techniques, data types, perfor |
| A6.7 | Operations in Space Debris Environment, This session will address the multiple aspects associated | Situational Awareness with safe operations in Space dealing with Space Debris, inclu | ding operational observations, orbit determination, | | Co-Chairs Eric Wille ESA — THE NETHERLANDS | Brent Sherwood — UNITED STATES |
| | | Tom unrefert sources, relevant data exchange standards and t | Percentary | A7 IP | Interactive Presentations - IAF SYMPOSI | IM ON FUTURE SPACE ASTRONOMY A |
| | Co-Chains T.S. Kelso Center for Space Standards and Innovation (CSSI) — UNITED STATES | Noelia Sanchez Ortiz Deimos Space S.L. — SPAIN | Kapporteur Vincent Martinot Thales Alenia Space France — FRANCE | | This session offers a unique opportunity to deliver your presentation will be displayed on a digital screen in a de dedicated exclusively for the attendees to view the Inte | key messages in an interactive presentation on any edicated location and available for view by all Congr ractive Presentations, and the author will be assign |
| A6.8 E9.1 | Policy, Legal, Institutional and Economic A Security Committee) | Aspects of Space Debris Detection, Mitigation | | | and video clips etc. An award will also be presented to t format must be submitted by the deadline for standard Co-Chair | In the author of the best Interactive Presentation in the IAC abstracts. |
| | other multilateral bodies. Economic issues including insu addressing these issues will be considered. | urance, financial incentives and funding for space debris mitiga | tion and removal. The role of international cooperation in | | Eric Wille ESA — THE NETHERLANDS | |
| | Co-Chairs | Course Blothead | Alexander Course | | | |
| | אינע ש. Spencer The Pennsylvania State University — UNITED STATES | Serge Plattard University College London (UCL) — UNITED KINGDOM | Alexander Soucek European Space Agency (ESA/ESRIN) — ITALY | | | |
| | Samantha Le May RMIT University (Royal Melbourne Institute of Technology) — AUSTRALIA | | | | | |
| A6.9 | Orbit Determination and Propagation This session will address aspects of space debris orbit de risk analysis of space debris. | etermination related to assessment of raw and derived data ac | curacy, optical measurements processing and modelling and | | | |





s Dolado Perez onal d'Etudes Spatiales (CNES) — FRANCE

Rapporteur

Fabrizio Piergentili Sapienza University of Rome — ITALY

ce Debris communities for shared understanding of the challenges/issues in operating in a debris-rich e especially welcome. Looking into the future: improved STM; automated CAM; and large constellation appropriate regulatory environment.

Rapporteur

Upasana Dasgupta Institute of Air and Space Law, McGill University — CANADA

SPACE DEBRIS

n an interactive presentation on any of the subjects of Space Debris addressed in the classic Sessions. The n and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon ntations, and the author will be assigned a specific ten minute slot to personally present the topic and take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, he author of the best Interactive Presentation in the A Category at a special ceremony. An Abstract that

plications Incorporated (IAI) — UNITED STATES QPS Institute— JAPAN

Tetsuo Yasaka

ND SPACE PHYSICS MISSIONS

n (IAF), invites leaders from the science, space industry, and space-agencies community to share information, my, space physics and fundamental physics. The Symposium will comprise both invited talks and contributed nposium solicits discussion of phenomena coming within our reach over the next decades; their enabling nade by industry and research laboratories; mission concepts to implement such investigations, and corporate to reality.

E NETHERLANDS

vision directors about their long-term views, priorities, and plans to implement developments and missions damental physics). The mission scope ranges from flagship-class, large-class, medium-class, and smalltes on current programmes, near-term investment priorities, and long-range directions, including the

Rapporteur

Brent Sherwood - UNITED STATES

ce Astronomy and Space Physics

ic motivations, goals, opportunities, and needs in the four fields (exoplanets, space astronomy, space physics, eing opened by emergent results and newly understood phenomena will be explored, and science roadmaps

Rapporteur

Eric Wille ESA — THE NETHERLANDS

Instruments

chology challenges and plans required to enable breakthrough science objectives in: exoplanet detection trum and using gravitational waves; space physics including fractional gravity regimes and heliophysics; and ment techniques, data types, performance requirements, instrument designs, mission concepts and systems,

Rapporteur

Pietro Ubertini INAF — ITALY

URE SPACE ASTRONOMY AND SPACE PHYSICS

an interactive presentation on any of the subjects of Space Astronomy addressed in the classic Sessions. The n and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is ations, and the author will be assigned a specific ten minute slot to personally present the topic and interact vantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio e best Interactive Presentation in the A Category at a special ceremony. An Abstract that follows the standard

H) - RUSSIAN FEDERATION

ndard IAC abstracts.





| Catagory | | | | | | |
|----------|---|--|---|-------|---|--|
| | APPLICATIONS AND OPER On-going and future operational applicati and small satellites B1 IAF EARTH OBSERVATION SYMI B2 IAF SPACE COMMUNICATIONS | ATIONS ions, including Earth observation, communica POSIUM AND NAVIGATION SYMPOSIUM | ation, navigation, human space endeavours | B1.IP | Interactive Presentations - IAE LARIH OBS This session offers a unique opportunity to deliver your k The presentation will be displayed on a digital screen in a afternoon is dedicated exclusively for the attendees to vi and interact with the attendees present. The Interactive pictures, audio and video clips etc. An award will also be follows the standard format must be submitted by the de | LEVATION SYMPOSIUM ey messages in an interactive presentation on any of the sui dedicated location and available for view by all Congress at ew the Interactive Presentations, and the author will be assi Presentation may take advantage of all electronic display ca presented to the author of the best Interactive Presentation readline for standard IAC abstracts. |
| | B3 IAF HUMAN SPACEFLIGHT STM B4 27 TH IAA SYMPOSIUM ON SMAI B5 IAF SYMPOSIUM ON INTEGRAT B6 IAF SPACE OPERATIONS SYMPO | EL SATELLITE MISSIONS ED APPLICATIONS DSIUM | | | Andrew Court TNO — THE NETHERLANDS | Harry A. Cikanek National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES |
| | Category coordinated by Otto Koudelka, G | Graz University of Technology (TU Graz), AUS | TRIA | B2 | IAF SPACE COMMUNICATIONS AND NA This symposium, organized by the International Astrona relate to fixed, broadcast, high-throughput, and mobile | VIGATION SYMPOSIUM utical Federation (IAF), examines development in space-ba communication services as well as, position determination, |
| B1 | IAF EARTH OBSERVATION SYMPOSIUM The Earth Observation Symposium, organized by the Inter related to the Earth's environment and including mission applications ground data processing | ernational Astronautical Federation (IAF), covers all aspects of planning, microwave and optical sensors and technologies, s | Earth observations from space, especially observations ystems for land, oceanographic, and atmospheric | | geostationary systems as well as non-geostationary syste Coordinator | Plant all strength |
| | Coordinators | | | | European Space Agency (ESA), retired — THE | The Aerospace Corporation — UNITED STATES |
| | Andrew Court TNO — THE NETHERLANDS | Harry Cikanek National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES | 1 | B2.1 | Advances in Space-based Communication This session is focused on all aspects of new space comm satellites (HTS) and low earth orbit systems; 56 integratio | Systems and Services, Part 1 nunications, services, architecture and infrastructure: fixed, n into satellite networks; Ku- and Ka-band, Q/V bands and hi |
| В1.1 | Focus is on efforts being made by governments, agencies systems. Presentations are encouraged which involve con commercial, government and other entities are especial | vaction IVIISSIONS s and society to achieve coordination, cooperation and compa operative efforts with developing countries. Papers on curren ly encouraged. | atibility in the development of space-based Earth observation t and ongoing missions involving coordination among | | continuumcautors); vsAt/Esim and radio/television and in systems/services, and systems modeling. | ternet services, including video to users, hear-carth and in |
| | Co-Chairs | lesí Cusia Invitado | Rapporteur | | Robert D. Briskman Sirius XM Radio — UNITED STATES | Laszlo Bacsardi Hungarian Astronautical Society (MANT) — HUNGARY |
| | National Institute of Advanced Studies (NIAS) — INDIA | Jose Gavira izquierdo European Space Agency (ESA) — THE NETHERLANDS | National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES | B2.2 | Advances in Space-based Communication This session is focused on all aspects of new space comm satellites (HTS) and low earth orbit systems; 5G integratio | Systems and Services, Part 2 nunications, services, architecture and infrastructure: fixed, n into satellite networks; Ku- and Ka-band, Q/V bands and hi |
| B1.2 | Future Earth Observation Systems Emphasis is on functional and technical description of en observation. Descriptions of new concepts and innovativ | nvisioned, planned and recently launched new space sensors, re Earth observation sensors and systems are encouraged. | systems and missions for experimental and operational Earth | | communications); VSAT/ESIM and radio/television and ir systems/services, and systems modeling. | ternet services, including video to users; near-Earth and in |
| | Co-Chairs | | Rapporteur | | Morio Toyoshima | Otto Koudelka |
| | Timo Stuffler OHB System AG - Munich — GERMANY | Alain Gleyzes Centre National d'Etudes Spatiales (CNES) — FRANCE | Gunter Schreier Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | | National Institute of Information and Communications Technology (NICT) — JAPAN | Joanneum Research — AUSTRIA |
| B1.3 | Earth Observation Sensors and Technolog Focus is on instruments and future concepts being propor technologies that make innovative measurements and do | Y osed, developed, tested, or calibrated for all aspects of Earth o eliver improved performance for science, operational or com | observation. Particular emphasis is on systems and mercial applications. | B2.3 | Advances in Space-based Communication This session is focused on all aspects of new space comm satellites (HTS) and low earth orbit systems; 5G integratin quantum communications); VSAT/ESIM and radio/televis | Systems and Services, Part 3 unications, services, architecture and infrastructure: fixed, on into satellite networks; Ku- and Ka-band, Q/V bands and ion and internet services, including video to users; near-Earl |
| | Co-Chairs | | Rapporteur | | for new systems/services, and systems modeling. | |
| | Andrew Court TNO — THE NETHERLANDS | Roland Le Goff SODERN — FRANCE | Kate Becker NOAA/NESDIS — UNITED STATES | | Co-Chairs Dipak Srinivasan | Ramon P. De Paula |
| B1.4 | Earth Observation Data Management System Focus is on Earth Observation related data processing an | tems Id systems. Emphasis is on the challenges of new information | technology and web-based technologies (e.g. Big Data, | | The John Hopkins University Applied Physics Laboratory — UNITED STATES | National Aeronautics and Space Administration (NASA) — UNITED STATES |
| | Cloud-based operations, crowd sourcing, etc) for acquisit the extraction of information from these large data syste coordination and programmes - on Earth Observation da | tion, communication, processing, dissemination and archiving ems (e.g. machine learning) and methods for making the resul ta -related systems - is also encouraged. | ş systems. The session also covers innovative methods for Its available to decision makers. Presentation of International Reservements. | B2.4 | Advances in Space-based Communication This session is focused on all aspects of payload, spacerc those used in nanosatellites to those applicable to large, nower amplifiers, adaptive transmit technologies inter-s | Technologies, Part 1 aft, and Earth station technologies for space-based commun high throughput systems, and integrated applications and s atellite links laser technology (as anolicable to communicat |
| | Co-Chairs James E. Graf | Gunter Schreier | Kapporteur Annamaria Nassisi Thalaa Alazia Gazas (taliaa - 1741)/ | | technologies, onboard processing, digital payload techno | logies, security including quantum key distribution via satel |
| | (NASA), Jet Propulsion Laboratory — UNITED STATES | GERMANY | Thules Alenia space Rana — TTALY | | Edward W. Ashford | Amane Miura |
| B1.5 | Earth Observation Applications, Societal C Focus is on using Earth Observation data to generate value | Challenges and Economic Benefits ue-added products and services for meeting societal challeng | es or addressing new commercial approaches. Presentation | | Graz University of Technology (TU Graz) — AUSTRIA | National Institute of Information and Communications Technology (NICT) — JAPAN |
| | web-based technologies, AI and machine learning, optim | nisideration of cost investments and economic and societal t nized satellite systems and vertical service integrations are en- | couraged. | B2.5 | Advances in Space-based Communication This session is focused on all aspects of payload, spacecre those used in nanosatellites to those applicable to large, | Technologies, Part 2 aft, and Earth station technologies for space-based commur high throughput systems, and integrated applications and s |
| | Masami Onoda Japan Aerospace Exploration Agency (JAXA) — JAPAN | Na Yao Qian Xuesen Laboratory of Space Technology, China Academy of Space Technology (CAST) — CHINA | | | power amplifiers, adaptive transmit technologies, inter-s band technologies, onboard processing, digital payload t communications. | atellite links, laser technology (as applicable to communicat echnologies, security including quantum key distribution via |
| | Rapporteurs | | | | Co-Chairs | |
| | Wolfgang Rathgeber European Space Agency (ESA) — ITALY | Annamaria Nassisi Thales Alenia Space Italia — ITALY | | | K.R. Sridhara Murthi NIAS — INDIA | Elemer Bertenyi Canadian Aeronautics and Space Institute — CANADA |
| B1.6 | 20th Anniversary of the Disaster Charter: H The Disaster Charter, through its 20-year history, has bee which involve case studies, success stories, history of the recommendations for the future. | History, Status and Future of this Powerful an en an outstanding success. Session focus is on Charter history, formation and early years, current status of operations, anal | d Productive International Cooperation current status and the future. Presentations are encouraged ysis of what has worked and why, challenges, plans and | B2.6 | Advances in Space-based Navigation Syste This session is focused on advances in space-based navig QZSS, WAAS), as well as proposed and emerging new spa determination, navigation, time determination, and integ | ems, Services, and Applications ation systems, including the existing global systems (Beidou, cce-based systems. The session also addresses advances in t yrity assurance on Earth, Moon, and potentially other bodie: |
| | Co-Chairs | | Rapporteur | | Lo-Chairs | Ciauanai B. Balmarini |
| | Harry A. Cikanek National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES | Elizabeth Seward Airbus Defence and Space Ltd — UNITED KINGDOM | Brent Smith National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES | | NISGAN PAUNY OHB System — GERMANY | Sapienza University of Rome — ITALY |
| | | | | | | |





SYMPOSIUM

an interactive presentation on any of the subjects of Earth Observation addressed in the classic Sessions. tion and available for view by all Congress attendees for the entire Congress week. In addition, one tive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic ay take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, e author of the best Interactive Presentation in the B Category at a special ceremony. An Abstract that lard IAC abstracts.

SYMPOSIUM

on (IAF), examines development in space-based systems, services, applications, and technologies as they services as well as, position determination, navigation and timing services. The symposium addresses the ations.

nd Services, Part 1

rvices, architecture and infrastructure: fixed, mobile and broadcast services, including the high-throughput etworks; Ku- and Ka-band, Q/V bands and higher frequencies and laser communication (including quantum including video to users; near-Earth and interplanetary services. It also includes spectrum issues for new

Rapporteur

Desaraju Venugopal ESA — THE NETHERLANDS

nd Services, Part 2

vices, architecture and infrastructure: fixed, mobile and broadcast services, including the high-throughput networks; Ku- and Ka-band, Q/V bands and higher frequencies and laser communication (including quantum , including video to users; near-Earth and interplanetary services. It also includes spectrum issues for new

Rapporteur

Debra Emmons The Aerospace Corporation — UNITED STATES

nd Services. Part 3

vices, architecture and infrastructure: fixed, mobile and broadcast services, including the high-throughput intervices, including video to users; near-Earth and interplanetary services. It also includes spectrum issues

Rapporteur

Sara AlMaeeni Mohammed Bin Rashid Space Centre (MBRSC) — UNITED ARAB EMIRATES

es, Part 1

ation technologies for space-based communications and data relay. It covers applications ranging from It systems, and integrated applications and services. It includes the modulation and coding, propagation, ser technology (as applicable to communications), antenna (including phased array) design, Q/V band including quantum key distribution via satellite, and other technology relevant to satellite communication.

Rapporteur

Nader Alagha ESA — THE NETHERLANDS

es, Part 2

tation technologies for space-based communications and data relay. It covers applications ranging from ut systems, and integrated applications and services. It includes modulation and coding, propagation, ser technology (as applicable to communications), antenna (including phased array) design, Q/V curity including quantum key distribution via satellites, and other technology relevant to satellite

Rapporteur

Enrique Pacheco Cabrera Incomspace — MEXICO

ncluding the existing global systems (Beidou, Galileo, GLONASS, GPS) and regional systems (EGNOS, IRNSS, ms. The session also addresses advances in the services and applications of those systems for position on Earth, Moon, and potentially other bodies of the solar system.

Rapporteu

Norbert Frischauf TU GRAZ — AUSTRIA





| B2.7 | Advances in Space-based Navigation Tech This session is focused on advances in technology applic system (spacecraft, monitor and control system, end-us techniques, etc. Technologies should be applicable to po bodies of the solar system. | nnologies cable to space-based navigation systems. Technologies include er equipment) such as: sensors, star trackers, sensor fusion alg ssition determination, navigation, time determination, and int | hardware or software necessary for the entire navigation corithms, space-born frequency standards, crosslink ranging egrity assurance on Earth, Moon, and potentially other | B3.5 | Astronaut Training, Accommodation, and This session begins with an Astronaut Roundtable where There will be an extended Question and Answer period astronauts. It encompasses astronaut activities such as s systems and robotic tools; interfaces; international com | Operations in S e an international grou of interaction with the selection, training, wo mand, control and con |
|---------------|--|--|--|---------------------|---|--|
| | Co-Chairs | | Rapporteur | | required to safely accommodate astronauts during intra technological and scientific space-based research and up | vehicular and extravel tilization of human spa |
| | Joe M. Straus | Peter Buist | Attila Matas | | Co-Chairs | |
| | The Aerospace Corporation — UNITED STATES | European GNSS Agency (GSA) — THE NETHERLANDS | — SWITZERLAND | | lgor V. Sorokin | Alan T. Del una |
| B2.8 GTS.3 | Space Communications and Navigation G A Global session to present and discuss developments services, as well as those for satellite-based position det | Iobal Technical Session in a wide range of satellite communication topics, including termination, navigation, and timing. Both Earth's orbital and in | fixed, mobile, broadcasting, and data relay technologies and terplanetary space communications topics can be addressed. | | S.P. Korolev Rocket and Space Corporation Energia — RUSSIAN FEDERATION | ATDL Inc. — UNIT |
| | This session is co-sponsored by the Space Communication | ons and Navigation Committee and the Workforce Developme | nt/Young Professionals Programme Committee. | B3.6 | Human and Robotic Partnerships in Explo | oration - Joint see |
| | Co-Chairs Kevin Shortt — GERMANY | Stephanie Wan | Rapporteur Eric Wille FSA — THE NETHERI ANDS | A5.3 | Inis session seeks papers on new systems and technolog such as onboard robotic assistants, habitat / infrastructu to human spaceflights for test, validation, and demonstr | gies for current numar ure construction support ration of systems. This |
| | | STATES | | | systems are intery to evolve in the conning years and the | corresponding impact |
| B2.IP | Interactive Presentations - IAF SPACE COI | MMUNICATIONS AND NAVIGATION SYMPOSIL | M | | Co-Chairs | March Harmon H |
| | This session offers a unique opportunity to deliver your the classic Sessions. The presentation will be displayed of In addition, one afternoon is dedicated exclusively for th | key messages in an interactive presentation on any of the sub on a digital screen in a dedicated location and available for vie the attendees to view the Interactive Presentations, and the au | ects of Space Communications and Navigation addressed in w by all Congress attendees for the entire Congress week. thor will be assigned a specific ten-minute slot to personally | P 2 7 | Constan Sallaberger Canadensys Aerospace Corporation — CANADA | The British Interplo |
| | present the topic and interact with the attendees prese embedded hot links, pictures, audio and video clips etc. An Abstract that follows the standard format must be su Co-Chair | nt. The Interactive Presentation may take advantage of all elect An award will also be presented to the author of the best Inter ubmitted by the deadline for standard IAC abstracts. | tronic display capabilities, such as: PowerPoint charts, eractive Presentation in the B Category at a special ceremony. | D3.7 | This session is designed to examine and identify the pot innovations. Papers are solicited that address how to sh improve future human space mission objectives that will and their application to future missions are essential top | ential evolution of key ape the future subsyst Il include exploration, o bics in this session. |
| | Manfred Wittig | Rita Lollock | | | Co-Chairs | |
| | European Space Agency (ESA), retired — THE NETHERLANDS | The Aerospace Corporation — UNITED STATES | | | Michele Gates NASA Headquarters — UNITED STATES | Sebastien Barde Centre National d' |
| В3 | IAF HUMAN SPACEFLIGHT SYMPOSIUN The symposium, organized by the International Astrona development, operations, utilization and future plans of beyond, both governmental and private. The Human Sp collaborative efforts of human and robotic systems and | 1 utical Federation (IAF), invites papers on all aspects of on-goin space missions involving humans. The scope covers past, pre- aceflight Symposium will also feature discussions on preparati technologies. | g and planned human spaceflight including the design, sent and planned space missions and programmes in LEO and ons for the launch of new human spaceflight capabilities and | B3.8 | IAF HUMAN SPACEFLIGHT SYMPOSIUM B | 3.8 Session |
| | Coordinators | | | | Co Chaire | Papportour |
| | Kevin D. Foley | Igor V. Sorokin | Peter Batenburg | | Dhilling Class | Kapporteur |
| | The boeing company — ONTED STATES | RUSSIAN FEDERATION | Nethenanas space society (NVR) — The NETHERLANDS | | Centre National d'Etudes Spatiales (CNES) — FRANCE | Swiss Space Office |
| B3.1 | Governmental Human Spaceflight Progra The session provides the forum for updates and annual will focus on specific themes dealing with manned spac manuscripts from any organization (agencies, industries format of the session (e.g. nagen) antroing presentations | mmes (Overview) "Overview" presentations on present and evolving governmen e exploration. These will be selected by the session chairs base , research centers, academia, etc.) dealing with international, keynote sceech will be a result of such a selection | ntal Human Spaceflight programmes. Each year, the session ed on the received abstracts. The session will accept Governmental human space programmes initiatives. The | B3.9 GTS.2 | Human Spaceflight Global Technical Sessi The Human Space Endeavours Global Technical Session issues for the future of Human Space Endeavours. This i Professionals Programme Committee. | on is targeting individuals s a Global session co-s |
| | Co-Chairs | | Rannorteur | | Co-Chairs | |
| | Sam Scimemi | Juergen Schlutz | Rainer Willnecker | | Guillaume Girard | Andrea Jaime |
| | National Aeronautics and Space Administration (NASA) | Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — | Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — | | Zerozinfinity — SPAIN | UHB System AG - I |
| B3.2 | – UNITED STATES Commercial Human Spaceflight Programs This session provides a forum for papers describing com and human-tended modules. Topics include the status of development; and other pertinent areas of commercial New Shepard, Spaceplane, SpaceShipTwo, WhiteKnight' updates for upcoming operation of crewed vehicle trans | GERMANY mes imercial human orbital and sub-orbital spacecraft and stations of development, testing, and operations; the architecture and human spaceflight development. Programmes such as Atlas 5, Woo, Soyuz Commercial Programmes, and others are appropria sportation services to the International Space Station. | in development, as well as human-rated launch vehicles performance of various systems; launch infrastructure Axiom, BA-330, CST-100 Starliner, Crew Dragon, Falcon 9, ate for this session. The session also invites papers on status | B3.IP | Interactive Presentations - IAF HUMAN SI This session offers a unique opportunity to deliver your The presentation will be displayed on digital screens in a afternoon is dedicated exclusively for the attendees to v and interact with the attendees present. The Interactive pictures, audio and video clips etc. An award will also be follows the standard format must be submitted by the d | PACEFLIGHT SYN key messages in an int a dedicated location ar iew the Interactive Pre- Presentation may take presented to the aut leadline for standard I/ |
| | Co-Chairs | | | | Co-Chair | |
| | Sergey K. Shaevich Khrunichev State Research & Production Space Center — RUSSIAN FEDERATION | Michael W. Hawes Lockheed Martin Corporation — UNITED STATES | Michael E. Lopex Alegria MLA Space, LLC — UNITED STATES | | Netherlands Space Society (NVR) — THE NETHERLANDS | |
| | Rapporteur | | | R/ | | |
| | Gene Rice | | | D4 | The International Academy of Astronautics (IAA) Sympo | sium on Small Satellite |
| | RWI - RICE WIGDEIS INT'I — UNITED STATES | | | | 1000kg, addressing needs in government, commerce, or | r academia. Papers sho |
| B3.3 | Utilization & Exploitation of Human Spaceflight Systems This session addresses the utilization and exploitation of space stations and human spacecraft and provides the opportunity to discuss achievements, plans and outlooks. Topics for discussion include proposed or available payload facilities, experiments, research, manufacturing, and other on-orbit activity and its related planning, accommodation, and implementation. Additional items appropriate for discussion include scientific and industrial utilization applications and engineering research and technology demonstrations, as well as uses of space stations (ie. International Space Station and Chinese Space Station Tjangong) and other crewed vehicles as test beds for exploration. We also invite papers on | | | | amongst others enable valuable results for the mission of small satellite utilization, design, manufacture and/or er topics that demonstrate the value of small satellites and science, exploration, "NewSpace", communications and and emerging and promising smallsat technologies and | end-user. Papers shoul ngineering. Papers can I their constellations, t Earth Observation. Se techniques. This symp |
| | challenges for future sustainability of human spaceflight in-situ resources and other potential economic and tech | t which may be investigated through utilization of on-orbit cre- inological enablers, results of advanced manufacturing tests a | w and crewed platforms. These may include investigation of nd demonstrations, and reduction and mitigation of risks. | | Coordinator | |
| | Co-Chairs | | | | Alex da Silva Curiel | Jian Guo |
| | Cristian Bank | Eleanor Morgan | | | UNITED KINGDOM | NETHERLANDS |
| | Eumetsat — DENMARK | — UNITED STATES | | B4.1 | 21 st Workshop on Small Satellite Program | mes at the Servi |
| B3.4 B6.5 | Flight & Ground Operations of HSF System This session addresses key challenges and their solution Topics include operational problems and solutions, cost included are logistics and mission planning, ground tran | ns - Joint Session of the IAF Human Spacefligh s related to flight and ground operations in governmental and reduction, new and proposed ground facilities or infrastructur sportation, and sustainment. | nt and IAF Space Operations Symposia) commercial human spaceflight, their systems and elements. re, and ground segment operations and planning. Also | 0.12 | This workshop is organized jointly by the United Nations that could be satisfied and results achieved by developin be included. Small satellite programmes in Africa, Middl international cooperation, technology transfer, lessons l | s Office for Outer Space ng nations through usi le-East, and Central Asi earned and the extent |
| | Co-Chairs | | Rapporteur | | Co-Chairs | |
| | Dieter Sabath Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | Annamaria Piras Thales Alenia Space Italia — ITALY | Thomas A.E. Andersen Danish Aerospace Company ApS — DENMARK | | Sias Mostert Space Commercial Services Holdings (Pty) Ltd — SOUTH AFRICA | Aimin NIU United Nations Off |





