



IAC 2015
Jerusalem

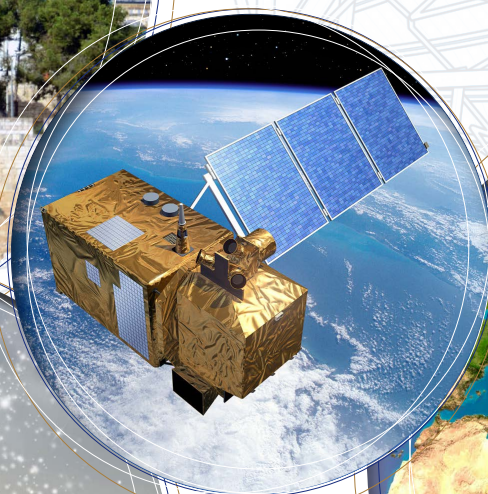
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66th IAC

International Astronautical Congress

**Call for Papers &
Registration of Interest**

**12 - 16 October 2015
Jerusalem, Israel**



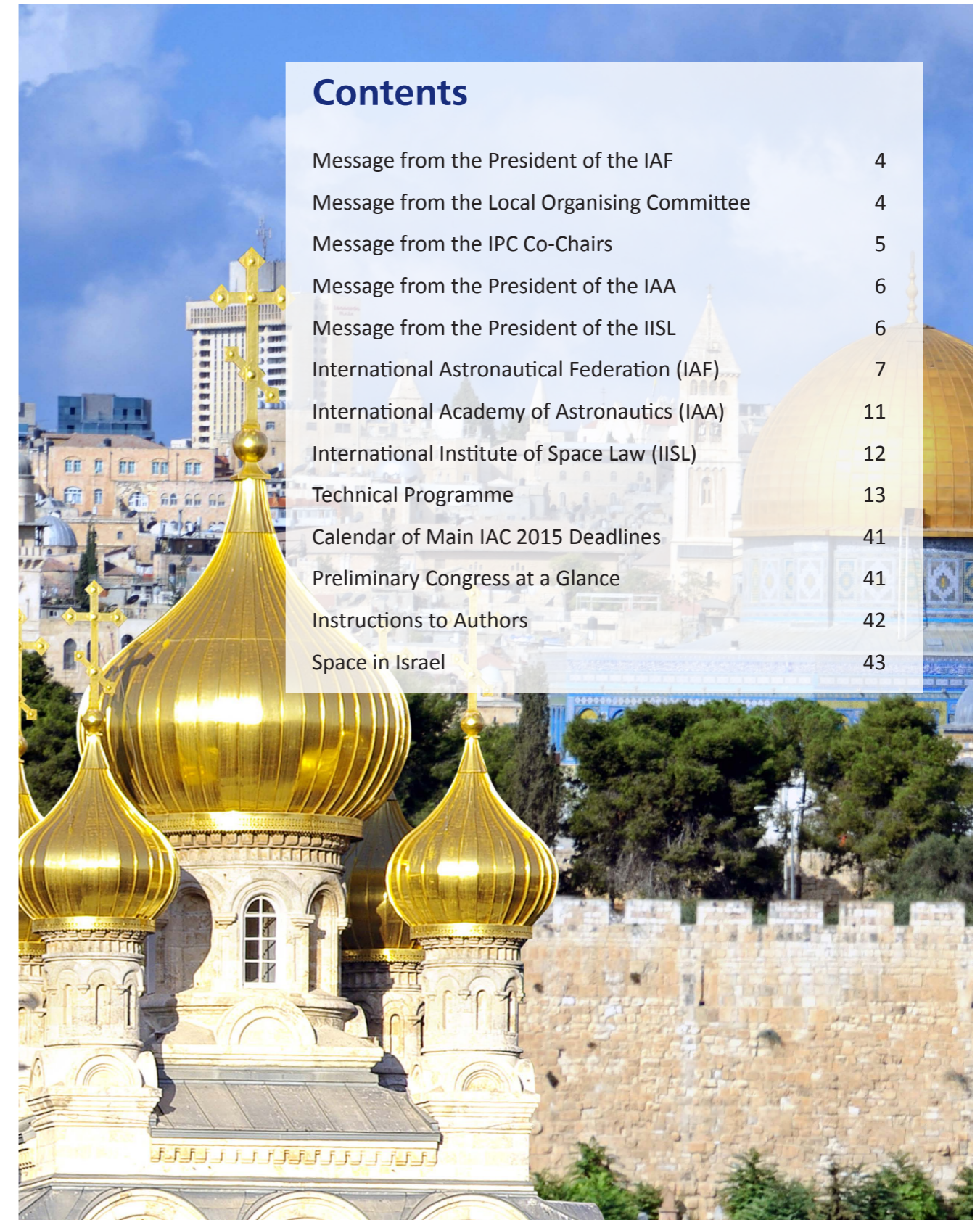
*Space – The Gateway for
Mankind's Future*





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Message from the President of the IAF



I have the great pleasure of inviting you to attend the 66th International Astronautical Congress in the vibrant, multicultural city of Jerusalem.

The IAC is returning to Israel 21 years after Jerusalem hosted the 45th Congress.

Despite being a small country, Israel is regarded internationally as a global leader in space science and technology. With its diverse space industrial facilities and technical expertise, Israel has much to offer to the international space community. As an example, on the basis of Cost-to-Performance analysis, Israel's imaging satellites are amongst the best worldwide.

Israel's space industry also encompasses some 20 companies engaged in satellite development and manufacturing, satellite operation, the sale of communication and remote sensing services, and the sale of ground equipment. The technical visits planned for IAC 2015 will give a great insight into Israel's space activities, and there will also be the usual broad range of IAC events. This includes highlight lectures from eminent space professionals, plenary sessions, the Global Networking Forum and associated events such as the UN/IAF workshop.

I am sure that the 66th IAC will be a great success, not only due to the prowess of Israel in the international space arena, but also due to the commitment and hard work of our hosts in Jerusalem, the Israel Space Agency. Our colleagues are already working tirelessly to ensure the success of the IAC and its associated exhibition.

I am confident that our Israeli hosts, along with the IAF's partner organisations, the IAA and IISL, will produce a fascinating Congress at a challenging and exciting time for the global space community

See you in Jerusalem!

Kiyoshi Higuchi
President, International Astronautical Federation

Message from the Local Organising Committee

We, the IAC-2015 LOC have the honor and privilege to host the 66th IAF International Astronautical Congress, in Jerusalem.

Jerusalem is a cradle of faith and hope, with an abundance of history, religious significance for many different faiths, where the ancient and modern come together.

The IAC 2015 theme is: **Space - The Gateway for Mankind's Future**. Space is non-sovereignty entity, belonging universally to all, without borders or limits. Space is the platform for creating future excellence and economic advantage. Space science and exploration demands comprehensive technological expertise, producing and providing giant leaps in global technology development, such as communication, computerization, new materials and much more. Space exploration enables mankind to better understand the creation of planet earth, the universe's make-up, and how to benefit from space to keep planet earth safe and thriving.

Jerusalem, Israel's largest city, is a mosaic of unique contrasts of cultures and nationalities; of ancient history and modern progress; offering an exceptional amalgamation of spiritual sanctity and colorful culture. The city enjoys a vibrant nightlife, first rate accommodation, diverse amenities, cosmopolitan infrastructures, and advanced innovations.

Amalgamating the **IAC 2015** Congress with domestic and international Space Industries and enterprises formulates an extremely rich and unique program for the Congress, with plentiful opportunities for exchange between industries, scientists, academia, and professionals.

Many of Israel's high-tech companies, with their diverse space industrial facilities, space technology, expertise, and know-how, have much to offer to the international space community. Israel's academia and research institutions represent the cutting-edge of research, technology, development, and space exploration, which will be available for IAC participants to experience, gain first-hand knowledge and discover.

Visiting Israel is a life-changing experience. The country features an abundance of history, religious significance for many different faiths; 21st Century amenities and infrastructures, advanced innovations, high-tech technologies, and unique landscapes.

The LOC undertakes to provide the Congress' participants with a unique experience, including the scientific and academic sessions, social gatherings and events, exceptional tourism, flawless logistics and tight security arrangements.