ronaut Training, Accommodation, and Operations in Space

session begins with an Astronaut Roundtable where an international group of astronauts from the various programmes will discuss their experiences in a roundtable format. e will be an extended Question and Answer period of interaction with the audience. This session concentrates on all aspects of spaceflight that are unique to the presence of onauts. It encompasses astronaut activities such as selection, training, workload management, and task division between flight and ground segments. It includes spacecraft sems and robotic tools; interfaces; international command, control and communications; payloads; research; and utilization. It addresses the unique spacecraft systems uired to safely accommodate astronauts during intravehicular and extravehicular activities. The session includes astronaut pre-mission, mission, and post-mission support of nological and scientific space-based research and utilization of human space complexes and the space environment.

Rapporteur Keiii Murakami

ATDL Inc. — UNITED STATES

Japan Aerospace Exploration Agency (JAXA) — JAPAN

man and Robotic Partnerships in Exploration - Joint session of the IAF Human Spaceflight and IAF Exploration Symposia

s session seeks papers on new systems and technologies for current human spaceflight and exploration programmes, and the role of human and robotic partnerships in areas h as onboard robotic assistants, habitat / infrastructure construction support, human mobility support systems (e.g. EVA mobility aids, rovers); and robotic precursor activities numan spaceflights for test, validation, and demonstration of systems. This session also welcomes papers considering how the roles of humans, machines and intelligent tems are likely to evolve in the coming years and the corresponding impact on complex mission design, implementation, and operations.

Rapporteu Marius Bach

The British Interplanetary Society — UNITED KINGDOM

DLR (German Aerospace Center) — GERMANY

vanced Systems, Technologies, and Innovations for Human Spaceflight

session is designed to examine and identify the potential evolution of key elements of Human Spaceflight missions, especially those driven by advanced technologies and various. Pages are solicited that address how to shape the future subsystems, technologies, innovations, logistics, processes, procedures, etc. to enable or significantly ove future human space mission objectives that will include exploration, commercial initiatives, tourism, and industrial undertakings. Also, lessons learned from past missions

Rapporteur Gi-Hyuk Choi

Centre National d'Etudes Spatiales (CNES) - FRANCE

Korean Aerospace Research Institute — KOREA, REPUBLIC

Swiss Space Office (SSO) — SWITZERLAND

Human Space Endeavours Global Technical Session is targeting individuals and organizations with the objective of sharing best practices, future projects, research and es for the future of Human Space Endeavours. This is a Global session co-sponsored by the Human Space Endeavours Committee and the Workforce Development/Young

OHB System AG - Munich — GERMANY

eractive Presentations - IAF HUMAN SPACEFLIGHT SYMPOSIUM

s session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Human Spaceflight addressed in the classic Sessions. presentation will be displayed on digital screens in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one rnoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic linteract with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, ures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the B Category at a special ceremony. An Abstract that ws the standard format must be submitted by the deadline for standard IAC abstracts

International Academy of Astronautics (IAA) Symposium on Small Satellite Missions is focused on recent advances in small satellite class missions weighing much less than 3 kg, addressing needs in government, commerce, or academia. Papers should focus on how microsatellites, nanosatellites, CubeSats and small and "megaconstellations" ngst others enable valuable results for the mission end-user. Papers should benefit the wider smallsat community, and demonstrate a degree of ingenuity and innovation in Il satellite utilization, design, manufacture and/or engineering. Papers can report on important lessons-learned, describe notable missions in the planning stages, or include cs that demonstrate the value of small satellites and their constellations, their applications. Sessions cover the role that small satellites can play in developing space nations, nce, exploration, "NewSpace", communications and Earth Observation, Sessions also cover cost-effective operations, affordable and reliable access to space through launch. emerging and promising smallsat technologies and techniques. This symposium will accept submissions for oral presentations only.

Support

Rhoda Shaller Hornstein - UNITED STATES

Jian Guo Delft University of Technology (TU Delft) — THE

^tWorkshop on Small Satellite Programmes at the Service of Developing Countries

workshop is organized jointly by the United Nations Office for Outer Space Affairs (UNOOSA) and the International Academy of Astronautics (IAA). It shall review the needs could be satisfied and results achieved by developing nations through using small satellites. National space plans and examples of application results and benefits shall ncluded. Small satellite programmes in Africa, Middle-East, and Central Asia would be of particular interest to the session. The workshop shall also review the results of rnational cooperation, technology transfer, lessons learned and the extent to which these efforts have contributed to the space maturity of developing countries.





| | Rapporteurs | | | | Chairman | Co-Chair |
|-------|--|---|--|----------------|--|---|
| | Danielle Wood Massachusetts Institute of Technology (MIT) — | Pierre Molette | | | Andy Vick RAL Space — UNITED KINGDOM | Zeger de Groot |
| | UNITED STATES | | | | Rapporteurs | |
| B4.2 | Small Space Science Missions | reved small /misso /pone missions whose abjective is to ashieve | o raturns in the fields of Forth science, solar interplanatory | | Martin Buscher | Eugene D Kim |
| | planetary, astronomy/astrophysics observations, and fur | ndamental physics. Emphasis will be given to results achieved | new technologies and concepts, and novel management | | Technische Universität Berlin — GERMANY | Satrec Initiative |
| | techniques. | | Rannorteur | B4.7 | Constellations and Distributed Systems Small satellites offer important advantages in creating n | ew opportunities for |
| | Stamatios Krimigis | Larry Paxton | Roberta Mugellesi-Dow | | focus on new, emerging, or enabling technologies that of focuses on Constellations (e.g. Constellation missions for | an be used or are be r Farth Observation. |
| | The Johns Hopkins University Applied Physics Laboratory — UNITED STATES | The John Hopkins University Applied Physics Laboratory — UNITED STATES | European Space Agency (ESA) — UNITED KINGDOM | | and sensor systems and how these low-cost and rapidly large space infrastructures (e.g. mega-constellations), a | delivered technolog s well as with airborn |
| B4.3 | Small Satellite Operations This session covers the planning for, and execution of, cc satellites, with new models of operation to reduce missi approach to new business opportunities, novel finance a particularly encouraged. Papers that discuss the applicat planning, as well as reports on missions recently accomp | ost-effective approaches for Small Satellite Operations, with er ion lifecycle costs and to minimize the cost impact of mission and business models, management techniques, and internatic tion of novel technology to mission operations, such as autom plished and lessons learned, are also welcome. For papers not | nphasis on new missions, including constellations of small extensions. Papers addressing innovation, an entrepreneurial nal cooperation in support of Small Satellite Operations are lation and autonomy, constraint resolution, and timeline addressing small satellites, please refer to Symposium B6. | | etc. We are particularly interested in technologies that t telecommunications in remote areas, navigation suppor responders support), and planetary exploration. In this the session. Distributed systems and their impact in ter- platforms is also of specific interest to the session. The and technologies to enable integrated applications are of guarantee small satellite integration with existing and sp | enable small spacecr t (e.g., along the nev regard, the developr ms of new opportun ntegrated applicatio covered in B5.1. In B cheduled assets from |
| | Co-Chairs | | | | can be addressed, like payload data management, space | ecraft operation, and |
| | Andreas Hornig University of Stuttgart — GERMANY | STFC — UNITED KINGDOM | | | Co-Chairs | |
| | Rapporteurs | lunatta Tan | | | Rainer Sandau International Academy of Astronautics — GERMANY | Michele Grassi University of Na |
| | OHB System AG - Munich — GERMANY | Singapore Space and Technology Association (SSTA) — | | | Rapporteurs | |
| | | SINGAPORE, REPUBLIC OF | | | Jaime Esper | Aaron Rogers |
| B4.4 | Small Earth Observation Missions We call for papers that will present information to decisi and designs of both current and planned Earth and near | ion makers, scientists, engineers, and managers about cost-efi -Earth missions. This session addresses the technologies, app | fective small satellite missions, instruments, technologies, lications and missions achieved through the use of small, | D4 9 | – UNITED STATES | LABORATORY - |
| | cost-effective satellites to observe the Earth and near-Ea Satellite technologies suited for use on small satellites in efforts that make use of innovative launch opportunities access to space make Earth observation missions attaina be welcomed. | arth space. Innovative cost-effective solutions to the needs of ncluding those in the single to multiple CubeSat ranges are pais s, such as the developing space tourism market and commerci- able to non-governmental organizations as well as traditional in the top of the second se | the science and applications communities are sought. ticularly encouraged. Satellite or technology development al launch capability, hold significant promise for low-cost users: papers addressing these evolving opportunities would | 54.5 | This session focuses on innovative small spaceraft desi destinations for these miniaturized space probes includ utilization (ISRU). Small exploration probes covered by t platforms such as Cubesats or other microsats, nanosat technologies, miniaturized subsystems including propul | gns, systems, mission e the Earth's Moon, his session may com s, picosats, etc. Topic sion, avionics, guidan |
| | Co-Chairs | | | | instruments. The main focus of this session is on new an commercial ventures. | nd emerging systems |
| | European Space Agency (ESA) — THE NETHERLANDS | The John Hopkins University Applied Physics Laboratory — UNITED STATES | | | Co-Chairs | |
| | Rapporteurs | | | | Leon Alkalai National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory — UNITED STATES | Rene Laufer Baylor University |
| | Werner R. Balogh World Meteorological Organization (WMO) — SWITZERLAND | Marco Gomez Jenkins Imperial College London — UNITED KINGDOM | | B4.9 | Small Satellite Missions Global Technical The Small Satellite Missions Global Technical Session (G | Session TS) is a collaboration |
| B4.5 | Access to Space for Small Satellite Missio A key challenge facing the viability and growth of the sm dedicated launches; development of ride-share systems efficient small satellite access to space. Includes lessons systems, please refer to session B4.5A-C4.8. For a discus Co-Chairs | ns nall satellite community is affordable and reliable space access , auxiliary payload systems, and separation and dispenser syst learned from users on technical and programmatic approach ision of small launchers concepts and operations, please refer | a. Topics of interest for this session include the utilization of ems; and responsive integration approaches that will enable es. For a dedicated discussion of small satellite propulsion to session D2.7. Rapporteur | | International Astronautical Federation (IAF) Workforce I on a global scale with presenters and audience both at or mature proposals for small satellite systems and relal professionals a taste of what the space sector has to off lessons learned. Abstracts highlighting ingenuity or inno or commercial challenges, or novel technologies that ha need, the small satellite approach that addresses this n | Development/Young the IAC venue and or ted topics. These mu er. Where possible, a wation are preferred we the potential to r eed, the benefits of t |
| | Alex da Silva Curiel | Philip Davies | Jeffery Emdee | | provide inferior solutions. Papers from, or directed at th | e young professiona |
| | Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM | Deimos Space UK Ltd — United Kingdom | The Aerospace Corporation — UNITED STATES | | Co-Chairs Matthias Hetscher | Norhert Lemke |
| B4.5A | Joint Session between IAA and IAF for Sm | nall Satellite Propulsion Systems | | | DLR (German Aerospace Center) — GERMANY | OHB System AG |
| C4.8 | This session will pay particular attention to propulsion sy invited discussing the particular challenges of design, m of obtaining high performance within a small volume an maintenance, and end-of-life disposal. This session will design, refer to other B4 sessions. For a focus on other p | ystems and associated technologies as an enabler to efficient anufacture, testing, operations and technological developmer id mass. The scope includes chemical and electric propulsion s be accepting submissions for oral presentations only. For pape propulsion systems and technologies, refer to other C4 sessior | small satellite access to space and orbit change. Papers are ts of small satellite propulsion systems, and the challenges ystems for major orbit changes, fine orbit control and rs with an emphasis on the small satellite and its system Is. | B4.10 A6.10 | Joint Small Satellite/Space Debris Session This session facilitates bilateral discussions between Sm small satellite solutions for the long-term sustainability Small satellite orbital debris mitigation lessons learned. | all Satellite and Space of space. It will inclu best practices and e |
| | Co-Chairs | | | | debris mitigation compliance statistics and monitoring r | nethods (for both sn |
| | Jeffery Emdee The Aerospace Corporation — UNITED STATES | Arnau Pons Lorente Purdue University – UNITED STATES | | | satellite orbit regulation concepts - Small satellite deort deployment best practices and lessons learned - Trackir | it technologies and g organization and s |
| B4.6A | Generic Technologies for Small/Micro Pla This session covers emerging and promising generic tech | tforms hnologies for small and micro platforms. Real-life examples are | e particularly encouraged, both recently launched and shortly | | Co-Chair Darren McKnight | Igor Usovik |
| | to be launched (next 3 years). | | | | Integrity Applications Incorporated (IAI) — UNITED STATES | Central Research — RUSSIAN FEL |
| | Philip Davies | Joost Elstak | | B4.IP | Interactive Presentations: 27th IAA SYMP | |
| | Deimos Space UK Ltd — UNITED KINGDOM | Airbus Defence and Space Netherlands — THE NETHERLANDS | | | This session offers a unique opportunity to deliver your Sessions. The presentation will be displayed on a digital one afternoon is dedicated exclusively for the attendees | key messages in an i screen in a dedicate to view the Interact |
| | Kapporteurs | Thomas Terzibaschian | | | topic and interact with the attendees present. The Inter links nictures audio and video cline etc. An award will | active Presentation |
| | Delft University of Technology (TU Delft) — THE NETHERLANDS | DLR, Germon Aerospace Center — GERMANY | | | that follows the standard format must be submitted by Co-Chair | the deadline for star |
| B4.6B | Generic Technologies for Nano/Pico Platf | orms | | | Alex da Silva Curiel | Jian Guo |
| | This session covers emerging and promising generic tech to be launched (next 3 years). | hnologies for nano and pico platforms. Real-life examples are | particularly encouraged, both recently launched and shortly | | Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM | Delft University NETHERLANDS |





ovative Solutions in Space BV — THE NETHERLANDS

rec Initiative — KORFA, REPUBLIC OF

portunities for implementing spatially-distributed space-based systems (e.g. Constellations). In this session we used or are being used to create networked data collection systems via small satellites. Specifically, Session B4.7 Observation, IoT/M2M and LEO Communications), distributed architectures (e.g. Distributed SAR systems) ed technologies offer the potential to fulfill complex user needs, working in coordination with other small or s with airborne or terrestrial assets. Papers should show how cross-platform compatibility (both hardware standards that are proposed or adopted, design techniques that enable this cross-platform compatibility, small spacecraft to play an important role in upcoming applications, such as (but not limited to) civil security, along the new foreseen routes in the Arctic), natural disaster management (e.g., damage assessment and first the development and usage of Commercial-off-the-shelf (COTS) technologies are also of specific interest to ew opportunities for the emerging Commercial Space Industry and new commercial space missions with small ed applications of these sensor systems are covered in Symposium Session B5.2, and the broader view of tools I in B5.1. In B4.7 authors are also invited to analyze technological enhancements and new developments needed to d assets from both the bus and payload perspectives. Also analysis of inter-operability within integrated systems peration, and formation flying.

iversity of Naples "Federico II" — ITALY

JOHN HOPKINS UNIVERSITY APPLIED PHYSICS BORATORY — UNITED STATES

tems, missions and technologies for the exploration and commercialization of space beyond Earth orbit. Target arth's Moon, Mars, comets and asteroids, as well as other destinations that are targets for in-situ resource sion may come in many different forms including special-purpose miniature spacecraft, standard format small ats, etc. Topics include new and emerging technologies including the use of commercial off the shelf (COTS) vionics, guidance navigation & control, power supply, communication, thermal management, and sensors and rging systems, missions, driving technologies and applications that are both government-funded as well as driven by

Rapporteur

vlor University / University of Cape Town — UNITED

Amanda Stiles Rocket Lab — UNITED STATES

collaboration between the International Academy of Astronautics (IAA) Small Satellite Missions Symposium and the pment/Young Professionals Programme Committee. This session is unique in that it allows for sharing of information venue and online at their home/work/university locations. Abstracts are solicited regarding operational missions ics. These must have clear relevance on an international scale or at a business level, and must also provide young ere possible, abstracts should have a wide interest in the community and should include transferable knowledge or are preferred. Examples include space missions utilizing small satellites that address specific new societal, scientific potential to revolutionize space missions and/or enable their access to space. Papers are to describe the specific e benefits of this approach and the use of space technology, and demonstrate that other non-space approaches ag professional community are preferred. This session will be accepting submissions for oral presentations only.

Rapporteur

System AG — GERMANY

Alex da Silva Curiel Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM

romote the long-term sustainability of space

Ilite and Space Debris communities for a shared understanding of the challenges/issues and to promote practical e. It will include topics such as: - Orbital debris mitigation solutions for small satellites and mega constellations actices and expected norms of behavior (including minimization of post-mission orbit lifetime, trackability) - Orbital s (for both small and large satellites) - Stakeholder education (bilateral) - Collision and warning risk assessment r operational spacecraft (ISS, etc.) - Small satellite propulsive requirements, methods and technology - Small nologies and lessons learned - Small satellite mission assurance, reliability and lessons learned - Small satellite ization and small satellite operator interplay - Orbit, maneuver, and scenario data exchange

Rapporteu

Upasana Dasgupta

RUSSIAN FEDERATION

tral Research Institute of Machine Building (TSNIIMASH) Institute of Air and Space Law, McGill University — CANADA

VI ON SMALL SATELLITE MISSIONS

ssages in an interactive presentation on any of the subjects on small satellite missions addressed in the classic in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, w the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot presented to the author of the best Interactive Presentation in the B Category at a special ceremony. An Abstract dline for standard IAC abstracts.