Your visit to Jerusalem and Israel shall remain with you for a life-time.

Sincerely,

Menachem Kidron
IAC 2015 Chair

Orna Marie Orshan
IAC 2015 Co-Chair

Daniel Barok
IAC 2015 Co-Chair

Message from the IPC Co-Chairs

The 66th IAF International Astronautical Congress takes place in the beautiful and unique city of Jerusalem, Israel.

In 1994, Israel very successfully hosted the 47th International Astronautical Congress. Ever since, Israel's space sector has developed and expanded in diverse areas, in R&D, industry, innovation, and in space sciences and exploration.

The IAC 2015 theme is: **Space - The Gateway for Mankind's Future**.

Planet Earth is a living entity, perpetually changing, affecting every living creature on its surface, and above. The implementation and the adaptation of space technology for peaceful usage are essential, in order to ensure the survival of all life forms.

Space is non-sovereignty entity, belonging universally to all, without borders or limits. Global cooperation in peaceful space exploration can provide significant benefit to all contributing partners; in monetary efficiency; diplomatic and political stability; providing employment opportunities; boosting economic stability, through new technological development and innovations.

Space is the stuff that dreams are made of; it is the force which compels the fascination of present and future generations to explore science in all its diverse facets, to learn and dream. Space science and exploration not only advances mankind in countless ways, it lifts and encourages the human spirit.

Space science, exploration, and technology are the important contributors for working towards the eradication of poverty, disaster management, improving health care, environmental stability and development, communications, maritime control and navigations, just to name a few.

Exceptional plenary sessions are planned for IAC 2015, to include the participation of global space industries, space agency leaders, and international scientists and academic experts on important space subjects. Additionally, highlight lectures and late breaking news sessions shall take place, alongside associated and side events including the UN/IAF Workshop, and IAC mainstays such as the Global Networking Forum, and much more.

The IAC-2015 includes a large space exhibition, where global and domestic industries, academia and space science and exploration entities will present their newest achievement in space innovations, thus providing an excellent opportunity for business-to-business meetings and discussions, for future joint venture and cooperation. The Congress welcomes participants from all nations who wish to attend, or present a paper. Papers are solicited under many different symposia, and for various technical sessions as noted in this brochure.

IAC 2015 presents an unparalleled opportunity to impart your recent research or findings, as well as to accumulate new knowledge and information in your field of interest. Most importantly, the Congress week will provide ample opportunities to network with renowned experts and leaders, and young talent in the form of students and young professionals, in different areas of space.

We hope that this Call for Papers encourages you to submit an abstract for presentation at the **66th International Astronautical Congress, in Jerusalem, Israel**.



Dr. Igal Pat-Ei
IPC Co-Chair
Director of the Givatayim Observatory and chairman of the Israeli Astronomical Association



Sandra I. Ramirez
IPC Co-Chair
Professor at Autonomous University of Morelos State (UAEM)

Message from the President of the International Academy of Astronautics



The International Academy of Astronautics (IAA) is pleased to invite you to attend the IAA symposia throughout the week. In addition to organising around 20 conferences a year, worldwide, the Academy is organising 13 symposia at this year's IAC in Jerusalem, representing one third of the IAC programme, and will co-host some thrilling sessions with the IAF and the IISL.

Gopalan Madhavan Nair
President of the International Academy of Astronautics



Message from the President of the International Institute of Space Law



On behalf of the Institute of Space Law, I am pleased to invite you to attend our 58th Colloquium on the Law of Outer Space. The IISL selected several topical issues that will be addressed and debated by the world's finest space lawyers, and we will again co-host some exciting sessions with the IAF and the IAA.

We will welcome university students from Africa, the Asia Pacific, Europe and North America to the World Finals of the 24th Manfred Lachs Space Law Moot Court Competition, judged by members of the International Court of Justice. Students and young professionals also have their own session during our Colloquium.

With the era of privatisation and commercialisation of space activities advancing rapidly, new legal issues arise and require attention. In this context, the IISL is pleased to contribute to the programme of the IAC, as it is important to address these questions together with scientists, engineers and other space professionals. We look forward to welcoming you in Jerusalem.

Tanja Masson-Zwaan
President of the International Institute of Space Law



International Astronautical Federation (IAF)

Founded in 1951, the International Astronautical Federation is the world's leading space advocacy body. The IAF has over 270 members in over 60 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" - the Federation advances knowledge about space and fosters the development and application of space assets by advancing global cooperation.

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

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



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Michel Arnaud, Advisor to IPC Co-Chairs (Volunteer)



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Aerospace Research Institute	Iran	Comision Nacional de Actividades Espaciales (CONAE)	Argentina	Future Space Leaders Foundation	United States	Kayser-Threde GmbH	Germany
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Alta SpA	Italy	Cyprus Astronautical Society	Cyprus	Graz University of Technology (TU Graz)	Denmark	Kyushu Institute of Technology	Japan
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Association Dedicated to Development in Astronautics (A.D.D.A)	Romania	Department of Space Studies, University of North Dakota	United States	Indian Space Research Organization (ISRO)	Japan	MDA Corporation	Canada
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Association of Space Explorers (ASE)	United States	Deutsche Gesellschaft für Luft- und Raumfahrt,	Germany	Instituto Nacional de Pesquisas Espaciais (INPE)	Indonesia	Mitsubishi Electric Corporation	Japan
Associazione Italiana di Aeronautica e Astronautica (AIDAA)	Italy	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)	Germany	Instituto Nacional de Tecnica Aeroespacial (INTA)	France	Mitsubishi Heavy Industries, Ltd.	Japan
Astronautic Technology SDN BHD	Malaysia	Dnipropetrovsk National University	Ukraine	INSYEN AG	France	Moscow Aviation Institute	Russia
Astronautical Society of India	India	Dniprotekhservice LLC	Ukraine	Intelligent Materials and Systems Lab, University of Tartu	France	MT Aerospace AG	Germany
ATUCOM - Tunisian Assoc. for Communic. and Space Sciences	Tunisia	DTU Space, National Space Institute	Denmark	International Association for the Advancement of Space Safety	France	National Aeronautics and Space Administration (NASA)	United States
Austrian Research Promotion Agency	Austria	Dutch Space	The Netherlands	International Institute of Space Commerce	France	National Aerospace Agency (NASA) of Azerbaijan Republic	Azerbaijan
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S.P. Korolev Rocket and Space Corporation Energia	Russia	Thales Alenia Space Italia	Italy
Samara Space Centre "TsSKB-Progress"	Russia	The Aerospace Corporation	United States
Samara State Aerospace University	Russia	The Boeing Company	United States
Satrec Initiative	Korea, Republic of	The British Interplanetary Society	United Kingdom
Secure World Foundation	United States	The Chinese Aeronautical and Astronautical Society located in Taipei	Taiwan, China
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SES	Luxemburg	The Korean Society for Aeronautical and Space Sciences	Korea, Republic of
Shaanxi Engineering Laboratory for Microsatellites	China	The Planetary Society	United States
Shamakhy Astrophysical Observatory	Azerbaijan	The Sergei Korolev Space Museum	Ukraine
Sirius XM Radio	United States	TNO	The Netherlands
Sky Perfect JSAT Corporation	Japan	TÜBITAK	Turkey
Snecma	France	Turkish Aerospace Industries	Turkey
South African National Space Agency	South Africa	U.S. Geological Survey	United States
South African Space Association (SASA)	South Africa	UK Space Agency	United Kingdom
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International Academy of Astronautics (IAA)

The international 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 non-governmental organisation established in 1960 and recognised by the United Nations in 1996.

It is an honorary society with an action agenda. With 1200 elected members and corresponding members from 87 nations, it 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 52 studies to date and is engaged in the preparation of 40 others. The Academy also publishes the journal ActaAstronautica containing refereed papers.

The Academy now organises 20 conferences per year and regional meetings focused on the development and promotion of new initiatives. This 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 sponsors 13 Symposia. The Academy also continues to enjoy its participation in the COSPAR Assemblies by sponsoring and co-sponsoring symposia. Although the IAA has many connections to these and other similar organisations, it is distinctive as the only international Academy of elected members in the broad area of astronautics and space.