Support

Rhoda Shaller Hornstein - UNITED STATES

t University of Technology (TU Delft) — THE





| В5 | IAF SYMPOSIUM ON INTEGRATED API Space systems are more and more involved in the delin of basic space services and technologies. This symposi observation, navigation, telecommunications, etc) with solutions responding to users' needs. The applications cost-effective manner and deliver the data to users in a user communities the are devine the user of the applications | PLICATIONS very of global utilitarian services to end-users. The concept of Ini um will address various aspects of integrated applications. Integ h airborne and ground-based systems, in addition to other techn exploit the synergies between different data sources to provide a readily usable form. The goal of the symposium is to enable the elutions with them there developed an enables the technological | tegrated Applications encompasses the simultaneous use rated applications combine different space systems (Earth ologies as big data, analytics, IOT, 5G and others to deliver the right information at the right time to the right user in a e development of end-to-end solutions by connecting the | B6.3 | Mission Operations, Validation, Simulation This session addresses the broad topic of operations, fro Co-Chairs Paolo Ferri European Space Agency (ESA) — GERMANY | on and Training om preparation throu Zeina Mounzer Telespazio VEGA |
|------|--|---|---|----------|--|---|
| | Coordinators | solutions with those that are developing enabling technologies r | or integrated applications. | B6.4 | Flight & Ground Operations of HSF Syster | ns - A Joint Ses |
| | Coordinators Larry Paxton The John Hopkins University Applied Physics Laboratory — UNITED STATES | Roberta Mugellesi-Dow European Space Agency (ESA) — UNITED KINGDOM | | ВЗ.4 | This session addresses key challenges and their solution Topics include operational problems and solutions, cost included are logistics and mission planning, ground tran | s related to flight and reduction, new and p sportation, and susta |
| B5.1 | Tools and Technology in Support of Integ The session will focus on specific systems, tools and te the kind of data to be collected, how are data collecter Learning, Artificial Intelligence, Internet of Things, and Leveraging these new transformative developments ar essential for space technologies. Possible topics includ focus on the space segment; new ways of distributing outreach efforts to connect the public to these applica | grated Applications choology in support of integrated applications by addressing the d and how the data are integrated and distributed to address key other advanced technologies are rapidly revolutionizing and res nd understanding their disruptive potential with respect to techr le: ground-truthing of data collected from space platforms; innoo integrated data products; data fusion and visualization tools; ma tions. | e various issues associated with applications development, y user needs. Emerging technologies, such as Machine shaping infrastructure and global-local economies. nology, shifting demographics and global connectivity is vative, low-cost tools for data distribution and access that unaging integrated applications programmes and public | B6.IP | Co-Chairs Dieter Sabath Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY Interactive Presentations - IAF SPACE OPI This session offers a unique opportunity to deliver your The presentation will be displayed on a digital screen in afternoon is dedicated exclusively for the attendees to v | Annamaria Piras Thales Alenia Spo ERATIONS SYMF key messages in an in a dedicated location iew the Interactive P |
| | Co-Chairs | | | | pictures, audio and video clips etc. An award will also be | presentation may ta |
| | Larry Paxton The John Hopkins University Applied Physics | Roberta Mugellesi-Dow European Space Agency (ESA) — UNITED KINGDOM | Boris Penne OHB System AG — GERMANY | | follows the standard format must be submitted by the d | leadline for standard |
| | Laboratory — UNITED STATES | | | | | Official Viewsch |
| | Rapporteur Beatrice Barresi FSA — UNITED KINGDOM | | | | John Auburn RHEATECH Ltd — UNITED KINGDOM | National Aeronau Propulsion Labor |
| B5.2 | Integrated Applications End-to-End Solu The session will be a forum for end-to-end solutions, c Applications that combine ground- and space-based d domains, like disaster/crisis monitoring and managem communities, the value chain, the business case and tl partnerships and fluent working relationships between Co-Chairs Boris Penne | tions are studies, proof-of-concept applications and current projects t at a sources with models to address specific user requirements w ent, energy, food security, space situational awareness, transpor he sustainability of the solutions are among the many aspects th n space and non-space stakeholders could be presented. Roberta Mugellesi-Dow | that aim to provide innovative user-driven solutions. ill be presented. These examples can cover a variety of tation, health, etc. The user needs, the structure of the user at can be considered. Examples of projects with established | Category | TECHNOLOGY Common technologies to space systems, C1 IAF ASTRODYNAMICS SYMPOS C2 IAF MATERIALS AND STRUCTU C3 IAF SPACE POWER SYMPOSIUM C4 IAE SPACE POWEN SYMP | including astro SIUM RES SYMPOSIL A OSUUM |
| | OHB System AG — GERMANY | European Space Agency (ESA) — UNITED KINGDOM | | | C4 IAF SPACE PROPOLSION STIMP | 0510101 |
| | Rapporteurs | | | | Category coordinated by Li Ming, Ching A | cademy of Spa |
| | Beatrice Barresi | Stefano Ferretti Furonean Space Policy Institute (FSPI) — AUSTRIA | | | | |
| B5.3 | Satellite Commercial Applications This session solicits papers pertinent to: - Commercial Application-Video Optics & Video SAR - New Applicatic Earth - Case Analysis of Satellite Commercial Applicatic | Space and Space Culture - A Commercial Space Model for Public on-Travellers (Outdoors, Automobiles, Sailboat, General Aviation ons. | : Users - Atmosphere, Ecosphere, Environment - New) - Global communications - Commercialising data about the | C1 | IAF ASTRODYNAMICS SYMPOSIUM This symposium addresses advances in orbital mechanic Coordinators Anna Guerman | cs, attitude dynamics |
| | Co-Chairs | | Rapporteur | | Centre for Mechanical and Aerospace Science and | Colorado Center |
| | John M. Horack The Ohio State University College of Engineering — UNITED STATES | Dengyun Yu China Aerospace Science and Technology Corporation (CASC) — CHINA | Samuel Malloy The Ohio State University — UNITED STATES | C1.1 | Technologies (C-MAST) — PORTUGAL Guidance, Navigation and Control (1) The emphasis of this theme is on the studies and applic flying, rendezvous and docking. | Colorado — UNI ation related to the g |
| B6 | IAF SPACE OPERATIONS SYMPOSIUM The Space Operations Symposium, organized by the Im and un-manned space operations, from low-Earth and and included mission planning. training, and real time | ternational Astronautical Federation (IAF), addresses all aspects geosynchronous orbit, to lunar, planetary, and exploration miss operations. Particular focus is provided for commercial space o | of spaceflight operations. The sessions address both manned ions. The symposium covers both flight and ground systems, nerations. advanced systems. new oncerations concepts. and | | Co-Chairs Moriba Jah The University of Texas at Austin — UNITED STATES | Jean de Lafontai NGC Aerospace L |
| | small satellite operations. Coordinators | | | C1.2 | Guidance, Navigation and Control (2) The emphasis of this theme is on the studies and applic | ation related to the g |
| | John Auburn RHEATECH Ltd — UNITED KINGDOM | Otfrid Liepack National Aeronautics and Space Administration (NASA), Jet | t. | | flying, rendezvous and docking. Co-Chairs | |
| B6.1 | Ground Operations - Systems and Soluti This session focuses on all aspects of ground systems a | ons and solutions for all mission types, for both preparation and exec | cution phases. | | Yong Chun Xie Beijing Institute of Control Engineering, China Academy of Space Technology (CAST) — CHINA | Anton de Ruiter Ryerson Universit |
| | Co-Chairs | | | C1.3 | Guidance, Navigation & Control (3) | |
| | Sean Burns Eumetsat — GERMANY | Thierry Levoir CNES — FRANCE | | 010 | The emphasis of this theme is on the studies and applic flying, rendezvous and docking. | ation related to the g |
| | Rapporteurs | | | | Co-Chairs | |
| | Akos Hegyi Airbus Defence & Space — GERMANY | Keyur Patel National Aeronautics and Space Administration (NASA), Jet | t | | Igor V. Belokonov Samara State Aerospace University — RUSSIAN FEDERATION | Miguel Bello Mo Deimos Space SL |
| B6.2 | New Space Operations Concepts and Ad This session forces on new space operations and add | Propulsion Laboratory — UNITED STATES | types of missions, improving mission output in quality and | C1.4 | Mission Design, Operations & Optimizati The theme covers design, operations and optimization of | on (1) of Earth-orbiting and |
| | quantity, and reducing cost. | sesses survinced concepts, systems and tools for operating new | crees or missions, improving mission output in quality and | | missions. | |
| | Co-Chairs | | Rapporteur | | Co-Chairs | |
| | Mario Cardano Thales Alenia Space France — ITALY | Thomas Kuch Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | Bobby Watkins NASA MSFC — UNITED STATES | | Richard Epenoy Centre National d'Etudes Spatiales (CNES) — FRANCE | Massimiliano Va University of Stra |





, ugh validation, simulation and training, including operations concepts, execution and lessons learned.

Rapporteur

Deutschland GmbH — GERMANY

Borre Pedersen Kongsberg Satellite Services AS — NORWAY

ssion of the IAF Human Spaceflight and IAF Space Operations Symposia and ground operations in governmental and commercial human spaceflight, their systems and elements. If proposed ground facilities or infrastructure, and ground segment operations and planning. Also tainment.

Rapporteur

ace Italia — ITALY

Thomas A.E. Andersen Danish Aerospace Company ApS — DENMARK

POSIUM

interactive presentation on any of the subjects of Space Operations addressed in the classic Sessions. Interactive presentation on any of the subjects of space operations addressed in the classic sessions. n and available for view by all Congress attendees for the entire Congress week. In addition, one Presentations, and the author will be assigned a specific ten minute slot to personally present the topic take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, author of the best Interactive Presentation in the B Category at a special ceremony. An Abstract that d IAC abstracts.

autics and Space Administration (NASA), Jet oratory — UNITED STATES

dynamics, structures, power and propulsion

JM

ce Technology (CAST), China

s, guidance, navigation and control of space systems.

r for Astrodynamics Research, University of ITED STATES

guidance, navigation and control of Earth-orbiting and interplanetary spacecraft, including formation

ine Ltd. — CANADA Rapporteur

Juan Carlos Bastante OHB System AG-Bremen — GERMANY

guidance, navigation and control of Earth-orbiting and interplanetary spacecraft, including formation

ity — CANADA

guidance, navigation and control of Earth-orbiting and interplanetary spacecraft, including formation

ora LU — SPAIN

interplanetary missions, with emphasis on studies and experiences related to current and future Rapporteur

asile athclyde — UNITED KINGDOM **Yury Razoumny** Peoples's Friendship University of Russia — RUSSIAN FEDERATION





| C1.5 | Mission Design, Operations & Optimizat | ion (2) | | C2.3 | Space Structures - Dynamics and Mic | rodynamics |
|------|---|--|---|-------|---|--|
| | The theme covers design, operations and optimization missions. | of Earth-orbiting and interplanetary missions, with emphasis | on studies and experiences related to current and future | | The topics to be addressed include dynamics anal damping, micro-dynamics, in-orbit dynamic enviro excitation sources and in-orbit dynamic testing. | ysis and testing, modal ic onment, dynamics and co |
| | | | | | Co-Chairs | |
| | Stéphanie Lizy-Destrez SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace — FRANCE | Michèle Lavagna Politecnico di Milano — ITALY | | | Ijar M. Da Fonseca ITA-DCTA — BRAZIL | Harijono Djojo — INDONESIA |
| C1.6 | Orbital Dynamics (1) This theme discusses advances in the knowledge of na orbital dynamics of spacecraft in the Solar System. It al | tural motions of objects in orbit around the Earth, planets, mi lso covers advances in orbit determination. | nor bodies, Lagrangian points and more generally natural | C2.4 | Advanced Materials and Structures f The topics to be addressed include advanced mat matrix composites, ultra high temperature cerami | or High Temperatures for h erials and structures for h cs, ablative materials, cer |
| | Co-Chairs | | Rapporteur | | propulsion systems, launchers, hypersonic vehicle testing aspects | s, entry vehicles, aero ca |
| | Laureano Cangahuala | Antonio Prado | Feng-Tai Hwang | | | |
| | Jet Propulsion Laboratory — UNITED STATES | National Institute for Space Research - INPE - BRAZIL | National Space Organization — TAIPEI | | Co-Chairs | |
| C1.7 | Orbital Dynamics (2) This theme discusses advances in the knowledge of na | tural motions of objects in orbit around the Earth, planets, mi | nor bodies, Lagrangian points and more generally natural | | Marc Lacoste ArianeGroup — FRANCE | David E. Glass National Aeron UNITED STATE |
| | orbital dynamics of spacecraft in the Solar System. It al | lso covers advances in orbit determination. | | C2.5 | Advancements in Materials Applicati | ons and Rapid Pro |
| | Co-Chairs | | | | The topics to be addressed include advancements | in materials applications |
| | Xiaoqian Chen National Innovation Institute of Defense Technology, Chinese Academy of Military Science — CHINA | Gerard Gomez University of Barcelona — SPAIN | | | in materials and structural concepts are always ne terms of greater accuracy/dimensional stability, lo Different rapid prototyping processes are current Manufacturing is strongly emerging due to the ca | eded to achieve extreme nger life, greater surviva y used for different mate pability of optimization o |
| C1.8 | Attitude Dynamics (1) | | | | properties and reduction of development and lead | d times as well as the red |
| | I his theme discusses advances in spacecraft attitude d covers dynamics and control of multiple interconnecte | ynamics and control, as well as design, testing and performan d rigid and flexible bodies, including tethered systems, and in | orbit assembly. | | Co. Chaine | |
| | Co.Chaire | · · · · · · · · · · · · · · · · · · · | · · · · · · · , | | Co-chairs | |
| | | | | | Giuliano Marino | Behnam Ashra |
| | Shinji Hokamoto KYUSHU UNIVERSITY — JAPAN | Giovanni B. Palmerini Sapienza University of Rome — ITALY | | | CINA Italian Aerospace Research Centre — HALI | Nutionui Reseu |
| | | | | C2.6 | Space Environmental Effects and Spa | cecraft Protection |
| C1.9 | Attitude Dynamics (2) This theme discusses advances in spacecraft attitude d covers dynamics and control of multiple interconnecte | ynamics and control, as well as design, testing and performan d rigid and flexible bodies, including tethered systems, and in | ce of novel attitude sensors and actuators. This theme also orbit assembly. | | The focus of the session will be on space environn dissociation, meteoroids and space debris impact including analysis simulation and testing of debris | nental effects and spacec on space systems, mater impact, and susceptibilit |
| | Co-Chairs | | | | | |
| | Gianmarco Radice | Toshio Kamiya | | | Giuliano Marino CIRA Italian Aerospace Research Centre — ITALY | Anatolii Lohvyi Yuzhnove State |
| | - SINGAPORE, REPUBLIC OF | NEC Corporation — JAPAN | | | | |
| CLIP | This session offers a unique opportunity to deliver you The presentation will be displayed on a digital screen in afternoon is dedicated exclusively for the attendees to and interact with the attendees present. The Interactiv pictures, audio and video clips etc. An award will also b follows the standard format must be submitted by the | r key messages in an interactive presentation on any of the su n a dedicated location and available for view by all Congress a view the Interactive Presentations, and the author will be ass we Presentation may take advantage of all electronic display ca be presented to the author of the best Interactive Presentatio deadline for standard IAC abstracts. | bjects of Astrodynamics addressed in the classic Sessions. ttendees for the entire Congress week. In addition, one igned a specific ten minute slot to personally present the topic pabilities, such as: PowerPoint charts, embedded hot links, n in the C Category at a special ceremony. An Abstract that | | The topics to be addressed include novel technica re-entry vehicles and small satellites. Advanced su efficiency and reliability, and advancements in spa the issues of experimental and computational sim of verification and validation of mathematical mon | l concepts for mechanica ibsystems and design of f ce vehicle development ulation of functioning an dels for the design and ex |
| | Co-Chairs | | | | Co-chairs | |
| | Anna Guerman | Daniel Scheeres | | | Oleg Alifanov Moscow Aviation Institute — RUSSIAN FEDERATI | ON Naval Postarad |
| | Centre for Mechanical and Aerospace Science and | Colorado Center for Astrodynamics Research, University | of | | | |
| (2 | Technologies (C-MAST) — PORTUGAL | Colorado — UNITED STATES | | C2.8 | Specialised Technologies, Including N Specialized material and structures technologies a scenarios to perform test verifications relying on u | lanotechnology re explored in a large var utmost miniaturization of |
| CL | This symposium, organized by the International Astron achievements in space structures, structural dynamics thermal/fluidic systems. Future advances in a number and space station will depend increasingly on the succ large deployable (and assembled) space structures. Fo | autical Federation (IAF), provides an international forum for r and materials. The Symposium addresses the design and dew of space systems applications for space power, space transpo essful application of innovative materials and the developmer r these applications to occur, increased interaction between t | ecent advancements in assessment of the latest technology elopment of space vehicle structures and mechanical/ tation, astrodynamics, space exploration, space propulsion t of structural concepts - particularly those relating to very nese technology communities, and collaboration among | | performances offered by the progress in nanotect nanotubes which are experiencing first application Molecular nanotechnology and advances in manij storage devices. The Session encourages presenta unprecedented performances for space application | nology. Examples are the ns at macro-scale such as pulation at nano-scale off tions of specialized techr ns. |
| | projected costs and mission planners need to be pursued projected costs and increase potential scientific return | a. Substantial improvements are essential in a wide range of c s from respective mission system applications. Papers in this s | urrent technologies, including nanotechnologies, to reduce vmposium will review the projected advances in materials and | | Co-Chairs | |
| | space structures in this domain for advanced space sys | stems applications. | , | | Mario Marchetti | Pierre Rochus |
| | Coordinator | | | | Sapienza University of Rome — HALY | CSL (Centre Spo |
| | Andreas Rittweger | Paolo Gasbarri | | 62.0 | | |
| C2.1 | DLR (German Aerospace Center) — GERMANY Space Structures I - Development and Ve | Sapienza University of Rome — ITALY erification (Space Vehicles and Components) | | C2.9 | The focus of the session will be on application of s functional and intelligent structural systems. Also | ures mart materials to spaced included in the session w |
| | The topics addressed in this session cover the aspects | of the development and verification of space vehicle structure | es (e.g. pressurized propellant tanks, non-pressurized | | weil as comparisons of predicted performance wi | in data nom ground and |
| | concern: • Thermo-Mechanical loads and environment | t • New structural concepts (e.g. multi-functional structures, o | lesign concepts for reusability) • Structure design and | | Co-Chairs | |
| | verification (stiffness, strength, static and dynamic stat | pility, damage tolerance, reusability) • Structure optimization | Materials • Static and dynamic ground testing • Exploitation | | Pavel Trivailo | Hiroshi Furuya |
| | of flight measurements and in-orbit testing • Lessons I | earned related to space vehicle structures and components d | evelopment, verification and qualification. | | Technology) — AUSTRALIA | lokyo mstitute |
| | Co-Chairs | | Rapporteur | | Rannorteurs | |
| | Alwin Eisenmann | Andreas Rittweger | Jochen Albus | | Reals Courses | Éleie Ierenime |
| | IABG Industrieanlagen - Betriebsgesellschaft mbH — GERMANY | DLR (German Aerospace Center) — GERMANY | ArianeGroup — GERMANY | | Sapienza University of Rome — ITALY | Luleå Universit |
| C2.2 | Space Structures II - Development and V The topics to be addressed include evaluation of analy of both on-ground and in-orbit testing, thermal distort | Cerification (Deployable and Dimensionally St sis versus test results for deployable and dimensionally stable ion and shape control, structural design, development and ve | able Structures) structures, e.g. reflectors, telescopes, antennas; examination rification; lessons learned. | C2.IP | Interactive Presentations - IAF MATE This session offers a unique opportunity to deliver Sessions. The presentation will be displayed on a d one afternoon is dedicated exclusively for the atte | RIALS AND STRUCT your key messages in an digital screen in a dedicat |
| | Co-Chairs | | | | topic and interact with the attendees present. The | Interactive Presentation |
| | Paolo Gasbarri | Oliver Kunz | | | links, pictures, audio and video clips etc. An award | I will also be presented to |
| | Sapienza University of — ITALY | RUAG Space — SWITZERLAND | | | | La by the deduille for Sta |
| | Rapporteur | | | | Co-Chair | |
| | Pierre Rochus | Thomas Sinn | | | Paolo Gasbarri | Andreas Rittwo |
| | CSL (Centre Spatial de Liège) — BELGIUM | HPS GmbH — UNITED KINGDOM | | | Suprenza Oniversity of Nonite - HALT | DEN (German A |

28





addressed include dynamics analysis and testing, modal identification, landing and impact dynamics, pyroshock, test facilities, vibration suppression techniques, dynamics, in-orbit dynamic environment, dynamics and control of robotic manipulators for the assembly of space structures, wave structural propagation,

Rapporteur

Harijono Djojodihardjo

National Aerona

UNITED STATES

Behnam Ashrafi

Antonio Del Vecchio CIRA Italian Aerospace Research Centre — ITALY

aterials and Structures for High Temperature Applications

addressed include advanced materials and structures for high temperature applications in space related domains. This includes carbon-carbon and ceramic es, ultra high temperature ceramics, ablative materials, ceramic tiles and insulations, together with innovative structural concepts making use of the above, for ns, launchers, hypersonic vehicles, entry vehicles, aero capture, power generation. The session covers the full spectrum of material, design, manufacturing and

Rapporteu Zijun Hu

utics and Space Administration (NASA) —

China Academy of Launch Vehicle Technology (CALT) -CHINA

nts in Materials Applications and Rapid Prototyping addressed include advancements in materials applications and novel technical concepts in the rapid prototyping of space systems. Continuous improvements structural concepts are always needed to achieve extremely demanding goals in performance, reliability, and affordability of space components, especially in accuracy/dimensional stability, longer life, greater survivability to both natural and threat environments, and producibility capability for high volume production. rototyping processes are currently used for different materials in the fabrication of metal, ceramic, and plastic parts. However, as very new technique, Additive s strongly emerging due to the capability of optimization of structural parts for space applications as it concerns weight reduction, improvement of mechanical duction of development and lead times as well as the reduction of costs. Furthermore AM processes make three-dimensional parts directly from CAD models by

Rapporteur James Tucker

National Research Council — CANADA

Southern Research Institute — UNITED STATES

session will be on space environmental effects and spacecraft protection. The effects of vacuum, radiation, atomic oxygen, spacecraft charging, thermal cycling, eoroids and space debris impact on space systems, materials and structures, and microelectronics will be addressed. Protective and shielding technologies, s simulation and testing of debris impact, and susceptibility of Commercial-Off-The-Shelf (COTS) micro-electronics to space radiation will be covered. Rapporteur

Anatolii Lohvvnenko

Yuzhnoye State Design Office — UKRAINE

Kveum-rae Cho

Pusan National University — KOREA, REPUBLIC OF

addressed include novel technical concepts for mechanical/robotic/thermal/fluidic systems and subsystems of launchers, manned and unmanned spacecraft, and small satellites. Advanced subsystems and design of future exploration missions will be covered, considering issues arising from material selection, cost iability, and advancements in space vehicle development with respect to engineering analysis, manufacturing, and test verification. It is also planned to discuss erimental and computational simulation of functioning and full-scale tests of space vehicles and their systems/subsystems. Attention will be paid to the problem validation of mathematical models for the design and experimental development of these objects at various phases of their life cycle.

Rapporteu

Naval Postgraduate School — UNITED STATES

Guoliang Mao Beijing Institute of Aerodynamics — CHINA

rial and structures technologies are explored in a large variety of space applications both to enable advanced exploration, and science/observation mission form test verifications relying on utmost miniaturization of devices and highest capabilities in structural, thermal, electrical, electromechanical/ optical ered by the progress in nanotechnology. Examples are the exceptional performances at nano-scale in strength, electrical, thermal conduction of Carbon are experiencing first applications at macro-scale such as nano-composite structures, high efficiency energy storage wheels, MEMS and MOEMS devices. chnology and advances in manipulation at nano-scale offer the road to molecular machines, ultracompact sensors for science applications and mass The Session encourages presentations of specialized technologies, in particular of nanomaterial related techniques and their application in devices offering

Rapporteur Bangcheng Ai

CSL (Centre Spatial de Liège) — BELGIUM

China Aerospace Science and Industry Corporation -CHINA

session will be on application of smart materials to spacecraft and launch vehicle systems, novel sensor and actuator concepts and new concepts for multitelligent structural systems. Also included in the session will be new control methods for vibration suppression and shape control using adaptive structures as ons of predicted performance with data from ground and in-orbit testing.

Hiroshi Furuya Tokyo Institute of Technology — JAPAN

Élcio Jeronimo de Oliveira

Luleå University of Technology - SWEDEN

resentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM

s a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Materials and Structures addressed in the classic sentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot idio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the C Category at a special ceremony. An Abstract tandard format must be submitted by the deadline for standard IAC abstracts.

> Andreas Rittweger DLR (German Aerospace Center) — GERMANY





| C3 | IAE SDACE DOWER SYMDOSIIIM | |
|----|----------------------------|--|

Reliable energy systems continue to be key for all space missions. The future exploration and development of space depend on new, more affordable and more reliable energy sources of diverse types ranging from the very small to the extraordinarily large. Moreover, the continuing support for space activities by the public requires that these activities are increasingly inserted into the global challenge to transition current terrestrial energy systems into more environmentally friendly, sustainable ones. The space sector has traditionally served as cutting edge precursor for the development of some renewable power systems. These activities are now put into a much larger space & energy perspective. These range from joint technology development up to visionary concepts such as space solar power plants. The Space Power Symposium, organized by the International Astronautical Federation (IAF), addresses all these aspects, covering the whole range from power generation, energy conversion & storage, power management, power transmission & distribution at system and sub-system levels including commercial considerations. It will include, but not be restricted, to topics such as advanced solar and nuclear systems for spacecraft power and propulsion, novel power generation and energy harvesting, and examine the prospects for using space-based power plants to provide energy remotely to the Earth or other planets.

Coordinato Ming Li

China Academy of Space Technology (CAST) — CHINA

Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

Koji Tanaka

Haroon B. Ogab

Gary Pearce Barnhard

STATES

Koji Tanaka

Space Canada Corporation — CANADA

Aerospace Exploration Agency — JAPAN

C3.1 Solar Power Satellite

This session deals with all aspects of concepts and architectures for space-based solar power plants and concepts integrating space and terrestrial energy activities. It will be structured in two half-sessions, one focusing on advances in the field of space solar power plant architectures and one on activities in the field of space & energy, including all types of conceptual, technical and organizational progress to better integrate space and terrestrial energy activities. It is the primary international forum for scientific and technical exchanges on this topic and thus provides a unique common platform for discussions. Topically it will include all system-level, architectural, organizational and commercial aspects, including modeling and optimization as well as related non-technical aspects.

Co-Chairs

John C. Mankins Ming Li ARTEMIS Innovation Management Solutions, LLC -China Academy of Space Technology (CAST) — CHINA UNITED STATES

Co-Chairs

Rapporteurs

Leopold Summere Koji Tanaka European Space Agency (ESA) — THE NETHERLANDS Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

C3.2 Wireless Power Transmission Technologies and Application

This session focuses on all aspects of wireless power transmission systems. It covers wireless power transmission technologies, including laser, microwave-based as well as novel wireless power transmission technologies from the short ranges (e.g. within spacecraft or between two surface installations) up the very large distances for space exploration and power transmission from space to ground. The session covers theoretical as well as applied and experimental results, including emitter/receiver antenna architectures and deployment

| Nobuyuki Kaya | Ming Li |
|-------------------------|--|
| Kobe University — JAPAN | China Academy of Space Technology (CAST) — CHINA |

Massimiliano Vasile University of Strathclyde — UNITED KINGDOM

C3.3 Advanced Space Power Technologies

This session covers all types of advanced space power technologies and concepts for the satellites, moon/asteroid/planetary exploration and manned space activities. These include technologies and concepts related to power generation (solar, nuclear, other) and harvesting, power conditioning, management and distribution, power transmission and energy storage.

Xtraordinary Innovative Space Partnerships, Inc. — UNITED

Co-Chairs

Matthew Perren Airbus Defence & Space — UNITED KINGDOM

Rapporteur

Lee Mason

National Aeronautics and Space Administration (NASA), Glenn Research Center — UNITED STATES

C3.4

C3.5

C4.10

Space Power System for Ambitious Missions This session is devoted to emerging concepts ranging from very small power (micro and milli-watt power) to very large power systems toward future ambitious space missions and space utilizations such as future moon village. These include concepts and technology developments of space power system for the increasing spacecraft market by the nano-, micro- and mini spacecraft. This session is dedicated to power systems for such applications as well as for long-duration exploration probes and sensors.

Institute of Space and Astronautical Science (ISAS), Japan

Co-Chairs

Rapporteur

Xinbin Hou

CAST - CHINA

Massimiliano Vasile Shoichiro Mihara University of Strathclyde — UNITED KINGDOM Japan Space Systems (J-spacesystems) — JAPAN

> Koii Tanaka Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

Joint Session on Advanced and Nuclear Power and Propulsion Systems

This session, organized jointly between the IAF Space Power and the IAF Space Propulsion Symposiums, includes papers addressing all aspects related to nuclear power and propulsion for space applications.

Co-Chair Rannorteur

Leopold Summerer European Space Agency (ESA) — THE NETHERLANDS

Koii Tanaka Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

C3.IP Interactive Presentations - IAE SPACE POWER SYMPOSIUM

This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Space Power addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the C Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts. Coordinators

Ming Li

C4

C4.1

C4.2

C4.3

C4.4

C4.5

China Academy of Space Technology (CAST) - CHINA

IAF SPACE PROPULSION SYMPOSIUM

The Space Propulsion Symposium addresses sub-orbital, Earth to orbit and in-space propulsion. The general areas considered include both chemical and non-chemical rocket propulsion, air-breathing propulsion, and combined air-breathing and rocket systems. Typical specific propulsion categories of interest are liquid, solid and hybrid rocket systems, ramjet, scramjet, detonation-based propulsion and various combinations of air-breathing and rocket propulsion and nuclear, electric, solar and other advanced rocket systems, and propulsion systems dedicated to ultra-small satellites. The Symposium is concerned with component technologies, the operation and application to missions of overall propulsion systems and unique propulsion test facilities.

Coordinator

Rapporteurs

Giorgio Saccoccia European Space Agency (ESA) — THE NETHERLANDS

Elena Toson Vanessa Vial Safran Aircraft Engines — FRANCE T4i — ITALY

Liquid Propulsion (1)

This session is dedicated to all aspects of Liquid Rocket Engines. Co-Chairs

Christophe Bonhomme

Centre National d'Etudes Spatiales (CNES) — FRANCE

Ozan Kara Akira Ogawara Space Generation Advisory Council (SGAC) — TURKEY

Liquid Propulsion (2) propulsion.

Co-Chairs Angelo Cervone Didier Boury

Delft University of Technology (TU Delft) - THE NETHERLANDS

Rapporteurs

Changjin Lee Konkuk University — KOREA, REPUBLIC OF

Solid and Hybrid Propulsion (1)

This session is dedicated to all aspects of Solid and Hybrid Rocket motor Co-Chairs

Stéphane Henry ArianeGroup — FRANCE

Rapporteurs Yen-Sen Chen National Space Organization — TAIWAN, CHINA

Solid and Hybrid Propulsion (2)

This session includes all science and tech nologies supporting all aspects of solid and hybrid propulsion. Co-Chairs

Jerrol Littles Aeroiet Rocketdyne — UNITED STATES

Rapporteurs

Jerome Breteau European Space Agency (ESA) — FRANCE

Electric Propulsion (1)

Co-Chairs Garri A. Popov

Research Institute of Applied Mechanics and Flectrodynamics (RIAMF), MAI - RUSSIAN FEDERATION

Rapporteurs

Vanessa Vial Safran Aircraft Engines — FRANCE Nicoletta Wagner Airbus DS GmbH — GERMANY





Koji Tanaka

Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

Christophe Bonhomme Centre National d'Etudes Spatiales (CNES) — FRANCE

Riheng Zheng China Aerospace Science & Industry Corporation (CASIC) – CHINA

George Schmidt NASA Glenn Research Center — UNITED STATES

ArianeGroup — FRANCE

Patrick Danous

Martin Velander

Toru Shimada

Mario Kobald

Jacques Gigou

Mitsubishi Heavy Industries, Ltd. — JAPAN

This session includes all science and technologies supporting all aspects of liquid propulsion. The emphasis in this session is placed, in particular, on components for liquid

ArianeGroup SAS — FRANCE

GKN Aerospace Engine Systems — SWEDEN

Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

HyImpulse Technologies GmbH — GERMANY

Furopean Space Agency (ESA) — FRANCE

Jean-Claude Traineau ONERA - The French Aerospace Lab — FRANCE

This session is dedicated to all aspects of electric propulsion dedicated to thrusters, applications and developments.

Mariano Andrenucci Sitael Spa — ITALY





| C4.6 | Electric Propulsion (2) This session is dedicated to all aspects of electric prop | ulsion dedicated to science (fundamentals, physics, modelling, | , diagnostic and measurements). | Category | INFRASTRUCTURE | |
|---------------|---|--|--|----------|---|---|
| | Co-Chairs | | | | Systems sustaining space missions, inclu | uding space system transportation |
| | Riheng Zheng China Aerospace Science & Industry Corporation (CASIC) — CHINA | Norbert Puettmann Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GFRMANY | | | D1 IAF SPACE SYSTEMS SYMPOS D2 IAF SPACE TRANSPORTATION D3 18 TH IAA SYMPOSIUM ON BU | IUM SOLUTIONS AND INNOVATION ILDING BLOCKS FOR FUTURE SP. |
| | Rapporteurs | SERVICE AND | | | D4 18 TH IAA SYMPOSIUM ON VIS | IONS AND STRATEGIES FOR THE |
| | Angelo Cervone | Martin Velander | | | D5 53 RD IAA SYMPOSIUM ON SAF | ETY, QUALITY AND KNOWLEDG |
| | Delft University of Technology (TU Delft) — THE NETHERLANDS | GKN Aerospace Engine Systems — SWEDEN | | | | RCIAL SPACEFLIGHT SAFETT ISS |
| C4.7 | Hypersonic Air-breathing and Combined | d Cycle Propulsion, and Hypersonic Vehicle | | | Category coordinated by John-David F. I | Bartoe, Association of Space Explo |
| | This session covers hypersonic air-breathing and comb ramjet, Scramjet, detonation engine, Turbine Based Co other types of hypersonic combined cycle propulsion, | bined cycle propulsion with space applications. The typical type ombined Cycle (TBCC), Rocket Based Combined Cycle (RBCC), F together with the associated vehicle. | es of engine considered in this session include: turbojet, Hypersonic Pre-cooled Propulsion, Air Turbo Rocket (ATR) and | D1 | IAF SPACE SYSTEMS SYMPOSIUM The Space Systems Symposium, organized by the Inter | rnational Astronautical Federation (IAF), addre |
| | Co-Chair | | | | and technologies, with sessions on System Engineerin implications for Lessons Learned and future Training a | g Methods, Processes, and Tools; Enabling Teo nd Practice: Advanced System Architectures: |
| | Riheng Zheng | Elizabeth Driscoll | | | future. | |
| | (CASIC) — CHINA | Gomspace Aps — UNITED STATES | | | Coordinators | |
| | Rapporteurs | | | | Reinhold Bertrand Furopean Space Agency (ESA) — GERMANY | Jill Prince National Aeronautics and Space Admini |
| | Salvatore Borrelli | Jean-Claude Traineau | | | | UNITED STATES |
| | CIRA Italian Aerospace Research Centre — ITALY | ONERA - The French Aerospace Lab — FRANCE | | D1.1 | Innovative and Visionary Space Systems | s Concepts |
| C4.8 B4.5A | Joint Session between IAA and IAF for S This session will pay particular attention to propulsion invited discussing the particular challenges of design, of obtaining high performance within a small volume a | mall Satellite Propulsion Systems systems and associated technologies as an enabler to efficien manufacture, testing, operations and technological developme and mass. The scope includes chemical and electrical propulsis | t small satellite access to space and orbit change. Papers are ents of small satellite propulsion systems, and the challenges on systems for major orbit changes, fine orbit control and | | This session will explore innovative concepts, and serv to foster the involvement of people, from researchers transformational space systems and relevant applicati concepts of space systems, and applications, we can b | vices for space applications in future scenarios and subject matter experts to other appropri ons. In this perspective, the dreams of yester oroaden today's paradigm towards preferable |
| | maintenance, and end-of-life disposal. For papers with and technologies, refer to other C4 sessions. | h an emphasis on the small satellite and its system design, refe | r to other B4 sessions. For a focus on other propulsion systems | | Co-Chairs | |
| | Co-Chairs | | | | Tibor Balint Art Center College of Design — UNITED STATES | Peter Dieleman National Aerospace Laboratory (NLR) — |
| | Arnau Pons Lorente | Jeffery Emdee | | | | THE NETHERLANDS |
| | Puraue University — UNITED STATES | The Aerospace Corporation — UNITED STATES | | D1.2 | Space Systems Architectures | |
| | Flena Toson | Flizaboth lens | | | This session addresses current and future space system These architectures and their elements and building b | ms architectures designed to realize promising locks should aim at an increase in functionalit |
| | T4i — ITALY | Jet Propulsion Laboratory - California Institute of Technology — UNITED STATES | | | building on state-of-the-art, innovative or even disrup such as constellations, formations, swarms, distribute functionality and aspects of autonomy, both on-board | tive technologies. The scope of the session in d systems, and system-of-systems (including h l and on-ground, may be addressed. |
| C4.9 | New Missions Enabled by New Propulsion The session will explore concepts for new missions that | on Technology and Systems at can be enabled by specific advancements in propulsion and/ | or integration of various propulsion technologies and systems. | | Co-Chairs | |
| | Co-Chairs | ···· ··· · · · · · · · · · · · · · · · | · · · · · · · · · · · · · · · · · · · | | Franck Durand-Carrier | Peter Dieleman |
| | Giorgio Saccoccia | Sabrina Corpino | | | | NETHERLANDS |
| | European Space Agency (ESA) — THE NETHERLANDS | Politecnico di Torino — ITALY | | D1.3 | Technologies to Enable Space Systems | |
| | Rapporteurs | | | | This session will focus on innovative, technological de new space systems. Enabling innovative technologies | velopments that are usually high risk, but whi for space applications often result from spin-i |
| | Elena Toson T4i — ITALY | Elizabeth Driscoll GomSpace Aps — UNITED STATES | | | Examples include instrumentation, biotechnology, cor | nponents, micro- and nano-technology, MEM |
| C4.10 | Joint Session on Advanced and Nuclear | Power and Propulsion Systems | | | Co-Chairs | |
| C3.5. | This session, organized jointly between the Space Pow and propulsion systems for space applications. | ver and the Space Propulsion Symposiums, includes papers add | dressing all aspects related to advanced and nuclear power | | Steven Arnold The John Hopkins University Applied Physics Laboratory — UNITED STATES | Xavier Roser Thales Alenia Space France — FRANCE |
| | Co-Chairs | | | D1.4.A | Space Systems Engineering - Methods, I | Processes and Tools (1) |
| | Jerome Breteau European Space Agency (ESA) — FRANCE | Leopold Summerer ESA - European Space Agency — THE NETHERLANDS | | | This session will focus on state-of-the-art systems eng | ineering methodologies that reduce the time |
| | Rapporteurs | | | | risk management, safety, reliability, testability, and qu | ality of life cycle cost estimates. Specifically, p |
| | Vito Salvatore CIRA Italian Aerospace Research Center, Capua — ITALY | Constanze Syring OHB System AG-Bremen — GERMANY | Changjin Lee Konkuk University — KOREA, REPUBLIC OF | | processes, tools, training that benefit space system (d system(s) of systems (SoS); engineering design metho technical planning, control, assessment and decision a design facilities; and novel methods to improve risk m | sign, development and operations; state of th ds or modeling and simulation tools applied th analysis of space system design; advancement anagement, earned value management, confi |
| C4.IP | Interactive Presentations - IAF SPACE PR | ROPULSION SYMPOSIUM | | | testability and quality of life cycle cost estimates. | |
| | Authors with an abstract accepted for an interactive p be assigned to interactive sessions in which they must | resentation will be asked to prepare slides and display them for the near the plasma screens to engage in interactive discussion | or the duration of the congress on plasma screens. Authors will ns with other congress attendees. | | Co-Chairs | Dmitry Pouron |
| | Coordinators | | | | Beihang University — CHINA | - RUSSIAN FEDERATION |
| | Elizabeth Jens | Christophe Bonhomme | Yen-Sen Chen | | Rapporteurs | |
| | Jet Propulsion Laboratory - California Institute of Technology — UNITED STATES | Centre National d'Etudes Spatiales (CNES) — FRANCE | American Institute of Aeronautics and Astronautics (AIAA) — UNITED STATES | | Franck Durand-Carrier Centre National d'Etudes Spatiales (CNES) — FRANCE | Geilson Loureiro Instituto Nacional de Pesquisas Espaciai |
| | Mario Kobald German Aerospace Center (DLR) — GERMANY | | | D1.4.B | Space Systems Engineering - Methods, I This session will focus on state-of-the-art systems eng are multi-disciplinary methods, processes, and tools u risk management, safety, reliability, testability, and qu | Processes and Tools (2) ineering methodologies that reduce the time sed for System Design, Product Realization, Te ality of life cycle cost estimates. Specifically, p |

at reduce the time and cost, and improve the quality of space system design. Of special interest oduct Realization, Technical Management, Operations, and Retirement of space systems to improve mates. Specifically, presentations may include: state of organizational structures, practice methods, processes, tools, training that benefit space system design, development and operations; state of the art systems engineering methodologies for space systems, including space system(s) of systems (SoS); engineering design methods, modeling and simulation tools applied to space system design and optimization; methodologies and processes for technical planning, control, assessment and decision analysis of space system design; advancement in space system development environments, such as concurrent engineering design facilities; novel methods to improve risk management, earned value management, configuration management, data management, availability, safety, reliability, testability and quality of life cycle cost estimates.

Co-Chairs

Norbert Frischauf **Geilson Loureiro** National Institute for Space Research (INPE) — BRAZIL TU GRAZ — AUSTRIA





transportation, future systems and safety

NNOVATIONS SYMPOSIUM

- R FUTURE SPACE EXPLORATION AND DEVELOPMENT
- GIES FOR THE FUTURE
- **KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES**
- T SAFETY ISSUES

of Space Explorers (ASE) – UNITED STATES

eration (IAF), addresses the present and future development of space systems, architectures, d Tools; Enabling Technologies for Space Systems; Significant Achievements in space systems with stem Architectures; Cooperative Space Systems, and Innovative and Visionary Space Systems of the

and Space Administration (NASA) —

s in future scenarios. The session objective is to broaden the opportunities for innovation in order ts to other appropriate stakeholders, in building and advancing the future vision of novel and ne dreams of yesterday are the hope of today and the reality of tomorrow. By proposing novel owards preferable outcomes beyond incremental advancements.

Rapporteur

Camillo Richiello

CIRA Italian Aerospace Research Centre — ITALY

to realize promising concepts for Earth orbiting or exploration missions, both robotic and crewed. rease in functionality, performance, efficiency, reliability and flexibility of operations, while ope of the session includes architectures for single satellite systems or multiple satellite systems, ystems (including hybridization with terrestrial systems). Ground-versus-space allocation of ddressed.

Rapporteur

Laboratory (NLR) — THE

Jill Prince National Aeronautics and Space Administration (NASA) — LINITED STATES

y high risk, but which have the potential to significantly enhance the performance of existing and n result from spin-ins which will be discussed during the session, together with potential spin-offs. -technology, MEMs, advanced new structures and software techniques.

Rapporteur

Eiichi Tomita Japan Aerospace Exploration Agency (JAXA) — JAPAN

s (1)

hat reduce the time and cost, and improve the quality of space system design. Of special interest oduct Realization, Technical Management, Operations, and Retirement of space systems to improve nates. Specifically, presentations may include: state of organizational structures, practice methods, perations; state of the art systems engineering methodologies for space systems, including space tion tools applied to space system design and optimization; methodologies and processes for sign; advancement in space system development environments, such as concurrent engineering management, configuration management, data management, availability, safety, reliability,

e Pesquisas Espaciais (INPE) — BRAZIL

s (2)

Rapporteur

Otfrid Liepack National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES





| D1.5 | Lessons Learned in Space Systems: Achiev This session addresses Lessons Learned in Space Systems missions. This retrospective viewpoint includes the achier mission success, incorporating documentation of Lessons design, development and operation; achievement from d management and systems engineering; challenges in proj former system development and operation; discussion of future missions. | ements, Challenges, Best Practices, Standard: on all aspects of the life cycle. The learning from the past is t vement of mission accomplishments, the challenges to overco: Learned. The scope of the session also includes the standard levelopment in project management; achievement from missi ject or programme development; challenges to overcome the 'standards to assure the mission; and the documentation of h | S he necessary way to ensure mission success of future ome the difficulties and the best practices to lead the Is in design, development and operation; lessons learned in ion success and on-orbit operation; best practices of project difficulties on orbit; improvement of a Space system from earned lessons to preserve and make them available to |
|-------|---|--|--|
| | Co-Chairs | | Rapporteur |
| | Fijchi Tomita | Igor V. Belokonov | Otfrid Liepack |
| | Japan Aerospace Exploration Agency (JAXA) — JAPAN | Samara State Aerospace University — RUSSIAN FEDERATION | National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory — UNITED STATES |
| D1.6 | Cooperative and Robotic Space Systems This session will focus on cooperative and robotic system architectures, and on-orbit servicing of space systems an Additional areas of interest include collaborative robotic technologies. Papers in this session will look at current m moves into these exciting areas. | s as they apply to the space domain. This emerging topic inclu d technologies. Hosted payloads, where their objectives may systems, such as space robotic systems and manipulators, rob issions and future opportunities, while addressing both benef | udes concepts such as constellations, multi-satellite be unrelated to the principal mission, are also addressed. botic/human interactions and distributed multi-agent fits and challenges as the world-wide space community |
| | Co-Chairs | | Rapporteur |
| | Klaus Schilling | Dapeng Wang | Steven Arnold |
| | Zentrum für Telematik — GERMANY | Beihang University — CHINA | The John Hopkins University Applied Physics Laboratory — UNITED STATES |
| D1.IP | Interactive Presentations - IAF SPACE SYST This session offers a unique opportunity to deliver your k The presentation will be displayed on a digital screen in a afternoon is dedicated exclusively for the attendees to via and interact with the attendees present. The Interactive f pictures, audio and video clips etc. An award will also be follows the standard format must be submitted by the de | EMS SYMPOSIUM ey messages in an interactive presentation on any of the subju dedicated location and available for view by all Congress atte ew the Interactive Presentations, and the author will be assig Presentation may take advantage of all electronic display capa presented to the author of the best Interactive Presentation i radline for standard IAC abstracts. | ects of Space Systems addressed in the classic Sessions. endees for the entire Congress week. In addition, one ned a specific ten minute slot to personally present the topic abilities, such as: PowerPoint charts, embedded hot links, n the D Category at a special ceremony. An Abstract that |
| | Co-Chair | | |
| | Reinhold Bertrand | Jill Prince | |
| | European Space Agency (ESA) — GERMANY | National Aeronautics and Space Administration (NASA) — UNITED STATES | |
| D2 | IAF SPACE TRANSPORTATION SOLUTION Topics of this symposium, organized by the International understanding and cooperation amongst the world's space | IS AND INNOVATIONS SYMPOSIUM Astronautical Federation (IAF), address worldwide space trans re-faring organizations. | sportation solutions and innovations. The goal is to foster |
| | Coordinators | | |
| | Vuguang Vang | Markus läger | Randolnh Kendall |
| | China Aerospace Science & Industry Corporation (CASIC) — CHINA | Airbus Defence & Space, Space Systems — GERMANY | The Aerospace Corporation — UNITED STATES |
| D2.1 | Launch Vehicles in Service or in Developm Review of up to date status of launch vehicles currently in | ent n use in the world or under short term development. | |
| | Co-Chairs | | Rapporteur |
| | lwao Igarashi Mitsubishi Heavy Industries Ltd Nagoya Aerospace Systems — JAPAN | Randolph Kendall The Aerospace Corporation — UNITED STATES | Martin Sippel Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY |
| D2.2 | Launch Services, Missions, Operations and Review of the current and planned launch services and su ground infrastructure, ground operations, production me | I Facilities upport, including economics of space transportation systems, thods, mission planning and mission control for both expendi | financing, cost, insurance, licensing. Advancements in able and reusable launch services. |
| | Co-Chairs | | Rapporteur |
| | Francesco Santoro Altec S.p.A. — ITALY | Sylvain Guédron Centre National d'Etudes Spatiales (CNES) — FRANCE | Yves Gerard Airbus Defence & Space — FRANCE |
| D2.3 | Upper Stages, Space Transfer, Entry and La Discussion of existing, planned or new advanced concept and technologies for accommodating crew and cargo trar | anding Systems s for cargo and human orbital transfer. Includes current and n sfer in space. | ear term transfer, entry and landing systems, sub-systems |
| | Co-Chairs | | Rapporteur |
| | Oliver Kunz | Brian Smith | Oleg Ventskovsky |
| | RUAG Space — SWITZERLAND | Raytheon Canada Limited — CANADA | Uleg Ventskovsky Yuzhnoye SOO European Representation in Brussels — UKRAINE |
| D2.4 | Future Space Transportation Systems Discussion of future overall transportation system design missions. | s and operational concepts for both expendable and reusable | systems for Earth-to-orbit transportation and exploration |
| | Co-Chairs | | Rapporteur |
| | José Gavira Izquierdo European Space Agency (ESA) — THE NETHERLANDS | Carina Dorbath MT Aerospace AG — GERMANY | Nicolas Bérend ONERA - The French Aerospace Lab — FRANCE |
| D2.5 | Technologies for Future Space Transportat Discussion of technologies enabling new reusable or experiment verification prior to flight, including ground testing and/o | tion Systems endable launch vehicles and in-space transportation systems. r innovative technology prototype demonstrations not yet inv | Emphasis is on early TRL hardware development and volving flight. |
| | Co-Chairs | | Rapporteur |
| | Mathieu Chaize | Lin Shen | Andrea Especito |
| | CIRA Italian Aerospace Research Centre — ITALY | China Academy of Launch Vehicle Technology (CALT) — | Northrop Grumman Corporation — ITALY |

Future Space Transportation Systems Verification and In-Flight Experimentation or leading to flight as well as new and unique test platforms and capabilities.