PRESIDENT:
Gopalan Madhavan Nair,
India



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International Institute of Space Law

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

The IISL holds an annual Colloquium at the International Astronautical Congress. During this Colloquium the Nandasiri Jasentuliyana Keynote lecture takes place, as well as a special session for Young Scholars. In addition the Institute organises 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 activities during the year.

Since 1992, the IISL organizes the annual Manfred Lachs Space Law Moot Court Competition. The competition is based on a hypothetical space law case, written by IISL members, in which around sixty student teams from universities in North America, Europe, Asia Pacific and Africa participate. Members of the International Court of Justice judge the World Finals of the competition, making it unique in the world.

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 UNCOUOS Legal Subcommittee.



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Olavo Bittencourt (Brazil)
Tare Brisibe (Nigeria)
Frans G. von der Dunk (Netherlands)
Steven Freeland (Australia)
Joanne Irene Gabrynowicz (United States)
Yasuaki Hashimoto (Japan)

Stephan Hobe (Germany)
Mahulena Hofmann (Czech Republic)
Sergio Marchisio (Italy)
Lesley Jane Smith (United Kingdom)
Milton 'Skip' Smith (United States)
Leslie I. Tennen (United States)
Maureen Williams (Argentina)
Haifeng Zhao (China)

Introduction to the Technical Programme

The IAC Technical Programme, which forms the core of the International Astronautical Congress, evolves continually in response to the changing nature of space science, technology and its societal aspects – and the programme for the 2015 IAC in Jerusalem is no exception.

As usual, the symposia are grouped into five Categories: A. **Science and Exploration**; B. **Applications and Operations**; C. **Technology**; D. **Infrastructure**; and E. **Space and Society** with the addition of the **Young Professionals Virtual Forums**. The IAF Technical Committees, IAACommissions and IISL Programme Committees plan the coverage of the symposia and, under the auspices of the International Programme Committee, which selected the papers that will be presented.

The technical programme for the 2015 Congress is shown on the following pages. I encourage you to consider the sessions to which you might make a contribution and to submit abstracts for consideration. The International Astronautical Congress is the world's premier spaceconference. As a forum for the world's space profession, the 66th IAC, in the wonderful city of Jerusalem, promises to be one of the best yet.



Maria Antonietta Perino
IAF Vice-President, Technical Activities

Technical Programme



SCIENCE AND EXPLORATION

Systems sustaining missions, including life, microgravity, space exploration, space debris and SETI

- A1 SPACE LIFE SCIENCES SYMPOSIUM
- A2 MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM
- A3 SPACE EXPLORATION SYMPOSIUM
- A4 44TH SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) - THE NEXT STEPS
- A5 HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM
- A6 SPACE DEBRIS SYMPOSIUM
- A7 SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS

Category coordinated by **Christophe Bonnal**, Senior Expert - Launch systems; Centre National d'Etudes Spatiales (CNES)

A1

SPACE LIFE SCIENCES SYMPOSIUM

This symposium jointly organised by the International Academy of Astronautics (IAA) and the International Astronautical Federation (IAF) addresses all aspects of space life sciences research and practice in human and robotic spaceflight, from Low Earth Orbit (LEO) to the universe beyond, and from the Big Bang to the lives of future explorers on other planets of our solar system.

Coordinators

Oleg Orlov
Institute for Biomedical Problems – RUSSIA

Peter Graef
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
– GERMANY

A1.1

Behaviour, Performance and Psychosocial Issues in Space

This session considers psychosocial, interpersonal, cultural, cognitive, sleep, circadian rhythm and human factors issues and countermeasures related to human spaceflight and space exploration.

Co-Chairs

Nick Kanas
University of California, San Francisco –
UNITED STATES

Vadim Gushin
Institute for Biomedical Problems of the Russian
Academy of Sciences – RUSSIA

Rapporteurs

Gro M. Sandal
University of Bergen – NORWAY

A1.2

Human Physiology in Space (1)

This session focuses on space physiological research that relates to human health and to the countermeasures employed to maintain health and performance.