D2.6

D2.7

D2.8

A5.4

D2.9

D6.2

D2.IP

D3

D3.1

D3.2A

Rapporteur Co-Chairs Christie Maddock Tetsuo Hiraiwa David E. Glass University of Strathclyde — UNITED KINGDOM National Aeronautics and Space Administration Japan Aerospace Exploration Agency (JAXA) — JAPAN (NASA) — UNITED STATES Small Launchers: Concepts and Operations Discussion of existing, planned and future Launchers for small payloads ranging from 1500 kg to as low as 1 kg into Low Earth Orbit. Includes innovative solutions such as airborne systems, evolutions from sub-orbital concepts, combinations of existing/emerging elements and new elements, reusable, partially reusable and expendable concepts, and flexible, highly responsive concepts. Includes mission operations, design, development, and specific constraints. For discussion of small satellite missions not focused on launchers and their operations, please refer to session B4.5. Co-Chairs Rapporteur Harry A. Cikanek Ulf Palmnäs Florian Ruhhammer National Oceanic and Atmospheric Administration Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — SSC — SWEDEN (NOAA) — UNITED STATES GERMANY Space Transportation Solutions for Deep Space Missions This session will explore space transportation capabilities, existing or under study, for human deep space exploration missions, new science, programme architectures, technology demonstrations as well as the issues of scientific and political motivations and international cooperation. The session will also deal with worldwide needs, requirements and potential missions enabled by deep space transportation system. Co-Chairs Rapporteur K. Bruce Morris Josef Wiedemann Gerhard Schwehm RUAG Space — UNITED STATES DLR (German Aerospace Center) — GERMANY European Space Agency (ESA)(retired) — THE NETHERLANDS Emerging Global Space Ventures This session will describe developments in countries that have government or commercial space programmes which are new or emerging within the global picture, including space transportation systems or spaceports either under development or recently deployed. Co-Chairs Rapporteu Andrew Aldrin Charles E. Cockrell Jr. Aline Decadi Florida Institute of Technology — UNITED STATES National Aeronautics and Space Administration (NASA) — HE Space Operations — FRANCE UNITED STATES Interactive Presentations - IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Space Transportation Solutions and Innovations addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the D Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts. Co-Chair Rapporteu Christophe Bonnal Markus Jäger Jens Lassmann Centre National d'Etudes Spatiales (CNES) — FRANCE ArianeGroup — GERMANY Airbus Defence & Space, Space Systems — GERMANY 18TH IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT This symposium, organized by the International Academy of Astronautics (IAA), will involve papers and discussion that traverse a wide range of highly valuable future space capabilities (FSC) - in other words "building blocks" for future space exploration, development and discovery - that could enable dramatic advances in global space goals and objectives. The international discussion of future directions for space exploration and utilisation is fully underway, including activities involving all major space-faring nations. Decisions are now being made that will set the course for space activities for many years to come. New approaches are needed that establish strategies, architectures, concepts

Coordinators

John C. Mankins Alain Pradier ARTEMIS Innovation Management Solutions, LLC — European Space Agency (ESA) — THE NETHERLANDS UNITED STATES

Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and Development Future scenarios for sustainable exploration and development in space will unfold in the context of global conditions that vary greatly from those of the 1950s-1970s (the first generation of space programmes, driven by international competition), or those of the 1980s-2000s (the second generation of space programmes, enabled by international cooperation). Looking to the future, it is likely that space-faring countries will pursue their goals and objectives in a more building-block fashion focused on developing highvalue future space capabilities, rather than through massive, geo-politically driven programmes. Increasingly, these developments may also reflect future commercial space opportunities. As a result, it is important that the international community should engage in an ongoing discussion of strategies and architectures to frame a "building block" approach to our future in space. Such a discussion should involve sustainable budgets and multiple-purpose system-of-systems capabilities that lead to a diverse range of future activities of broad benefit to humanity. This session, which is related to a prospective new International Academy of Astronautics (IAA) study group, will address strategies and architectural approaches that may allow a new paradigm, a "building block" approach, to be established among the space-faring countries. Papers are solicited in these and related areas.

Co-Chairs

John C. Mankins Maria Antonietta Perino ARTEMIS Innovation Management Solutions, LLC — Thales Alenia Space Italia — ITALY UNITED STATES

Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems The emergence of novel systems and infrastructures will be needed to enable ambitious scenarios for sustainable future space exploration and utilization. New, reusable space infrastructures must emerge in various areas include the following: (1) infrastructures that enable affordable and reliable access to space for both exploration systems and logistics; (2) infrastructures for affordable and reliable transportation in space, including access to/from lunar and planetary surfaces for crews, robotic and supporting systems and logistics; (3) infrastructures that allow sustained, affordable and highly effective operations on the Moon. Mars and other destinations; and, (4) supporting in space infrastructures that provide key services (such as communications, navigation, etc.). Papers are solicited in these and related areas.

CHINA





Discussion of atmospheric and in-space flight testing and qualification of system, sub-system, and advanced technologies for future launch vehicles and in-space transportation systems. Emphasis is on higher TRL in-flight experimentation, demonstration, and qualification, including test plans and innovative technology prototype demonstrations involving

and technologies that will lead to sustainable human and robotic space exploration and utilisation during the coming decades. The symposium will examine the possible paths, beginning with current capabilities such as the International Space Station, which may lead to ambitious future opportunities for space exploration, discovery and benefits. The sessions that comprise this symposium are key elements of current or planned International Academy of Astronautics (IAA) studies.

Rapporteur

Anouck Girard University of Michigan — UNITED STATES





| | Co Chaire | | | |
|-------|--|--|--|-------|
| | Paivi Jukola Aalto University — FINLAND | Gary Barnhard XISP-Inc — UNITED STATES | | |
| | Rapporteurs | | | |
| | Junjiro Onoda Japan Society for Aeronautics and Space Sciences (JSASS) — JAPAN | Christopher Moore National Aeronautics and Space Administration (NASA) — UNITED STATES | | D4.3 |
| D3.2B | Systems and Infrastructures to Implement The emergence of new technologies will be essential to space exploration, utilization and eventual settlement. The affordable and reliable access to space for both exploration lunar and planetary surfaces for crews, robotic and supp operations on the Moon, Mars and other destinations; a solicited in these and related areas. | t Sustainable Space Development and Settler realizing the various systems and infrastructures that will be r echnologies for new, reusable space infrastructures are need ion systems and logistics; (2) infrastructures for affordable an borting systems and logistics; (3) infrastructures that allow sus and, (4) supporting in space infrastructures that provide key so | ment - Technologies needed to enable ambitious scenarios for sustainable future ed, including the following: (1) infrastructures that enable d reliable transportation in space, including access to/from tained, affordable and highly effective robotic and human ervices (such as communications, navigation, etc.). Papers are | |
| | Co-Chairs | | | D4.4 |
| | Alain Pradier European Space Agency (ESA) — THE NETHERLANDS | Christopher Moore National Aeronautics and Space Administration (NASA) — UNITED STATES | | |
| | Rapporteurs | | | |
| | Alain Dupas European Bank for Reconstruction and Development — FRANCE | Gary Barnhard XISP-Inc — UNITED STATES | | |
| D3.3 | Space Technology and System Manageme The effective management of space technology and syst in an ongoing series at the International Astronautical C in this important field. Specific areas of potential intere: Databases; and (3) Systems Analysis Methods and Tools through technology R&D programmes, to system develo could include: Technology Readiness Levels (TRLs) and T Approaches and Tools, etc. Either more theoretical disco projects are of interest for the session. | ent Practices and Tools tems development is critical to future success in space explore ongress that provides a unique international forum to further it include: (1) Technology Management Methodologies and Br The full range of R&D activities is appropriate for discussion, opment projects, with special emphasis on the transition of ne echnology Readiness Assessments, Technology R&D Risk Asse ussions, or examples of applications of R&D management tech | ation, development and discovery. This session is the next the development of a family of 'best practices and tools' est Practices; (2) R&D Management Software Tools and ranging from technology development long-term planning, ew technologies from one stage to the next. Particular topics ssments and Management, Advanced Concepts Modeling iniques and/or tools to specific R&D programmes and | D4.5 |
| | Co-Chairs | | Rapporteur | |
| | John C. Mankins ARTEMIS Innovation Management Solutions, LLC — UNITED STATES | Paivi Jukola Aolto University — FINLAND | Maria Antonietta Perino Thales Alenia Space Italia — ITALY | |
| D3.IP | Interactive Presentations Interactive Pres AND DEVELOPMENT This session offers a unique opportunity to deliver your Development addressed in the classic Sessions. The pre the entire Congress week. In addition, one afternoon is minute slot to personally present the topic and interact PowerPoint charts, embedded hot links, pictures, audio a special ceremony. An Abstract that follows the standa | key messages in an interactive presentation on any of the sub sentation will be displayed on a digital screen in a dedicated lo dedicated exclusively for the attendees to view the Interactive with the attendees present. The Interactive Presentation may and video clips etc. An award will also be presented to the au rd format must be submitted by the deadline for standard IAC | NG BLOCKS FOR FUTURE SPACE EXPLORATION jects of Building Blocks for Future Space Exploration and ocation and available for view by all Congress attendees for Presentations, and the author will be assigned a specific ten take advantage of all electronic display capabilities, such as: thor of the best Interactive Presentation in the D Category at abstracts. | D4.IP |
| | Co-Chair | | | |
| | John C. Mankins ARTEMIS Innovation Management Solutions, LLC — UNITED STATES | Alain Pradier European Space Agency (ESA) — THE NETHERLANDS | | |
| D4 | 18 TH IAA SYMPOSIUM ON VISIONS AND This 18 th symposium is organized by the International At expense of future goals. The Symposium will discuss top These developments will be examined with the goal to Symposium will address innovative technologies and St can contribute to the resolution of World Societal Chang | STRATEGIES FOR THE FUTURE cademy of Astronautics (IAA). In Space Activities the focus is u pics with at least 20 to 30 years prospective lead time and iden support also short/medium term projects and to identify prior ategies to develop Space Elevator as well as Interstellar Precu ges as well as increasing the countries engaged in space activi | sually kept on the short term developments, at the tiffy technologies and strategies that need to be developed. ities required for their development. The Sessions in the rsor Missions. A session will address also how Space activities ties. | DS |
| | Coordinators | | | |
| | Giuseppe Reibaldi Moon Village Association (MVA) — AUSTRIA | Yu Lu China Academy of Launch Vehicle Technology, China — CHINA | | |
| D4.1 | Innovative Concepts and Technologies In order to realize future, sustainable programmes of sp be developed during the coming decade. The technical must be sufficiently focused, to allow tangible progressi a number of discipline research topics and/or technolog related areas. | ace exploration and utilization, a focused suite of transformat objectives to be pursued should be drawn from a broad, forw on and dramatic improvements over current capabilities. This jies may be successfully developed to support transformation. | ional new system concept and supporting technologies must ard-looking view of the technologies and system needed, but session will address cross-cutting considerations in which al new system concept. Papers are solicited in these and | D5.1 |
| | Co-Chairs | | Rapporteur | |
| | Roger X. Lenard LPS — UNITED STATES | Giorgio Saccoccia European Space Agency (ESA) — THE NETHERLANDS | Xlaowei Wang China Academy of Launch Vehicle Technology (CALT) — China | |
| D4.2 | Contribution of Moon Village to Solving (Moon Village is a concept that brings together efforts, v manner. Moon Village is a community of projects carrie implementation of the Moon Village has already startec Moon Village can offer a new start to humanity on the M Moon Village to the solution of global challenges (e.g., global societal issues and bring benefits to society on a be developed. The definition of a roadmap complement | Global Societal Issues vorld-wide, from the private sector, governments, academics : d out by stakeholders from different fields (for example, techr with missions and activities in line with its spirit, It is a major Aoon and on the Earth by contributing to solve global societal energy, population, sustainable development, many others). H global scale will also be discussed. The session will include also ary to the UN Agenda 2030 will be also discussed. | and others to explore and use the Moon in a sustainable iical, scientific, cultural, economic) working together. The step forward for the peaceful development of humankind. issues. The session will discuss the contributions of the low the Moon Village will support the understanding of the to the identification of the related technologies that need to | D5.2 |

Entering the Space Elevator Era Upon publishing the International Academy of Astronautics four-year study entitled "Road to the Space Elevator Era," members of the study see the future a little brighter. The purpose of this study, published in spring of 2019, was to assess the critical technological issues and general questions and then present assessments to the Academy to ensure that the topic has been approached with expertise and curiosity. Now the challenge is to initiate appropriate programs, tests, and research to truly enter the Space Elevator Era. This session will discuss the efforts around the world ensuring that the results of the study are incorporated into the engineering and development plans. The invitation is open to show the test results and experimentation results that will indeed lead to space elevators. Co-Chairs Rapporteur Peter Swan Yoji Ishikawa Akira Tsuchida International Space Elevator Consortium — UNITED Obayashi Corporation — JAPAN STATES Strategies for Rapid Implementation of Interstellar Missions: Precursors and Beyond Knowledge about space beyond our solar system and between the stars-that is interstellar space - is lacking data. Even as IBEX, NASA's Interstellar Background Explorer. studies the edge of our solar system, it still is confined to earth orbit. Arguably, some of the most compelling data to understand the universe we live in will come from sampling the actual environment beyond our solar system as Voyager 1 and Voyager 2 spacecraft are on the threshold of doing. In the 36 years since the Voyager probes' launches, significant advances in materials science, analytical chemistry, information technologies, imaging capabilities, communications and propulsion systems have been made. The recently released IAA study: "Key Technologies to Enable Near-Term Interstellar Scientific Precursor Missions" along with significant initiatives like the DARPA seed-funded 100 Year Starship and the Breakthrough Starshot project, signal the need, readiness and benefits to aggressively undertaking interstellar space missions. This session seeks to define specific strategies and key enabling steps to implement interstellar precursor missions within the next 10-15 years. Suggestions for defined projects, payloads, teams, spacecraft and mission profiles that leverage existing technological capacities, yet will yield probes that generate new information about deep space, rapidly exit the solar system and which can be launched before 2040 are sought. Co-Chairs Rapporteu Mae Jemison Giancarlo Genta Les Johnson 100 Year Starship — UNITED STATES Politecnico di Torino — ITALY Space Resources, the Enabler of the Earth-Moon Econosphere Last year, the Academy published a second study report showing case studies and legal status for the future exploration utilization of space mineral resources. The next step is to refine the process, propose projects, fund projects and actually mine space mineral resources. As the new Earth Moon infrastructure development occurs, the need will become obvious to have a cost-effective method of providing drinking water and fuel, from in-situ resources. This technical session will develop ideas and present approaches to enable the future growth inside the Earth Moon Econo-sphere. Co-Chairs Rapporteur Peter Swan International Space Elevator Consortium — UNITED Roger X. Lenard Helen Tung elseco Limited — UNITED ARAB EMIRATES LPS - UNITED STATES STATES Interactive Presentations - 18TH IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Visions and Strategies for the Future addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the D Category at a special ceremony An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts. Co-Chairs Helen Tung elseco Limited — UNITED ARAB EMIRATES **Gongling Sun** International Space University — FRANCE 53RD IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES Quality, safety, security... These domains reflect the same concern: how a complex space system can be developed and be operated in order to give its best with the proper robustness. In that environment, where radiations are not the least stress and possible ill-intentioned actions may occur, decreasing the level of failures in space activities is a must. Knowledge management, meaning proper capturing, capitalizing, protecting and sharing the knowledge, and application of lessons learned and experience, are key factors. This Symposium organized by the International Academy of Astronautics aims at arousing the discussion between professionals, and raising the awareness of the new generation on the various approaches to obtain and run reliable, and safe space systems: design solutions, validation and tests, software development, validation and security, methods, management approaches, regulations to improve the quality, efficiency, and collaborative ability of space programmes and space operations. All aspects are considered: risk management, complexity of systems and operations, knowledge and information management, human factors, economical constraints, international cooperation, norms, and standards Coordinato Jeanne Holm Roberta Mugellesi-Dow - UNITED STATES European Space Agency (ESA) — UNITED KINGDOM Quality and Safety, always a beginning! Implementing and maintaining a Safety and Quality Management System in Space Programmes is a great challenge we have better to entrust to well seasoned manpower But a space programme is always somewhat new. New ambitions, new programme, new stakeholders, new workforce, new country... This is also an underestimated facet of the so-called « New Space ». How is it possible to set realistic goals, with real ambition, and ensure success in this challenging context? This session deals with the methods, tests, lessons learned, standards for analysis and mitigation of such risks to maintain the desired quality. It provides an opportunity for exchanges on all aspects of the life cycle (including design, development and production philosophy, operations) and associated risk management approach. It addresses every kind of space mission: transportation systems, orbital systems, exploration vehicles Co-Chairs

CHINA

| ola Romero | Alexander S. Filat |
|------------|--------------------|
| - FRANCE | Central AeroHydro |
| | FEDERATION |

Man 3AF

Co-Chairs

Giuseppe Reibaldi

Moon Village Association (MVA) — AUSTRIA

Knowledge Management for Space Activities in the Digital Transformation Age In this age of big data, analytics, artificial intelligence, Internet of Things (IOT) and others, knowledge management has a key role to help decision makers in today's competitive economy, by creating communities of shared and useful information. Digital transformation and innovations have changed how employees access and share the knowledge and therefore KM processes need to adapt to the new environment, by supporting and helping the users in how they collaborate and interact with knowledge on a daily basis. Key themes addressed during the session are strategies and tools for the sharing of existing knowledge to develop and sustain new projects, the impact of the internal social network in driving innovation and creating new knowledge, and processes and technologies that organizations are using to energize their ability to learn, innovate, and share knowledge. Examples of case studies of particular interest include successful projects and innovations in the application of knowledge management, grounded research in knowledge and risk gement, methods that allow data, information or knowledge exchange within or amongst organizations in support of actual programmes, and capturing engineering knowledge and information in computer models.





Rapporteu

China Academy of Launch Vehicle Technology, China -

Paivi Jukola Aalto University — FINLAND

International Academy of Astronautics (IAA) — JAPAN

NASA Marshall Space Flight Center — UNITED STATES

odynamic Institute (TsAGI) — RUSSIAN





| | Co-Chairs | | | |
|--------------|---|--|---|--|
| | Roberta Mugellesi-Dow European Space Agency (ESA) — UNITED KINGDOM | Patrick Hambloch University of Alabama in Huntsville — UNITED STATES | | |
| | Rapporteurs | | | |
| | Daniel Galaretta Centre National d'Etudes Spatiales (CNES) — FRANCE | Jeanne Holm — UNITED STATES | | |
| D5.3 | Prediction, Testing, Measurement and Effe Space environment characterized by various factors such debris, etc. And its fluctuations strongly affects quality of The evaluation of the average and worst-case conditions t following topics: Space Weather, Plasma, Spacecraft Char prediction of average or worst-case condition; - ground te | ects of Space Environment on Space Missions as radiation, plasma, atomic oxygen, planetary dust, extreme space missions. Environmental conditions yield constraints at to be met, and of their impact on missions and sub-systems ar ging, Radiation, Atomic Oxygen, Planetary Dusts, Combined Ei sting; - flight experiments and lessons learned; - modeling an | temperature, vacuum, micro-gravity, micrometeoroid and design phase, and important risks in the course of the mission. 'e thus of prime importance. This session will encompass the nvironments - flight measurements; - physical processes; - d prediction. | |
| | Co-Chairs | | Rapporteur | |
| | Jean-Francois Roussel Office National d'Etudes et de Recherches Aérospatiales (ONERA) — FRANCE | Mengu Cho Kyushu Institute of Technology — JAPAN | Carlos Soares Boeing Integrated Defense Systems — UNITED STATES | |
| D5.4 E9.2 | Cyber-Security Threats to Space Missions a The global network connectivity offered by the Internet in nowadays one would not need to build a ground station, I tion measures. These questions will be addressed in the so organizations managing the ability to introduce the right 1 corporate and international boundaries? - How is knowlee threats? - Which ones of these specific threats are to be e cyber-space to target outer space? Case studies will focus ing the technical and organizational measures necessary t | and Countermeasures to Address them troduces whole new families of cyber-security threats that ca but just penetrate from home or office the existing ground inf ession: - What is the interest of cyber-crime and cyber-activis evel of security measures in the process to develop new miss dge about security threats captured, shared among the consti xpected to target space missions, from the ground and up int on cryptography, processes, operational security, supply chai o make a mission "cyber secure". | In target space missions. To send commands to a spacecraft rastructures, challenging and bypassing their protec- m with respect to space activities? - How are aerospace ions? - What solutions are in place to work securely across tuency, and used to counteract the evolution of cyber o space? - What is particularly to be expected from the n, and other aspects of space missions that are all constitut- | |
| | Co-Chair | | Rapporteur | |
| | Stefano Zatti ESA — ITALY | Stefano Ferretti Space Renaissance International — ITALY | Julien Airaud Centre National d'Etudes Spatiales (CNES) — FRANCE | |
| D5.IP | Interactive Presentations - 53 RD IAA SYMPO This session offers a unique opportunity to deliver your ka Activities addressed in the classic Sessions. The presentat entire Congress week. In addition, one afternoon is dedic minute slot to personally present the topic and interact w PowerPoint charts, embedded hot links, pictures, audio a a special ceremony. An Abstract that follows the standard | DSIUM ON SAFETY, QUALITY AND KNOWLEDG ey messages in an interactive presentation on any of the subje- ion will be displayed on a digital screen in a dedicated location ated exclusively for the attendees to view the Interactive Pres- ith the attendees present. The Interactive Presentation may t divideo clips etc. An award will also be presented to the auth format must be submitted by the deadline for standard IAC a | The MANAGEMENT IN SPACE ACTIVITIES is of Safety, Quality and Knowledge Management in Space in and available for view by all Congress attendees for the entations, and the author will be assigned a specific ten ake advantage of all electronic display capabilities, such as: or of the best Interactive Presentation in the D Category at bstracts. | |
| | Co-Chair | | | |
| | Jeanne Holm — UNITED STATES | Roberta Mugellesi-Dow European Space Agency (ESA) — UNITED KINGDOM | | |
| D6 | IAF SYMPOSIUM ON COMMERCIAL SPA Topics of this symposium, organized by the International transportation and spaceports. The goal is to identify issu interoperability. | CEFLIGHT SAFETY ISSUES Astronautical Federation (IAF), address commercial safety and es common to commercial operators of both human and robo | regulatory policy issues for orbital and suborbital space otic space vehicles to increase international safety and | |
| | Coordinator | | | |
| | John Sloan Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) — UNITED STATES | Francesco Santoro Altec S.p.A. — ITALY | | |
| D6.1 | Commercial Space Flight Safety and Emerg Topics for this session cover commercial space transporta vehicles, and regulations. Papers related to commercial sp crew and participant safety; and ground operations and la | ting Issues tion and safety issues including human and robotic vehicles, s pace transportation are also encouraged on: policy and law; o aunch site safety. | paceports, reentry vehicles, in-space transportation perations and training; best practices and standards; pilot, | |
| | Co-Chairs | | Rapporteur | |
| | John Sloan | Francesco Santoro | Gennaro Russo | |
| | Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) — UNITED STATES | Altec S.p.A. — ITALY | Associazione Italiana di Aeronautica e Astronautica (AIDAA) — ITALY | |
| D6.2 D2.9 | Emerging Global Space Ventures This session will describe developments in countries that space transportation systems or spaceports either under | have government or commercial space programmes which ar development or recently deployed. | e new or emerging within the global picture, including | |
| | Co-Chairs | | Rapporteur | |
| | Andrew Aldrin Florida Institute of Technology — UNITED STATES | Charles E. Cockrell Jr. National Aeronautics and Space Administration (NASA) — UNITED STATES | Aline Decadi HE Space Operations — FRANCE | |
| D6.3 | Enabling Safe Commercial Spaceflight: Veh This session addresses new and existing spaceports and fa location. Topics include: safety, air and spaceport facilities customer needs, regulations, and other areas. Papers are commercial companies and governments. | icles and Spaceports actors that launch vehicle and spaceplane operators may use i , runways, geography, air and space traffic, weather, populati welcome from spaceports, airports, space transportation pro | in evaluating the selection of a launch and/or landing on density, access to workforce and technical support, viders, support equipment providers, academia, | |
| | Co-Chairs | | Rapporteur | |
| | John Sloan Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) — UNITED STATES | Francesco Santoro Altec S.p.A. — ITALY | Gennaro Russo TRANS-TECH Srl — ITALY | |

SPACE AND SOCIETY

Interaction of space with society, including education, policy and economics, history and law

- IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM E1
- E2 **48TH STUDENT CONFERENCE**
- 33RD IAA SYMPOSIUM ON SPACE POLICY, REGULATIONS AND ECONOMICS E3
- 54TH IAA HISTORY OF ASTRONAUTICS SYMPOSIUM F4
- E5 31ST IAA SYMPOSIUM ON SPACE AND SOCIETY
- IAF BUSINESS INNOVATION SYMPOSIUM E6
- E7 **IISL COLLOQUIUM ON THE LAW OF OUTER SPACE**
 - IAA MULTILINGUAL ASTRONAUTICAL TERMINOLOGY SYMPOSIUM

Category coordinated by Lyn Wigbels, American Astronautical Society (AAS) - UNITED STATES

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM

This symposium, organized by the International Astronautical Federation (IAF) Space Education and Outreach Committee (SEOC), explores best practices and innovative approaches to space education at all levels. Through its 10 sessions, the symposium showcases activities, methods and techniques for education, outreach to the general public, and workforce development. The symposium keynotes, including the one by the winner of the IAF Frank J. Malina Astronautics Medal, highlight some of the best education and outreach programmes from around the world. When submitting abstracts for this symposium, please note that: • Abstracts should present a coherent story or idea, and follow a logical sequence. • The work should be the original work of the authors. • It should share information that is innovative and new or put a new spin on an old subject. The novelty can be in idea, methodology and approach, or in results and recommendations. • Papers should have clear education or outreach content. They should also be in the scope of the session they are submitted to. • Authors are encouraged to clearly identify target groups, benefits, lessons-learned, recommendations and include measures of critical assessment. • Only providing technical details of projects, even if carried out in an educational context, will not usually qualify. Preference is given to papers that present the pedagogical theories behind the work presented. • Papers reporting on programmes/activities that have already taken place will be given preference over papers dealing with concepts and plans for the future. • Papers covering topics/activities which have been reported at a prior IAC must state this explicitly and detail both the additional inform to be presented and the added value that this represents.

Coordinators

E8

E1

E1.1

E1.2

E1.3

E1.4

Lisa Antoniadis Astrocast SA — SWITZERLAND

Ignition - Primary Space Education

This session will explore innovative programmes focusing on space education and outreach to students up to the age of 11. Emphasis will be placed on programmes that effectively engage primary school students in Science, Technology, Engineering, Arts and Mathematics (STEAM), help them develop key skills, and foster a long-term passion for space. This session will also consider programmes and activities that focus on the professional development of primary school teachers, or on educational methodologies of relevance to primary education. When submitting abstracts for this session, please: • Clearly identify the connection to primary education/outreach and to space. • Provide a short but clear description of the activity or the programme. • Include some information about the unique, original or innovative nature of your activity or programme. • Include lessons learned, recommendations or other take away messages in the body of your abstract. If any theories are developed, please include some information about the practical applicability of the information. • Make sure that the abstract provides a coherent idea or narrative. • If data has been gathered as part of the work (including evaluations), please include some reference to that in your abstract.

Co-Chairs

Kaori Sasaki Carol Carnett Japan Aerospace Exploration Agency (JAXA) — JAPAN

Rapporteurs

Christopher Vasko European Space Agency (ESA) — FRANCE

GomSpace Aps — Denmark

Lift Off - Secondary Space Education

This session will explore innovative programmes focusing on space education and outreach to students aged 11 to 18. Emphasis will be placed on programmes that effectively engage secondary school students in Science, Technology, Engineering, Arts and Math (STEAM), help them develop key skills, and foster a long-term passion for space. This session will also consider programmes and activities that focus on the professional development of secondary school teachers, or on educational methodologies of relevance to secondary education. When submitting abstracts for this session, please:
• Clearly identify the connection to secondary education/outreach and to space activities.
• Provide a short but clear description of the activity or the programme.
• Include some information about the unique, original or innovative nature of your activity or programme.
• Include lessons learned, recommendations or other take away messages in the body of your abstract. If any theories are developed, please include some information about the practical applicability of the information. • Make sure that the abstract provides a coherent idea or narrative. • If data has been gathered as part of the work (including evaluations), please include some reference to that in your abstract.

Co-Chairs

Christopher Vasko Space Generation Advisory Council (SGAC) — CANADA European Space Agency (ESA) — FRANCE

On Track - Undergraduate Space Education

This session will explore innovative space education and outreach programmes dedicated to undergraduate students. This can include the development and delivery of innovative courses, project-based work, and work placements. Emphasis should be placed on how the programme is structured for maximum impact, how the impact is measured and how the lessons learned are being applied to other courses. This session will also consider programmes and activities that focus on the professional development of undergraduate educators, or on educational methodologies of relevance to undergraduate education. When submitting abstracts for this session, please:

Clearly identify the connection to undergraduate space education. • Provide a short but clear description of the activity or the programme. • Include some information about the unique, original or innovative nature of your activity or programme. • Include lessons learned, recommendations or other take away messages in the body of your abstract. If any theories are developed, please include some information about the practical applicability of the information. • Make sure that the abstract provides a coherent idea or narrative. • If data has been gathered as part of the work (including evaluations), please include some reference to that in your abstract. Co-Chairs

Hubert Diez

CNES - FRANCE

Camille Alleyne NASA — UNITED STATES

In Orbit - Postgraduate Space Education

This session will explore innovative space education and outreach programmes for postgraduate students. This can include the development and delivery of innovative courses, project-based work, and work placements. Emphasis should be placed on how the programme is structured for maximum impact, how the impact is measured and how the lessons learned are being applied to other courses. This session will also consider programmes and activities that focus on the professional development of postgraduate educators, or on educational methodologies of relevance to postgraduate education. When submitting abstracts for this session, please: • Clearly identify the connection to postgraduate space education. • Provide a short but clear description of the activity or the programme. • Include some information about the unique, original or innovative postpratuate space evolution • Provide a short but clear description or the example of the programmer • instance for under the day of your abstract. If any theories are developed, please include some information about the practical applicability of the information. • Make sure that the abstract provides a coherent idea or narrative. • If data has been gathered as part of the work (including evaluations), please include some reference to that in your abstract

Seyed Ali Nasseri





Seyed Ali Nasseri Space Generation Advisory Council (SGAC) — CANADA

International Space University (ISU) — UNITED STATES

Matteo Emanuelli

Rapporteur

Michal Kunes - CZECH REPUBLIC





| | Co-Chairs | | | Rapporteurs | |
|------|--|--|-------|--|---|
| | David B. Spencer | Camille Alleyne | | Carol Oliver | Nahum Romero |
| | Rapporteurs | | F1.IP | Interactive Presentations - IAF SPACE FDI | |
| F1.5 | Carol Carnett International Space University (ISU) — UNITED STATES Enabling the Euture - Developing the Spa | Remco Timmermans International Space University (ISU) — THE NETHERLANDS | | This session offers a unique opportunity to share your e presentation will be displayed on a digital screen in a de is dedicated exclusively for the attendees to view the In interact with the attendees present. The Interactive Pre video clips. An award will also be presented to the auth | education and outreach edicated location and a teractive Presentation sentation may take ad or of the best Interacti |
| | This session will focus on the challenges, opportunities a session may include but is not limited to: formal profess other actors, When submitting abstracts for this sympos of the activity or the programme. • Include some inform recommendations or other take away messages in the b | and innovative approaches to developing the current and future global space workforce. The work presented in this ional development and accreditation programmes, professional development activities by companies, nonprofits and ium, please: • Clearly identify the connection to space workforce development. • Provide a short but clear description nation about the unique, original or innovative nature of your activity or programme. • Include lessons learned, oody of your abstract. If any theories are developed, please include some information about the practical applicability of | | please: • Clearly identify the educational/outreach aspet information about the unique, original or innovative nat of your abstract. If any theories are developed, please in coherent idea or narrative. | ects of the work presen ture of your activity or nclude some informati |
| | the information. • Make sure that the abstract provides reference to that in your abstract. | a coherent idea or narrative. • If data has been gathered as part of the work (including evaluations), please include some | | Kevin Stube | Jessica Culler |
| | Co-Chairs | | | | NASA Ames neseu |
| | Kathleen Coderre Lockheed Martin Corporation — UNITED STATES | Olga Zhdanovich Modis for European Space Agency — THE NETHERLANDS | E2 | 48TH STUDENT CONFERENCE Presentation of space-related papers by undergraduate | and graduate student |
| | Rapporteurs | University Disc | | Coordinators | |
| | - CZECH REPUBLIC | CNES — FRANCE | | Marco Schmidt Bochum University of Applied Sciences — GERMANY | Franco Bernelli-Za Politecnico di Mila |
| E1.6 | Calling Planet Earth - Space Outreach to the This session will focus on activities, programmes and str abstracts for this symposium, please: • Clearly identify the programme. • Include some information about the uniq away messages in the body of your abstract. If any theore the abstract provides a coherent idea or narrative. • If de contrained the second strate is the second strate of the second strate of the second strate second strate second strate second strate the second strate second stra | the General Public ategies for engaging the general public in space activities, and outside the formal education system. When submitting the connection to public outreach and space activities. Provide a short but clear description of the activity or the upue, original or innovative nature of your activity or programme. Include lessons learned, recommendations or other take rises are developed, please include some information about the practical applicability of the information. Make sure that lata has been gathered as part of the work (including evaluations), please include some reference to that in your abstract. | E2.1 | Student Conference – Part 1 Undergraduate and graduate level students (no more th represent the specific work of the author(s) (no more th session is NOT for team projects. Team project papers si strongly recommend that you submit an abstract with a French, German, US, UK and Canadian students submit full work for the strong stro | han 28 years of age) pr han two students). The hould be submitted to an extensive descriptio ting abstracts for the sp |
| | Co-Chairs | Nelle Res Houses | | competition: Marco Schmidt – marco.schmidt@hs-boch | hation: For the French r hum.de For the US nati |
| | NASA Ames Research Center — UNITED STATES | Royal Holloway, University of London — UNITED KINGDOM | | stuart.eves@bis-space.com For the Canadian sponsori distributed from the session chairs to the authors after | ing programme, please abstract acceptance. |
| | Rapporteurs | | | Co-Chairs | |
| | Remco Timmermans International Space University (ISU) — UNITED KINGDOM | Frank Friedlaender Lockheed Martin Space Systems Company — UNITED STATES | | Franco Bernelli-Zazzera Politecnico di Milano — ITALY | Benedicte Escudie Institut Supérieur — FRANCE |
| E1.7 | New Worlds - Non-Traditional Space Educ This session will focus on novel and non-standard methe abstracts for this symposium, please: • Clearly identify f • Include some information about the unique, original c messages in the body of your abstract. If any theories ar abstract provides a coherent idea or narrative. • If data | cation and Outreach ods of space education and outreach in non-traditional areas and to non-traditional target groups. When submitting now the work presented is non-traditional. • Provide a short but clear description of the activity or the programme. or innovative nature of your activity or programme. • Include lessons learned, recommendations or other take away re developed, please include some information about the practical applicability of the information. • Make sure that the has been gathered as part of the work (including evaluations), please include some reference to that in your abstract. | E2.2 | Student Conference – Part 2 Undergraduate and graduate level students (no more the represent the specific work of the author(s) (no more the session is NOT for team projects. Team project papers sis strongly recommend that you submit an abstract with a French, German, US, UK and Canadian students submitt following contact persons are available for more inform | han 28 years of age) pr han two students). The hould be submitted to ne extensive descriptio ting abstracts for the s lation: For the French r |
| | Co-Chairs Vera Mayorova | Olga Zhdanovich | | competition: Marco Schmidt – marco.schmidt@hs-boch - stuart.eves@bis-space.com For the Canadian sponsori distributed from the session chairs to the authors after | num.de For the US nat ing programme, please abstract acceptance. |
| | Bauman Moscow State Technical University — RUSSIAN FEDERATION | Modis for European Space Agency — THE NETHERLANDS | | Co-Chairs | |
| | Rapporteurs | | | Marco Schmidt | Frank Friedlaende |
| | Carol Christian STScl — UNITED STATES | Kaori Sasaki JAXA — JAPAN | | Bochum University of Applied Sciences — GERMANY | Lockheed Martin S STATES |
| E1 9 | Hands on Space Education and Outroach | | E2.3 | Student Team Competition | |
| E1.0 | Hands-on space education and outreach can be a powerful way to introduce and teach Science, Technology, Engineering, Arts and Math (STEAM) concepts, especially with diverse learners. This session will demonstrate and share effective hands-on activities and experiments to explore, teach and reinforce space-related concepts. During the session, presenters will not only present the ideas behind the activity, but also demonstrate it hands-on at the IAC. When submitting abstracts for this symposium, please: • Clearly identify the hands-on nature of the work presented, and its space connection. • Provide a short but clear description of the activity or the programme. • Include some information about the unique, original or innovative nature of your activity or programme. • Include Issons learned, are ordered and conceptions or other take away messages in the body. | | GTS.4 | authors (three or more students). Students presenting in this session will o on the submitted abstracts. We strongly recommend that you submit an al and the novelty of your work. Furthermore, a short description how your t competition will be distributed from the session chairs to the authors after | |
| | of your abstract. If any theories are developed, please in | is the second se | | Co-Chairs | |
| | Co-Chairs | as part of the work (including evaluations), please include some reference to that in your abstract. | | Andrea Jaime OHB System AG - Munich — GERMANY | Emmanuel Zenou Institut Supérieur — FRANCE |
| | Lyn Wigbels University Corporation for Atmospheric Research — UNITED STATES | Valerie Anne Casasanto NASA Goddard/University of Maryland, Baltimore County (UMBC) — UNITED STATES | E2.4 | Educational Pico and Nano Satellites Joint session with SUAC. The session covers all aspects a | related to educational |
| | Rapporteur | | | Co-Chair | |
| | Carol Carnett International Space University (ISU) — UNITED | Kevin Stube The Planetary Society — UNITED STATES | | Xiaozhou Yu Northwestern Polytechnical University — CHINA | Franco Bernelli-Za Politecnico di Mila |
| E1.9 | STATES Space Culture – Public Engagement in Spa | ace through Culture | E3 | 33 RD IAA SYMPOSIUM ON SPACE POLIC This Symposium, organized by the International Academ | CY, REGULATION |
| | culture. When submitting abstracts for this symposium, please: • Clearly identify both the educational and cultural aspects of the work presented, and its connection to space activities. • Provide a short but clear description of the activity or the programme. • Include some information about the unique, original or innovative nature of your activity | | | Coordinators | . The symposium also i |
| | or programme. • Include lessons learned, recommendal information about the practical applicability of the infor work (including evaluations), please include some refere | tions or other take away messages in the body of your abstract. If any theories are developed, please include some mation. • Make sure that the abstract provides a coherent idea or narrative. • If data has been gathered as part of the ence to that in your abstract. | | Jacques Masson European Space Agency (ESA) — THE NETHERLANDS | Bernard Schmidt- Deutsches Zentrur GERMANY |
| | Co-Chairs | | F3 1 | International Cooperation in using Space | for Sustainable |
| | Nelly Ben Hayoun Royal Holloway, University of London — UNITED KINGDOM | Mike Garrett University of Manchester — UNITED KINGDOM | 23.1 | As the societal benefits of space technologies and appli- agendas on sustainability and development, in particula Space (UNCOPUOS) has decided to develop a "Space20 | cations are growing, th ar the Sustainable Deve 30" agenda and its imp |





Romero A — GERMANY

AND OUTREACH SYMPOSIUM

d outreach activities through an interactive presentation on any of the subjects of the symposium. The tion and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon sentations, and the author will be assigned a specific ten minute slot to personally present the topic and y take advantage of digital capabilities, including powerpoints, embedded hot links, pictures, audio and st Interactive Presentation in the E Category at a special ceremony. When submitting abstracts for this session, work presented. • Provide a short but clear description of the activity or the programme. • Include some activity or programme. • Include lessons learned, recommendations or other take away messages in the body information about the practical applicability of the information. • Make sure that the abstract provides a

mes Research Center — UNITED STATES

te students who participate in an international student competition.

Bernelli-Zazzera ico di Milano — ITALY

of age) present technical papers on any project in space sciences, industry or technology. These papers will lents). The students presenting in this session will compete in the 44th International Student Competition. This bmitted to session E2.3. The selection of the oral presentations is solely based on the submitted abstracts. We description of your topic, including a detailed explanation of your contribution and the novelty of your work. s for the sessions E2.1 and E2.2 will be forwarded to the corresponding national competition coordinators. The e French national competition: Benedicte Escudier - benedicte.escudier@supaero.fr For the German national he US national competition - Felicia Livingston - felicial@aiaa.org For the UK national competition: Stuart Eves me, please check the CSA website http://www.asc-csa.gc.ca/ The guidelines for the student competition will be

te Escudier

Rapporteur

Supérieur de l'Aéronautique et de l'Espace (ISAE)

Jeong-Won Lee Korea Aerospace Research Institute (KARI) — KOREA, REPUBLIC OF

of age) present technical papers on any project in space sciences, industry or technology. These papers will lents). The students presenting in this session will compete in the 44th International Student Competition. This omitted to session E2.3. The selection of the oral presentations is solely based on the submitted abstracts. We description of your topic, including a detailed explanation of your contribution and the novelty of your work. for the sessions E2.1 and E2.2 will be forwarded to the corresponding national competition coordinators. The ie French national competition: Benedicte Escudier - benedicte.escudier@supaero.fr For the German national the US national competition - Felicia Livingston - felicial@aiaa.org For the UK national competition: Stuart Eves ne, please check the CSA website http://www.asc-csa.gc.ca/ The guidelines for the student competition will be

iedlaender

d Martin Space Systems Company — UNITED

Rapporteur

Emmanuel Zenou Institut Supérieur de l'Aéronautique et de l'Espace (ISAE) - FRANCE

any subject related to space sciences, industry or technology. These papers will represent the work of the will compete for the Hans von Muldau Team Award. The selection of the oral presentations is solely based it an abstract with an extensive description of your topic, including a detailed explanation of your contribution your team worked together to achieve the project goal should be included. The guidelines for the student rs after abstract acceptance.

Rapporteur

Kathleen Coderre Supérieur de l'Aéronautique et de l'Espace (ISAE) Lockheed Martin Corporation — UNITED STATES

ucational small satellites.