Co-Chairs

Inessa Kozlovskaya
Institute for Biomedical Problems – RUSSIA

Rupert Gerzer
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
– GERMANY

Rapporteur

Thais Russomano
Microgravity Centre – BRAZIL

A1.3	<p>Human Physiology in Space (2) This session focuses on space physiological research that relates to human health and to the countermeasures employed to maintain health and performance.</p> <p>Co-Chairs Hanns-Christian Gunga <i>Charité - University Medicine Berlin — GERMANY</i></p> <p>Satoshi Iwase <i>Aichi Medical University — Japan</i></p> <p>Rapporteur Jeffrey Davis <i>University of Alberta — CANADA</i></p>
A1.4	<p>Medical Care for Humans in Space This session focuses on medical care for astronauts including operational medicine aspects, countermeasure development and applications as well as needs for future care for astronauts during long term stays in space and missions to and on the Moon and Mars. A further focus will lie on medical care for passengers and operators of commercial suborbital and orbital space flights.</p> <p>Co-Chairs Oleg Orlov <i>Institute for Biomedical Problems — RUSSIA</i></p> <p>Patrik Sundblad <i>ESA — Sweden</i></p> <p>Rapporteur Peter Graef <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — Germany</i></p>
A1.5	<p>Radiation Fields, Effects and Risks in Human Space Missions The major topics of this session are the characterisation of the radiation environment by theoretical modelling and experimental data, radiation effects on physical and biological systems, countermeasures to radiation and radiation risk assessment.</p> <p>Co-Chairs Guenther Reitz <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Ronald J. White <i>Montana Tech of The University of Montana — UNITED STATES</i></p> <p>Rapporteur Giovanni De Angelis <i>Istituto Superiore di Sanita (ISS) — ITALY</i></p>
A1.6	<p>Astrobiology and Exploration A new era of space exploration will soon expand into a global endeavour to achieve highly ambitious goals such as establishing human bases on the Moon, journeys to Mars and the construction of new infrastructures in space. Astrobiology plays a key role in the strategic search for organic compounds and life on Mars and other planetary objects in our solar system and can provide support in the preparation of human exploration endeavours. The session invites papers of astrobiological content supporting future robotic and human exploration missions..</p> <p>Co-Chairs Petra Rettberg <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Pascale Ehrenfreund <i>Space Policy Institute, George Washington University — UNITED STATES</i></p> <p>Rapporteur Inge ten Kate <i>SETI Institute — United States</i></p>
A1.7	<p>Life Support, habitats and EVA Systems This session will address strategies, solutions and technologies in providing for human requirements during future deep space and planetary/lunar surface exploration.</p> <p>Co-Chairs Chiaki Mukai <i>Japan Aerospace Exploration Agency (JAXA) — JAPAN</i></p> <p>Klaus Slenzka <i>OHB System AG — GERMANY</i></p> <p>Rapporteur Terrence G. Reese <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p>
A1.8	<p>Biology in Space This session focuses on all aspects of biology and biological systems related to gravity in ground-based and space flight experiments as well as on topics not covered by other sessions of this symposium.</p> <p>Co-Chairs Nicole Buckley <i>Canadian Space Agency (RET) — CANADA</i></p> <p>Marlene Grenon <i>University of California, San Francisco — UNITED STATES</i></p> <p>Rapporteurs Fengyuan Zhuang <i>Beihang University — CHINA</i></p>
A1.P	<p>Poster Session</p>
A2	<p>MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM The objective of the Microgravity Science and Processes Symposium is to highlight and discuss the state of the art in microgravity (reduced-gravity) physical sciences and processes, as well as to prepare for future orbital infrastructure. Session topics cover all microgravity science disciplines (material science, fluid physics, combustion science, fundamental physics), current results and research perspectives, together with relevant technology developments.</p> <p>Coordinator Marcus Dejmek <i>Canadian Space Agency — CANADA</i></p> <p>Vice-Coordinator Kenol Jules <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p>
A2.1	<p>Gravity and Fundamental Physics This session is devoted to the search of new fields of research in condensed matter physics and gravitational physics including cryogenic fluids, critical fluids, equivalence principle, atomic clock and plasma crystals.</p> <p>Co-Chairs Francois Gonzalez <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i></p> <p>Joachim Richter <i>RWTH Aachen — GERMANY</i></p> <p>Rapporteur Qi KANG <i>National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences. — CHINA</i></p>
A2.2	<p>Fluid and Materials Sciences The main focus of the session is on perspective research fields in fluid and materials sciences, multi-phase and chemically reacting flows including theoretical modelling, numerical simulations, and results of pathfinder laboratory and space experiments.</p> <p>Co-Chairs Raimondo Fortezza <i>Telespazio — ITALY</i></p> <p>Nickolay N. Smirnov <i>Moscow Lomonosov State University — RUSSIA</i></p> <p>Rapporteur Jean-Claude Legros <i>Université Libre de Bruxelles — BELGIUM</i></p>
A2.3	<p>Microgravity Experiments from Sub-Orbital to Orbital Platforms This session presents recent results of microgravity experiments from all disciplines using different microgravity platforms, including drop towers, parabolic aircraft, sounding rockets and capsules.</p> <p>Co-Chairs Ziad Saghir <i>Ryerson University — CANADA</i></p> <p>Raffaele Savino <i>— ITALY</i></p>

A2.4	<p>Science Results from Ground Based Research This session is focused on the results of ground based preparatory experiments from all disciplines.</p> <p>Co-Chairs Valentina Shevtsova <i>Université Libre de Bruxelles — BELGIUM</i></p> <p>Antonio Viviani <i>Second University of Naples, SUN — ITALY</i></p> <p>Rapporteur Nickolay N. Smirnov <i>Moscow Lomonosov State University — RUSSIA</i></p>
A2.5	<p>Facilities and Operations of Microgravity Experiments This session is devoted to new diagnosis developments, new instruments definition and concepts for the future, ground and flight operation (telescience, robotics, hardware & software).</p> <p>Co-Chairs Marcus Dejmek <i>Canadian Space Agency — CANADA</i></p> <p>Rainer Willnecker <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Rapporteur Peter Hofmann <i>Kayser-Threde GmbH — GERMANY</i></p>
A2.6	<p>Microgravity Sciences Onboard the International Space Station and Beyond – Part 1 Aimed at the presentation of results obtained from large orbital platforms, in particular the ISS, as well as preparation scenarios for further long term flight opportunities, this session includes description and performance of ground and in-orbit infrastructures.</p> <p>Co-Chairs Kenol Jules <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p> <p>Bernard Zappoli <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i></p> <p>Rapporteur Christoph Puetz <i>Astrium Space Transportation — GERMANY</i></p>
A2.7	<p>Microgravity Sciences Onboard the International Space Station and Beyond - Part 2 Aimed at the presentation of results obtained from large orbital platforms, in particular the ISS, as well as preparation scenarios for further long term flight opportunities, this session includes description and performance of ground and in-orbit infrastructures.</p> <p>Co-Chairs Peter Hofmann <i>Kayser-Threde GmbH — GERMANY</i></p> <p>Christoph Puetz <i>Astrium Space Transportation — GERMANY</i></p> <p>Rapporteur Gabriel Pont <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i></p>
A2.P	<p>Poster Session</p>
A3	<p>SPACE EXPLORATION SYMPOSIUM This symposium covers the current and future robotic missions and material plans for initiatives in the exploration of the Solar System.</p> <p>Coordinators Christian Sallaberger <i>Canadensys Aerospace — CANADA</i></p> <p>Bernard Foing <i>ESA/ESTEC — The Netherlands</i></p>
A3.1	<p>Space Exploration Overview This Session covers Space Exploration strategies and architectures, as well as technology roadmaps. Papers of both national and international perspectives are invited, as are papers dealing with the emerging area of commercial space exploration activities.</p> <p>Co-Chairs Christian Sallaberger <i>Canadensys Aerospace Corporation — CANADA</i></p> <p>Luc Frécon <i>Thales Alenia Space France — FRANCE</i></p> <p>Rapporteurs Keyur Patel <i>National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory — UNITED STATES</i></p> <p>Norbert Frischauf <i>ORF — AUSTRIA</i></p>
A3.2A	<p>Moon Exploration – Part 1 This session will address current and future lunar missions. The session will address orbital missions, robotic surface missions, as well as life sciences on the Moon, resource utilisation and preparatory activities for future solar system exploration.</p> <p>Co-Chairs Bernard Foing <i>ESA/ESTEC — THE NETHERLANDS</i></p> <p>David Korsmeyer <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p> <p>Rapporteur William H. Siegfried <i>The Boeing Company — UNITED STATES</i></p> <p>Sylvie Espinasse <i>European Space Agency (ESA) — THE NETHERLANDS</i></p>
A3.2B	<p>Moon Exploration – Part 2 This session will address current and future lunar missions. The session will address orbital missions, robotic surface missions, as well as life sciences on the Moon, resource utilisation and preparatory activities for future solar system exploration.</p> <p>Co-Chairs Bernard Foing <i>ESA/ESTEC — THE NETHERLANDS</i></p> <p>David Korsmeyer <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p> <p>Rapporteurs William H. Siegfried <i>The Boeing Company — UNITED STATES</i></p> <p>Sylvie Espinasse <i>European Space Agency (ESA) — THE NETHERLANDS</i></p>
A3.2C	<p>Moon Exploration – Part 3 This session will address current and future lunar missions. The session will address orbital missions, robotic surface missions, as well as life sciences on the Moon, resource utilisation and preparatory activities for future solar system exploration.</p> <p>Co-Chairs Bernard Foing <i>ESA/ESTEC — THE NETHERLANDS</i></p> <p>David Korsmeyer <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p>