Bernelli-Zazzera ico di Milano — ITALY

LATIONS AND ECONOMICS

autics (IAA), will provide overview of the current trends in space policy, regulations and economics, by covering sium also integrates the 35th IAA/IISL Scientific-Legal Roundtabl

Schmidt-Tedd

es Zentrum für Luft- und Raumfahrt e.V. (DLR) –

ainable Development: Towards a "Space2030" Agenda

rowing, the international community has increasingly shifted its attention to their contributions to the global nable Development Goals (SDGs). In this regard, the United Nations Committee on the Peaceful Uses of Outer and its implementation plan. This session provides the opportunity to discuss potential elements of such an agenda, especially how international cooperation in space activities can contribute to these objectives.





| | Co-Chairs | | | |
|--|--|--|--|--|
| | Isabelle Duvaux-Bechon European Space Agency (ESA) — FRANCE | Dumitru-Dorin Prunariu Romanian Space Agency (ROSA) — ROMANIA | | |
| | Rapporteurs | | | |
| | Alexander Soucek | Peter Stubbe | | |
| | Austrian Space Forum — AUSTRIA | DLR (German Aerospace Center) — GERMANY | | |
| E3.2 The Future of Space Exploration and Innovation Technological innovation, new policies and initiatives have allowed both public and private actors to once again focus their energy on space exploration ventures. This session provides an opportunity to discuss the changing space exploration context and current challenges and opportunities for future space activities in this domain. | | | eir energy on space exploration ventures. This session future space activities in this domain. | |
| | Co-Chairs | | Rapporteur | |
| | Nicolas Peter | Marc Haese | Devanshu Ganatra | |
| | — Germany | DLR, German Aerospace Center — GERMANT | - INDIA | |
| E3.3 | Space Economy - New Models and Econom | nic Approaches for Private Space Ventures, W | ith an Emphasis on the Needs of Emerging | |
| | This session will focus on how financial and regulatory ind devoted to the dynamic of new space ventures, particula new and long run trends in socio-economic development governments and economies of space-faring nations. | centives from governments and from market mechanisms facil rly start-up companies in nations recently entering the space d from space activities recognizing and comparing the different | itate the access and use of space. Special attention will be omain. The session is intended to develop an overview of elements necessary for success given the wide variety of | |
| | Co-Chairs | | | |
| | Henry Hertzfeld Space Policy Institute, George Washington University — UNITED STATES | Jean-Jacques Tortora European Space Policy Institute (ESPI) — AUSTRIA | | |
| | Rapporteurs | | | |
| | Magda Cocco Vieira de Almeida & Associados — PORTUGAL | Mahulena Hofmann University of Luxembourg — LUXEMBURG | | |
| E3.4 Assuring a Safe, Secure and Sustainable Space Environment for Space Activities Space Activities provide a wealth of increasing benefits for people on Earth. However, space actors have come to realize that the benefits of the space infrastructure for the world community depend on technical, legal, policy and political means to keep a safe, secure and sustainable space environment. This session will explore the progress being made within multilateral fora, the private sector and individual countries in supporting the goal of a safe, secure and sustainable space environment. It will focus on the LTS Follow-up process at LINCOPLIDS the Guidelines agreed upon, new initiatives for STM and the way forward | | that the benefits of the space infrastructure for the world nent. This session will explore the progress being made ole space environment. It will focus on the LTS Follow-up | | |
| | Co-Chair | | Rapporteur | |
| | Ray A. Williamson — UNITED STATES | Jana Robinson The Prague Security Studies Institute — CZECH REPUBLIC | Peter Stubbe German Aerospace Center (DLR) — GERMANY | |
| E3.5 E7.6 | 35TH IAA / IISL Scientific-Legal Roundtable: Let's Go Digital: Legal and Technical Aspects of Autonomous, Digital Systems in an Al- Driven World INVITED PAPERS ONLY: NO UNINVITED AUTHOR ABSTRACTS The development of artificial intelligence-based autonomous systems for space operations is opening up a whole new set of questions about how these interact with existing legal concepts and technical standards. Intelligent satellites that enable collision avoidance will soon become standard practice; little human intervention will be required beyond the programming. One of the first questions is the extent to which the laws – particularly space laws - governing these technologies on earth are relevant and applicable to these activities in outer space. The growing reliance on autonomous technologies may require a fresh look at the traditional concepts behind the regulation of space activities. The specific attributes of autonomous space systems may also require further consideration when licensing space missions. The aim of this session is to explore the extent to which the world of Al-driven autonated processes for space operations and digital connections is developing from both a technical and legal perspective. It will examine how the technical developments, including systems for data sharing and space traffic management, may shape and transform the existing body of legal rules, regulations and practices that apply to space activities. This will inevitably also include how AI technologies relate to the traditional understandings of legal reconceptibility and liberationed proteoned record. | | | |
| | Co-Chairs | | Rapporteur | |
| | Marco Ferrazzani | Peter Martinez | Marc Haese | |
| | European Space Agency (ESA) — FRANCE | Secure World Foundation — UNITED STATES | DLR, German Aerospace Center — GERMANY | |
| E3.6 | Economics of Procurement in Space Contracting "The roles and responsibilities of space procurement agencies to support start-up companies " The industrial landscape involved in space and defense has until recently been primarily composed of large system integrators (prime contractors), independent (equipment) suppliers, and SME companies. Linked to the major increase in space and defense activities during recent years and the impact of the commercialization of the space domain many new entrants have arrived in the form of start-up companies. Today's start-up companies may become SME's during the next years, as their strengths – innovation, penetration of niche markets, enthusiasm, entrepreneurial drive, and low-cost structures are very important ingredients. However, it is observed that over 80% of the start-up companies fail within a couple of years. The reasons for failure are mainly the overestimation of the market needs, funding of cash problems, composition of the team, strong(er) competitors, inadequate pricing of products. Space procurement agencies can play an important role in helping start-up companies to become successful. Suitable procurement rules, fast procurement cycles, business incubator support centers are to be considered. The E3.6 session at the IAC in Dubai will be fully devoted to the growing role and importance of start-up companies in the industrial landscape of space companies. A keynote address will be given followed by a panel session and dedicated presentations for which the call for abstracts is herewith launched. | | | |
| | Co-Chairs | | | |
| | Eric Morel de Westgaver ESA - European Space Agency — FRANCE | Henry Hertzfeld Space Policy Institute, George Washington University — UNITED STATES | | |
| | Rapporteurs | | | |
| | Pieter Van Beekhuizen European Space Agency (ESA) — FRANCE | Karina Miranda Sanchez ESA — THE NETHERLANDS | | |
| E3.IP | Interactive Presentations - 33 RD IAA SYMP Authors with an abstract accepted for an interactive pres be assigned to interactive sessions in which they must be | OSIUM ON SPACE POLICY, REGULATIONS AND entation will be asked to prepare slides and display them for th near plasma screens to engage in interactive discussions with | ECONOMICS ne duration of the congress on plasma screens. Authors will other congress attendees. | |
| | Co-Chair | | | |
| | Jacques Masson European Space Agency (ESA) — THE NETHERLANDS | Bernhard Schmidt-Tedd Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | | |

| 54 TH IAA HISTORY OF ASTRONAUTICS SYMP History of space science, technology & development, rocke rocketry and astronautics in the Middle East. | OSIUM try, personal memo |
|--|---|
| Coordinators | |
| A. Ingemar Skoog – GERMANY | Otfrid Liepack National Aeronaut Propulsion Labora |
| Sandra Haeuplik-Meusburger Vienna University of Technology — Austria | |
| Memoirs, Organizational, Scientific and Tecc Autobiographical & biographical memoirs of individuals wh government, agencies, industrial, academic & professional history, at least 25 years old. | hnical Historie o have made origir societies & organiz |
| Co-Chairs | |
| Marsha Freeman 21 ⁴⁴ Century Science & Technology — UNITED STATES | Niklas Reinke Deutsches Zentrun GERMANY |
| Rapporteurs | |
| Philippe Cosyn — BELGIUM | Sandra Haeuplik-I Vienna University |
| Scientific and Technical Histories The symposium will cover the history of space science, exp include the entire spectrum of space history, at least 25 year | loration, innovation ars old. |
| Co-Chairs | |
| John Charles Space Center Houston — UNITED STATES | Vera Pinto Gomes European Commis |
| Rapporteurs | |
| Hannes Mayer Karl Franzens Universität Graz — AUSTRIA | Rachel Tillman The Viking Mars N Project (VMMEPP) |
| History of Middle Eastern Contribution to A Technical session with invited & proposed speakers. Origin the entire spectrum of space history, at least 25 years old. | stronautics ar (technical & politic |
| Co-Chairs | |
| Otfrid Liepack National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES | Karlheinz Rohrwil — GERMANY |
| Rapporteurs | |
| Kerrie Dougherty — AUSTRALIA | Radu Rugescu Association Dedico (A.D.D.A) — ROM |
| 31 ^{5T} IAA SYMPOSIUM ON SPACE AND SOU This 31 st symposium is organized by the International Acad Earth and in space. A broad range of topics may be covered as technology and knowledge transfer. | CIETY emy of Astronautic: I including arts and |
| Coordinators | |
| Geoffrey Languedoc Canadian Aeronautics & Space Institute (CASI) — CANADA | Olga Bannova University of Hous |
| Space Architecture: Habitats, Habitability, a Space Architecture integrates all topics related to designing prototype testing, manufacture, and operation of habitats requirements based on the "human factor"; 3) fabrication a | and Bases gand building huma for space and analo and construction of |
| Co-Chairs | |
| Olga Bannova University of Houston — UNITED STATES | Anna Barbara Imh Liquifer Systems G |
| Space Architecture: Habitats, Habitability, a Space Architecture integrates all topics related to designing prototype testing, manufacture, and operation of habitats requirements based on the "human factor"; 3) fabrication a | and Bases and building hum for space and analo and construction of |
| Co-Chairs | |
| Olga Bannova University of Houston — UNITED STATES | Anna Barbara Imh Liquifer Systems G |

E4

E4.1

E4.2

E4.3

E5

E5.1A

E5.1A





noirs. The entire spectrum of space history, at least 25 years old, is covered, as well as the history of

Kerrie Dougherty utics and Space Administration (NASA), Jet — AUSTRALIA 'atory — UNITED STATES

nal contributions to the development & application of astronautics & rocketry. History of zations long engaged in astronautical endeavors. This will include the entire spectrum of space

m für Luft- und Raumfahrt e.V. (DLR) —

Meusburger of Technology — AUSTRIA

Irene Farquhar — UNITED STATES

n & technology. Furthermore reflection on the cultural, socio-political impact are parts of it. This will

ssion — BELGIUM

Missions Education and Preservation) — UNITED STATES

Christophe Rothmund Airbus Safran Launchers — FRANCE

nd Astronomy

cal, science and social aspects) of the space activities & programs in the Middle East. This will include

ild

cated to Development in Astronautics IANIA

cs (IAA). Presentations will review the impact and benefits of space activities on the quality of life on d culture, space architecture, and society's expectations from space exploration and research, as well

ston — UNITED STATES

nan environments for use in space. The session welcomes papers in three areas: 1) research, design, log terrestrial environments; 2) how habitats influence human health, psychology, and efficiency, and of habitable complexes on planetary surfaces or in orbit.

Rapporteur

hof Group (LSG) — AUSTRIA **Anne-Marlene Rüede** Ecole Polytechnique Fédérale de Lausanne (EPFL) — SWITZERLAND

nan environments for use in space. The session welcomes papers in three areas: 1) research, design, og terrestrial environments; 2) how habitats influence human health, psychology, and efficiency, and f habitable complexes on planetary surfaces or in orbit.

Rapporteur

hof Group (LSG) — AUSTRIA Anne-Marlene Rüede Ecole Polytechnique Fédérale de Lausanne (EPFL) — SWITZERLAND



Co-Chairs

E5.3

E5.4



F5.2 Is Space R&D Truly Fostering A Better World For Our Future?

This session solicits papers for a panel discussion focusing on the distinct benefits to society from products derived from space research and development (R&D). The goal of this session is to examine and discuss cases of both emerging and established goals, best practices, and associated outcomes of knowledge sharing, technology transfer, and technology commercialization programmes as they relate specifically to societal benefits. Presenters will identify distinctive ways their organizations are promoting the relevance of space R&D to diverse societies. Attendees will develop a broader awareness of how they can also identify and promote the benefits of space R&D in order to influence broader support of space R&D investments. Panel Members are asked to introduce novel practices which: - Increase attendee understanding of how innovations resulting from space R&D have changed, and will continue to change, the world. - Promote productive thinking about optimizing space R&D investments in order to maximize societal benefits. - Increase the understanding of technology transfer policies and practices for both space and non-space utilization. - Demonstrate the correlation and synergies between technology transfer and STEM education for interdisciplinary space careers and technical entrepreneurship. - Measurably demonstrate the impact of innovation derived from space R&D when transferred into new products, services and processes

Rapporteur

Ines Prieto

SEMECCEL Cité de l'Espace — FRANCE

Anna Barbara Imhof

Liquifer Systems Group (LSG) — AUSTRIA

Olga Bannova Nona Minnifield Cheeks University of Houston — UNITED STATES National Aeronautics and Space Administration (NASA)/ Goddard Space Flight Center — UNITED STATES Contemporary Arts Practice and Outer Space: A Multi-Disciplinary Approach

Since the late 1970s a number of artists have been negotiating access to space facilities and organizations, critiquing or making experiential the exploration and utilization of space, or re-purposing space technology, materials or data independently or in direct exchange with the space sector. Today this important practice is branching into several directions, ranging from performance, installation, video, or conceptual work situated in space or space analogous environments themselves, to commercial gallery contexts and the realm of participation and public engagement with science. This session addresses the practice of contemporary artists who have developed new ways to appropriate space for their work, the conceptual and practical foundations of their engagement, and the implications of this emerging aesthetic paradigm for both the fields of space and art. Submissions are welcome from artists and art historians, and from space industry and space agency representatives as well as from the cultural sector facilitating or program related projects crossing over the increasingly blurred boundaries of creative practice.

| Co-Chairs | | Rapporteur |
|---|--|--|
| Richard Clar Art Technologies — UNITED STATES | Tibor Balint Art Center College of Design — UNITED STATES | Daniela de Paulis Rietveld Academy/ASCA - University of Amsterdam — THE NETHERLANDS |
| Space Assets and Disaster Manageme This session will explore the role space assets can p applications can be brought to bear to assist with s | nt lay in situations requiring disaster management and emergenc ituation monitoring and assessment, shortening response time | y response. Papers will discuss how space assets and s and mitigating impact on affected populations. |
| Co-Chairs | | |
| Geoffrey Languedoc Canadian Aeronautics & Space Institute (CASI) — | Jillianne Pierce Space Florida — UNITED STATES | |

E5.5 Sharing Space Achievements and Heritage: Space Museums And Societies

Space societies, professional associations and museums form a special and important group of IAF members - nearly one guarter of the membership and, as a sector, second in size after space industries. They include professional societies, space museums, space associations, non-profit organizations and other organizations interested in space activities. Some have a large membership of 10 000 or more, others can be small; a few are already a century old, others are just being created. They exist in traditional and emerging space nations. Together they champion the interests of an impressive number of individuals and organizations connected to space. Space Museums are the visible face of space for most of the general public. This symposium offers a podium for ideas and proposals to enhance the interaction between the organizations, their members and the Federation. Papers may address proposals to exchange experiences and best practices; sharing articles, exhibitions or educational material; novel ideas to help outreach to the general public, etc. Of particular interest are papers exploring ways to foster communication and collaboration and to develop mutual benefits amongst young societies, representatives of emerging space nations and museums within and outside the IAF family.

Jean-Baptiste Desbois

SEMECCEL Cité de l'Espace — FRANCE

Scott Hatton The British Interplanetary Society — UNITED

Co-Chairs

CANADA

KINGDOM Rapporteur

Clementine Decoopman

Space Generation Advisory Council (SGAC) — AUSTRIA

Interactive Presentations - 31ST IAA SYMPOSIUM ON SPACE AND SOCIETY E5.1P

This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Space and Society addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the E Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.

Co-Chair

Geoffrey Languedoc Olga Bannova Canadian Aeronautics & Space Institute (CASI) — University of Houston — UNITED STATES CANADA

IAF BUSINESS INNOVATION SYMPOSIUM

The Business Innovation Symposium, organized by the International Astronautical Federation (IAF), is designed to offer papers that observe, study, analyze, describe, and/or propose any topic related to space activities that have commercial objectives, whether from an academic and/or practitioner perspectiv

Coordinato

E6

F6.1

Ken Davidian Maria-Gabriella Sarah Federal Aviation Administration Office of Commercial European Space Agency (ESA) — FRANCE Space Transportation (FAA/AST) — UNITED STATES

Entrepreneurship and Innovation: The Practitioners' Perspectives

his session will contain a broad spectrum of entrepreneurship presentations from the perspective of the practitioner. Suggested topics that are suitable for this session can be at any level of analysis and deal with any aspect of entrepreneurship or innovation. Levels of analysis span a wide range, including (from macroscopic to microscopic): • the space industry (aka the "field" level of analysis) • an entire industry sector (aka the "community" level, e.g., space transportation), or a broad category of industry capability (e.g. Propulsion) • an industry segment or sub-sector (aka the "population" level, e.g., human suborbital), or a more specific industry capability (e.g., liquid rockets, or solid rocket motors) • an individual firm (aka the "organization" level) • a portion of a firm, or a group of individuals within a firm (aka the "sub-unit" level) • an individual (unsurprisingly projects, recent experiences of start-up companies, etc. ABSTRACT GUIDELINES: The submitted abstract should not exceed one page (approximately 300-400 words). The purpose of an abstract is to enable the abstract evaluation and paper selection committee to understand the essential hypothesis, method and findings of the research. Do not use telegraphic phrases. Do not repeat information given in the title. Do not use abbreviations.

Co-Chairs

Juergen Dresche Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) - GERMANY

E6.2.

Finance and Investment: The Practitioners' Perspectives This session will contain a broad spectrum of finance and investment presentations from the perspective of the practitioner. Suggested topics that are suitable for this session can be at any level of analysis and deal with any aspect of finance or investment. Levels of analysis span a wide range, including (from macroscopic to microscopic): • the space industry (aka the "field" level of analysis) • an entire industry sector (aka the "community" level, e.g., space transportation), or a broad category of industry capability (e.g. propulsion) • an industry segment or sub-sector (aka the "population" level, e.g., human suborbital), or a more specific industry capability (e.g., liquid rockets, or solid rocket motors) • an individual firm (aka the "organization" level) • a portion of a firm, or a group of individuals within a firm (aka the "sub-unit" level) • an individual (unsurprisingly referred to as the "individual" level) Example topics include descriptions of funding or investment of large programmes, new firms, or the analysis methodologies of markets, new developments in the investment communities (including angel investors, venture capital organizations, and investment banks. ABSTRACT GUIDELINES: The submitted abstract should not exceed one page (approximately 300-400 words). The purpose of an abstract is to enable the abstract evaluation and paper selection committee to understand the essential hypothesis, method and findings of the research. Do not use telegraphic phrases. Do not repeat information given in the title. Do not use abbreviations.

Co-Chairs

Joerg Kreisel JOERG KREISEL International Consultant (JKIC) -GERMANY

Innovation: The Academics' Perspectives

This session will contain academic presentations, at any level of analysis, and on any aspect of entrepreneurship, innovation, finance, or investment, organization theory. investment, etc. Variance and phenomenological studies are encouraged. Qualitative, quantitative, or mixed methods approaches are all accepted. Academic domains of interest include strategic management, economics, leadership, innovation management, and all perspectives of organization theory (including organizational economics, cognition and interpretation, power and dependence, technology, learning, complexity and computation, institutions, networks, ecology, and evolution). At a minimum, submissions are expected to be at the level of working papers performed as part of any graduate degree programme (i.e., masters, doctoral, and post-graduate). This work can include theoretical and applied research. ABSTRACT GUIDELINES: The submitted abstract should not exceed one page (approximately 300-400 words). The purpose of an abstract is to enable the abstract evaluation and paper selection committee to understand the essential hypothesis, method and findings of the research. Do not use telegraphic phrases. Do not repeat information given in the title. Do not use abbreviations. If selected during the March meetings, the authors will be asked to submit an extended abstract to ken.davidian@gmail. com within 60 days, with the following content and format: • Total Page Length: 5-10 pages • Sections: Introduction/Background, Literature Review, Methods, Data, Results, Conclusions, Limitations, Future Research • Page Margins (Left, Right, Top, Bottom): 1 inch/2.5cm • Font Size: 12 point • Font Style: Times New Roman • Line Spacing: Double Co-Chair

Ken Davidian Federal Aviation Administration Office of Commercial

Space Transportation (FAA/AST) — UNITED STATES

E6.4

E6.3

Considering today's global economic and industrial challenges, organizations have various risk appetites and risk profiles concerning the management of strategic risks and associated opportunities. In space and defense activities, the risk management process and procedures are designed to identify and mitigate potential threats and exploit opportunities to support decision makers. The ERM Technical Committee will offer a forum for all space and defense actors and stakeholders ranging from new to established entities. The session will reflect upon recent trends, validated good practices and lessons learned from organizations. Potential topics include changes to strategic risk frameworks due to the impact of emergent and disruptive technologies, etc. Other topics suggestions are welcome.

Co-Chair

Maria-Gabriella Sarah European Space Agency (ESA) — FRANCE

E6.5 GTS.1

E7

Entrepreneurship Around the World

Entrepreneurship has different characteristics that differ from country to country around the world. Some of the challenges that entrepreneurs face transcend national and cultural borders, but some others do not. This session welcomes papers and presentations that describe the barriers experienced by real entrepreneurs in their different countries and regions around the world. A summary discussion will identify the commonalities and unique characteristics of nation-specific entrepreneurial barriers as identified by the presenters. This is a technical session co-sponsored by the IAF Entrepreneurship and Investment Committee (EIC) and the IAF Workforce Development/Young Professionals Programme Committee, as part of the Global Technical Sessions – presenters can present in person at the IAC or from their home/work/university location. ABSTRACT GUIDELINES: The submitted abstract should not exceed one page (approximately 300-400 words). The purpose of an abstract is to enable the abstract evaluation and paper selection committee to understand the essential hypothesis, method and findings of the research. Do not use telegraphic phrases. Do not repeat information given in the title. Do not use abbreviations.

Co-Chairs

Ken Davidian **Elizabeth Seward** Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) — UNITED STATES

E6.IP

Interactive Presentations - IAF BUSINESS INNOVATION SYMPOSIUM

This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Business Innovation addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best interactive Presentation in the E Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts. Co-Chair

Ken Davidian

Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) — UNITED STATES

IISL COLLOQUIUM ON THE LAW OF OUTER SPACE

The 2020 IISL Collequium focuses on how latest technological developments are impacting the development of the law of outer space, and on whether space law should embrace new fields of activities, such as cyber, within its scope. The Colloquium looks at current discussions about settlements on the Moon and Mars from the perspective of compliance with international space law. It examines the interface between remote sensing technology applications and the law, including whether a new regulatory framework is needed for an increasingly digitalized and networked world that combines multiple sources of data with satellite-based network systems. It looks at whether existing legal concepts, particularly responsibility and liability for autonomous systems driven by artificial intelligence are sufficiently regulated, also from a perspective of homogenous approach to licensing at national level.

Coordinators

Lesley Jane Smith Catherine Doldirina Leuphana University of Lünebura/Weber-Steinhaus & International Institute of Space Law (IISL) — ITALY Smith - GERMANY

ΔΔ





Strategic Risk Management for Successful Space & Defence Programmes

Airbus Defence and Space Ltd — UNITED KINGDOM





| E7.1 | IISL Young Scholars session and Dr. Jasentuliyana Keynote lecture by a leading space law expert This session is open for abstracts and papers from space lawyers under 35 years old. It welcomes contributions on any topics related to space law. It also features a regular, annual keynote presentation by a leading space law expert. In 2020, the invited speaker is Prof. Stephan Hobe from Germany. | | | |
|--------------|--|---|--|--------------|
| | Co-Chairs | | Rapporteur | |
| | Kai-Uwe Schrogl | Mohamed Amara | Jenni Tapio | E7.IF |
| E7.2 | Consisting of authorization of space activities, the collision of national legislations, the jurisdiction in civil and criminal cases, the extension of human rights to the persons on the celestial bodies, the ownership of objects created on celestial bodies, intellectual property, the protection of environment, space transport, as well as allocation of frequencies to the tunar and Martian communication. | | | |
| | Co-Chairs | | Rapporteur | |
| | Mahulena Hofmann University of Luxembourg — LUXEMBOURG | Zhenjun Zhang China Institute of Space Law — CHINA | Federico Bergamasco University of Luxembourg — LUXEMBOURG | |
| E7.3 | Legal Implications of Evolving Remote Sensing Technologies New and evolving remote sensing technologies pertinent to all aspects of remote sensing activities are rapidly progressing and being deployed worldwide. A wider and greater availability of such technology is reinforced by new space-based systems, including smallsats, constellations and launch vehicles, data collection and storage capabilities. These advances are catalyzing a new generation of national laws and regulations while adding new issues for existing international space law to resolve or address. The U.S. is in the process of legislating an entirely new remote sensing law. New Zealand has new laws applicable to launching activities that take into account the explosive growth of small satellite data collection. Portugal has new legislation addressing the commercial potential of these activities. At the international level, the question of international responsibility under the Outer Space Treaty becomes ever more relevant. Furthermore, states need to address how to "authorize and continually supervise" remote sensing systems that use new technologies. Legal aspects regarding access to and processing of remote sensing data are also changing as more data is generated by the private sector for government use at both national and international levels. This session invites authors to contribute to these and other legal aspects of remote sensing. | | | |
| | Co-Chairs | | Rapporteur | |
| | Joanne Gabrynowicz International Institute of Space Law (IISL) — UNITED STATES | George Kyriakopoulos National and Kapodistrian University Of Athens — GREEC | Kamlesh Brocard E Swiss Space Office (SSO) — SWITZERLAND | E8.1 |
| E7.4 | Application of Space Law to Cyber Activities It is difficult to overstate the reach of cybertechnologies, which have become embedded in the everyday life of developed and developing countries alike. Space is no exception to the reach of these technologies. This session will investigate the legal issues that arise from the various aspects of the intersection of space activities and cyberspace. Some questions to be discussed are: When do cyber activities relate to space systems (manned and non-manned) in a way that they can be considered as space activities under the space treaties? Are unauthorized cyber activities [e.g., interference], such as the hacking of flight or payload controls of a space object, space activities? Can an unauthorized cyber activity [e.g., interference] to databases on the ground that hold data or provide conjunction assessment be considered a space activity under the space treaties? How responsibility and liability under the space treaties are applicable? Can a cyber activity be legally considered as an 'attack'? Which scenarios would fall under the term 'attack' and which do not? | | | |
| | Co-Chairs | | Rapporteur | ES |
| | PJ Blount University of Luxembourg — LUXEMBOURG | Martha Mejia-Kaiser Independent Researcher — GERMANY | Rada Popova Institute of Air and Space Law, University of Cologne — GERMANY | |
| E7.5 | National Space Law Developments with Particular Focus on The Middle East Region National space law implements the principles and general norms of space law to ensure their applicability and enforcement at national level. It also reflects the details of a state's national regulatory structure as well as elements of national legal culture. Since national space law defines the scope of space activities and those falling under its jurisdiction, it has a comparative nature. This annual session has a particular focus this year on the national space statutes and regulations promulgated across the Middle east. It also invites consideration of whether and if so, how states approach implementation of the various sets of non-binding rules applicable to outer space activities, whether debris mitigation or the more recently approved long term sustainability guidelines the soft law rules of space law the extent to which considers the extent to which in 2020 on developments in space law with a particular regard to the middle eastern region. It has a comparative format and has enabled the transitions and reforms in the community of | | | |
| | Co-Chairs | | Rapporteur | |
| | Armel Kerrest University of Western Brittany (UBO) — FRANCE | Sridhara Murthi K. R. Jain University — INDIA | Zeina Ahmad University of Leiden — THE NETHERLANDS | |
| E7.6 E3.5 | 35 th Joint IISL /IAA round table: Let's Go World The development of artificial intelligence-based automotigat concepts and technical standards. Intelligent sately beyond the programming. One of the first questions is to these activities in outer space. The growing reliance activities. The specific attributes of autonomous space the extent to which the world of Al-driven automated p will examine how the technical developments, includin regulations and practices that apply to space activities. liability under national and international space law. Co-Chairs | Digital: Legal and Technical Aspects of Autono mous systems for space operations is opening up a whole new lites that enable collision avoidance will soon become standar the extent to which the laws – particularly space laws - govern on autonomous technologies may require a fresh look at the t systems may also require further consideration when licensing processes for space operations and digital connections is devel g systems for data sharing and space traffic management, may This will inevitably also include how AI technologies relate to | west of questions about how these interact with existing d practice; little human intervention will be required ing these technologies on earth are relevant and applicable raditional concepts behind the regulation of space space missions. The aim of this session is to explore oping from both a technical and legal perspective. It shape and transform the existing body of legal rules, the traditional understandings of legal responsibility and | E9.2 D5.4 |
| | Marco Ferrazzani | Peter Martinez | | |
| | European Space Agency (ESA) — FRANCE Rapporteurs | secure World Foundation — UNITED STATES | | |
| | Marc Haese | Nicola Rohner-Willsch | | |
| | DLR, German Aerospace Center — GERMANY | Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY | | |
| E7.7 | Space Law in a Networked World Space applications have entered human daily lives all o positioning, images and video flows emerge, literally, fr machines. These process big data and furnish us with v | ver the globe. Voice and Interned-based communications, wea om our pockets. Not only people and businesses have become ital information for decision-making. This may even include de | ather reports and emergency warnings, navigation and e constantly networked via space capabilities, but also cision-making for us. Could the authors of the United | |

Co-Chairs

Elina Mor Intersputnik International Organization of Space Communications - RUSSIAN FEDERATION STATES

This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Space Law addressed in the classic Sessions. The IP session is not restricted to any specific topic related to space law and invites authors to contribute presentations on any interesting, relevant and current space law issues. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the E Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.

Co-Chair

Lesley Jane Smith Catherine Doldirina Leuphana University of Lüneburg/Weber-Steinhaus & International Institute of Space Law (IISL) — ITALY Smith — GERMANY

IAA MULTILINGUAL ASTRONAUTICAL TERMINOLOGY SYMPOSIUM

This symposium, organized by the International Academy of Astronautics (IAA), will review the progress made in multilingual space terminology and its impact on international cooperation in space. Terminology is a key issue for a better understanding among people using various languages and dialects. Consecutive or simultaneous translation does not remove the risk of ambiguity during technical meetings and accuracy in terminology is essential during all phases of cooperation. The session will address issues such as standardization of definitions in space science and technology. The specific character of emerging space countries will also be discussed.

Coordinators

Susan McKenna-Lawlor Space Technology (Ireland) Ltd. — IRELAND

Multilingual Astronautical Terminology

This symposium, organized by the International Academy of Astronautics (IAA), will review the progress made in multilingual space terminology and its impact on international cooperation in space. Terminology is a key issue for a better understanding among people using various languages and dialects. Consecutive or simultaneous translation does not remove the risk of ambiguity during technical meetings and accuracy in terminology is essential during all phases of cooperation. The session will address issues such as standardization of definitions in space science and technology. The specific character of emerging space countries will also be discussed

Co-Chairs

Susan McKenna-Lawlor Space Technology (Ireland) Ltd. — IRELAND

IAF SYMPOSIUM ON SPACE SECURITY

This symposium, organized by the IAF Committee on Space security, will address two major issues regarding safe and secure operations of space systems via two separate sessions: i) policy, legal, institutional and economic aspects of space debris detection, mitigation and removal, jointly with the IAA Symposium on Space Debris, and, ii) cyber security threats to space missions and countermeasures to address them, jointly with the IAA Symposium on Safety, Quality and Knowledge Management on Space Activities. Papers dealing with non-technical aspects of space debris mitigation and removal, and case studies focusing on countermeasures needs, including cryptography processes, operational security, supply chain and other aspects relevant to ensure a "cyber secure" mission will be well received in this Symposium.

Coordinators

Serge Plattard Stefano Zatti University College London (UCL — UNITED KINGDOM European Space Agency (ESA) — ITALY

Policy, Legal, Institutional and Economic Aspects of Space Debris Detection, Mitigation and Removal This session will deal with the non-technical aspect of space debris mitigation and removal. Political, legal and institutional aspects include the role of IADC and UNCOPUOS and

in addressing these issues will be considered. Co-Chairs David B. Spencer Serge Plattard

The Pennsylvania State University – UNITED STATES

Ms. Samantha Le May RMIT University (Royal Melbourne Institute of Technology) – AUSTRALIA

Cyber-Security Threats to Space Missions and Countermeasures to Address them

The global network connectivity offered by the Internet introduces whole new families of cyber-security threats that can target space missions. To send commands to a spacecraft nowadays one would not need to build a ground station, but just penetrate from home or office the existing ground infrastructures, challenging and bypassing their protection measures. These questions will be addressed in the session: - What is the interest of cyber-crime and cyber-activism with respect to space activities? - How are aerospace organizations managing the ability to introduce the right level of security measures in the process to develop new missions? - What solutions are in place to work securely across corporate and international boundaries? - How is knowledge about security threats captured, shared among the constituency, and used to counteract the evolution of cyber threats? - Which ones of these specific threats are to be expected to target space missions, from the ground and up into space? - What is particularly to be expected from the cyber-space to target outer space? Case studies will focus on cryptography, processes, operational security, supply chain, and other aspects of space missions that are all constituting the technical and organizational measures necessary to make a mission "cyber secure".

Co-Chair

Stefano Zatti ESA — ITALY

Stefano Ferretti Space Renaissance International — ITALY

still keeps pace with modern times or there is an urgent need to reflect these changes in a regulatory framework.

Nations space treaties have imagined how significant those principles of space activities were or would become for ensuring public interest and the quality of life, health, and well-being of Earth's population? Tangible changes in the exploration and use of outer space have taken, and continue to take place. With an ever increasing number of space actors and the continuous development of new technologies, space is becoming more accessible and affordable. This session aims at discussing whether traditional space law

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Rapporteur

Olga Stelmakh-Drescher International Institute of Space Commerce — UNITED

Gina Petrovic University of London — GERMANY

Interactive Presentations - IISL COLLOQUIUM ON THE LAW OF OUTER SPACE

Tetsuo Yoshimitsu

Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

Tetsuo Yoshimitsu

Rapporteu Fabrice Dennemont

Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency — JAPAN

International Academy of Astronautics (IAA) - FRANCE

other multilateral bodies. Economic issues including insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation

University College London (UCL — UNITED KINGDOM

Alexander Soucek European Space Agency (ESA/ESRIN) – ITALY

Rannorteur

Julien Airaud Centre National d'Etudes Spatiales (CNES) — FRANCE



| atogory | | | | | |
|---------|--|---|--|--|--|
| ategory | GTS. GLOBAL TECHNICA | L SYMPOSIUM (GTS) | | | |
| | The Global Technical Symposium (GTS) is designed to offer a modern and eclectic platform at the IAC for sharing technical content to an open minded audience on-site but also online! Jointly organized by associated technical committees and the Workforce | | | | |
| | Development-Young Professional Prog | ramme Committee, these sessions are similar | to the conventional technical sessions in terms | | |
| | are also broadcast online. Authors are | allowed to present remotely or on-site, and p | articipants are also allowed to listen the the | | |
| | session from the comfort of their home | es or at their workplaces in addition to the IAC | venue. The IAF hopes that this approach will | | |
| | enable more students and young profe | ssionals without the ability to join IAC on-site | to contribute to discussion at the IAC. | | |
| | GTS.2 HUMAN SPACEFLIGHT G | COBAL TECHNICAL SESSION | | | |
| | GTS.3 SPACE COMMUNICATIO | NS AND NAVIGATION GLOBAL TECHNICAL | SESSION | | |
| | GTS 5 SMALL SATELLITE MISS | | | | |
| | | | | | |
| | Coordinated by Stephanie Wan, Space Generation Advisory Council (SGAC) – | Generation Advisory Council (SGAC) — UNI - CANADA | TED STATES and Seyed Ali Nasseri, Space | | |
| GTS.1 | Entrepreneurship Around the World | | | | |
| E6.5 | Entrepreneurship has different characteristics that di cultural borders, but some others do not. This session | ffer from country to country around the world. Some of the ch n welcomes papers and presentations that describe the barrie | allenges that entrepreneurs face transcend national and rs experienced by real entrepreneurs in their different countries | | |
| | and regions around the world. A summary discussion | will identify the commonalities and unique characteristics of | nation-specific entrepreneurial barriers as identified by the | | |
| | Programme Committee, as part of the Global Technic | al Sessions – presenters can present in person at the IAC or fro | om their home/work/university location. ABSTRACT GUIDELINES: | | |
| | The submitted abstract should not exceed one page to understand the essential hypothesis, method and | approximately 300-400 words). The purpose of an abstract is findings of the research. Do not use telegraphic phrases. Do not | to enable the abstract evaluation and paper selection committee ot repeat information given in the title. Do not use abbreviations. | | |
| | Co-Chairs | | | | |
| | Ken Davidian | Elizabeth Seward | | | |
| | Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) — | Airbus Defence and Space Lta — UNITED KINGDOM | | | |
| | UNITED STATES | | | | |
| GTS.2 | Human Spaceflight Global Technical So | ession | | | |
| B3.9 | The Human Space Endeavours Global Technical Sessi- the future of Human Space Endeavours. This is a Glo | on is targeting individuals and organizations with the objective bal session co-sponsored by the Human Space Endeavours Cor | of sharing best practices, future projects, research and issues for nmittee and the Workforce Development/Young Professionals | | |
| | Programme Committee. | | ····· | | |
| | Co-Chairs | | | | |
| | Guillaume Girard | Andrea Jaime | | | |
| CTC 2 | Concerning Strain | | | | |
| B2 8 | A Global session to present and discuss development | is in a wide range of satellite communication topics, including | ixed, mobile, broadcasting, and data relay technologies and | | |
| 02.0 | services, as well as those for satellite-based position determination, navigation, and timing. Both Earth's orbital and interplanetary space communications topics can be addressed. | | | | |
| | Co Chaire | ations and wavigation committee and the workforce bevelop | Papagetour | | |
| | | Stankonia Wan | | | |
| | - GERMANY | Space Generation Advisory Council (SGAC) — UNITED | ESA — THE NETHERLANDS | | |
| | | STATES | | | |
| GTS.4 | Student Team Competition | | | | |
| E2.3 | Undergraduate and graduate level student teams pre authors (three or more students). Students presenting | sent papers on any subject related to space sciences, industry g in this session will compete for the Hans von Muldau Team A | or technology. These papers will represent the work of the Award. The selection of the oral presentations is solely based | | |
| | on the submitted abstracts. We strongly recommend that you submit an abstract with an extensive description of your topic, including a detailed explanation of your contribution and the novelty of your work. Furthermore, a short description how your team worked together to achieve the project anal should be included. The guidelines for the student | | | | |
| | competition will be distributed from the session chai | rs to the authors after abstract acceptance. | lect goal should be included. The guidelines for the student | | |
| | Co-Chairs | | Rapporteur | | |
| | Andrea Jaime | Emmanuel Zenou | Kathleen Coderre | | |
| | OHB System AG - Munich — GERMANY | Institut Supérieur de l'Aéronautique et de l'Espace | Lockheed Martin Corporation — UNITED STATES | | |
| | | | | | |
| GTS.5 | Small Satellite Missions Global Technic The Small Satellite Missions Global Technical Session | cal Session (GTS) is a collaboration between the International Academy of | Astronautics (IAA) Small Satellite Missions Symposium and the | | |
| в4.9 | International Astronautical Federation (IAF) Workford | e Development/Young Professionals Programme Committee. | This session is unique in that it allows for sharing of information | | |
| | on a global scale with presenters and audience both or mature proposals for small satellite systems and re | at the IAC venue and online at their home/work/university loc elated topics. These must have clear relevance on an internation | ations. Abstracts are solicited regarding operational missions anal scale or at a business level, and must also provide voung | | |
| | professionals a taste of what the space sector has to | offer. Where possible, abstracts should have a wide interest in | the community and should include transferable knowledge or | | |
| | ressons rearned. Abstracts highlighting ingenuity or in commercial challenges, or novel technologies that ha | novation are preterred. Examples include space missions utiliz we the potential to revolutionize space missions and/or enable | ing small satellites that address specific new societal, scientific or their access to space. Papers are to describe the specific need. | | |
| | the small satellite approach that addresses this need | , the benefits of this approach and the use of space technology | /, and demonstrate that other non-space approaches provide | | |
| | Co Choire | ing professional community are preferred. This session will be | Accepting submissions for oral presentations only. | | |
| | | Madantia | Rapporteur | | |
| | Matthias Hetscher | Norbert Lemke | Alex da Silva Curiel | | |

9. IAC 2020 Technical Sessions Deadlines Calendar











10. Preliminary IAC 2020 at a Glance



11. Instructions to Authors

Abstract Preparation

Format

- Abstracts must be written in English.
- Abstract length should not exceed 400 words.

Content

- Tables or drawings are not allowed in the abstract.
- Formulas can be included using the LaTeX box provided on the
- abstract submission web page.
 Abstracts should specify: purpose, methodology, results and conclusions.
- Abstracts should indicate that substantive technical and/or programmatic content is included.

Co-authors

All your co-authors should be added at the time you submit your abstract using the tool provided online. You should register all of them online indicating their name, affiliation, full postal address, phone and email address.

Abstract Submission

Signing in

- The submission of abstracts must be done exclusively on the IAF website restricted area <u>www.iafastro.net</u>
- If you are submitting an abstract on our website for the first time, you will need to register.
- In case you have forgotten your password, please use the password recovery utility.

Submission

- Go to the new abstract submission page.
- Browse the technical programme and choose the symposium and technical session for which you want to submit your abstract.
- Type the title and content of your abstract into the related fields.
- Choose you presentation preference: oral presentation only, interactive presentation only, oral or interactive.
- Confirm that the material is new and original and that it has not been presented at a previous meeting.
- Confirm that your attendance at IAC 2020 to deliver and present the paper is assured.

Note: An abstract can be submitted to only one Technical Session and duplicates will be discarded.

Abstract Selection

Submitted abstracts will be evaluated by the Session Chairs on the basis of technical quality and relevance to the session topics. Prospective authors should certify that the paper was not presented at a previous meeting. Selected abstracts may be chosen for eventual oral or interactive presentation – any such choice is not an indication of quality of the submitted abstract. Their evaluation will be submitted to the Symposium Coordinators, who will make acceptance recommendations to the International Programme Committee which will make the final decision. Please note that any relevance to the Congress' main theme will be considered as an advantage.





Paper and Presentation Submission

- Details on how to prepare and submit your final paper as well as your presentation material will be available on <u>www.iafastro.org</u> by mid-April.
- Authors with an abstract accepted for oral presentation will be offered a presentation slot of 10 to 20 minutes.
- Authors with an abstract accepted for interactive presentation will be offered a presentation slot of 10 minutes.
- Authors with an abstract accepted for an interactive presentation will be asked to prepare slides and display them for the duration of the congress on screens. Authors will be assigned a specific screen number and will have a dedicated slot during which they will have the opportunity to engage in interactive discussion with other Congress attendees.

Additional Information

Preliminary versions of the IAC proceedings will be available to participants at the Congress electronically. More information about the IAC Archive is available on the IAF website: www.iafastro.org

Authors should follow the above general procedure. An additional suitability requirement is that the proposed topic must be related to a potential or on-going IAA Study Group activity.

Authors should follow the above instructions for the submission of their abstracts. In addition to the IAC Proceedings, the papers of the Colloquium, along with other materials, will be published in the Proceedings of IISL. Authors who qualify may ask to be considered for the Dr I.H. Ph. Diederiks-Verschoor Award for Best Paper. Please contact the IISL secretary for the regulations at secretary@iislweb.org.

DEADLINES

| Abstract Submission | 28 February 2020 |
|--|-------------------|
| Interactive Presentation Submission | 25 September 2020 |
| Paper Submission | 28 September 2020 |
| Oral Presentation Submission | 5 October 2020 |

Please make sure to check the IAF website (<u>www.iafastro.org</u>) and the IAF App regularly to get the latest updates on the Technical Programme!

QUESTIONS

Abstract submission and/or oral presentations: support@iafastro.org

Interactive presentations: ipsupport@iafastro.org



12. Space in the United Arab Emirates

The UAE has long viewed space exploration as the bridge linking humans to its future - the industry has inspired unparalleled growth and innovation, and has advanced collaboration on a truly global scale. The UAE's leaders, attuned to the potential and possibilities of a thriving space sector, have therefore firmly integrated it into their vision for the nation's future. And the UAE's framework of robust economy, infrastructure and national competencies has made the genesis of strong, flourishing space sector possible.

Today, the UAE's space sector has to its credit a long, impressive list of achievements. The UAE has a national Space Programme under the umbrella of the Mohammed Bin Rashid Space Centre (MBRSC). Over the last few years it has launched a number of Earth-observation, remote-sensing satellites into space, among which are: Nayif-1 CubeSat, Dubai Sat-1, Dubai Sat-2 and KhalifaSat, the first satellite developed 100% in the UAE by a team of highly qualified Emirati engineers. Aerospace industries, particularly satellites and their services, are among the top drivers of economic growth, and the UAE is set to reap the benefits of its investments. The nation's satellites can capture images of unprecedented accuracy, which will be supplied to government and private sectors organisations around the world.

The UAE has now also successfully completed its first manned mission into space under the UAE Astronaut Programme that is managed by the Mohammed Bin Rashid Space Centre (MBRSC), having sent the first Emirati astronaut to the International Space Station (ISS). Meanwhile, MBRSC is on course to launch the Emirates Mars Mission (EMM) - Hope Probe in 2020, which will mark the first-ever Arab space exploration of the Red Planet. In addition to the development of the Mars 2117 vision to build a human colony on Mars.

This is but a prelude to the ground-breaking trajectory the UAE has set down. Piece by piece, the nation is stitching together a promising future for itself, and for the generations that will follow. The space sector was established to help drive the UAE's shift to a knowledge-based economy. Its objectives include creating new generations of Emirati scientists, engineers, researchers, academics and experts to support an informationbased infrastructure.

The UAE has the infrastructure and the dedication to move to the forefront of the global space industry, and now positioned to make significant contributions to the growth of space science and technology, and ultimately, the future of humankind



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