	Rapporteurs		
	William H. Siegfried <i>The Boeing Company — UNITED STATES</i>	Sylvie Espinasse <i>European Space Agency (ESA) — THE NETHERLANDS</i>	
A3.2D	Moon Exploration – Poster session		
	This session will address current and future lunar missions. The session will address orbital missions, robotic surface missions, as well as life sciences on the Moon, resource utilisation and preparatory activities for future solar system exploration.		
	Co-Chairs		
	Bernard Foing <i>ESA/ESTEC — THE NETHERLANDS</i>	David Korsmeyer <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i>	
	Rapporteurs		
	William H. Siegfried <i>The Boeing Company — UNITED STATES</i>	Sylvie Espinasse <i>European Space Agency (ESA) — THE NETHERLANDS</i>	
A3.3A	Mars Exploration – missions current and future		
	The planet Mars is being explored now and in the coming years with multiple robotic missions from a variety of nations. This session will cover current results from ongoing Mars missions and the designs for proposed Mars missions including expected experiments. Papers on any aspects of the search for evidence of extant or extinct Martian life, and forward and backward contamination are particularly welcome.		
	Co-Chairs		
	Vincenzo Giorgio <i>Thales Alenia Space Italia — ITALY</i>	Pierre W. Bousquet <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i>	
	Rapporteurs		
	Cheryl Reed <i>The Johns Hopkins University Applied Physics Laboratory — UNITED STATES</i>	Amalia Ercoli Finzi <i>Politecnico di Milano — ITALY</i>	
A3.3B	Mars Exploration – Sample, return including human/robotics		
	The planet Mars is being explored now and in the coming years with multiple robotic missions from a variety of nations. This session will cover current results from ongoing Mars missions and the designs for proposed Mars missions including expected experiments. Papers on any aspects of the search for evidence of extant or extinct Martian life, and forward and backward contamination are particularly welcome.		
	Co-Chairs		
	Vincenzo Giorgio <i>Thales Alenia Space Italia — ITALY</i>	Pierre W. Bousquet <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i>	
	Rapporteurs		
	Cheryl Reed <i>The John Hopkins University Applied Physics Laboratory — UNITED STATES</i>	Amalia Ercoli Finzi <i>Politecnico di Milano — ITALY</i>	
A3.3C	Mars Exploration – Science, Instruments and Technologies		
	The planet Mars is being explored now and in the coming years with multiple robotic missions from a variety of nations. This session will cover current results from ongoing Mars missions and the designs for proposed Mars missions including expected experiments. Papers on any aspects of the search for evidence of extant or extinct Martian life, and forward and backward contamination are particularly welcome.		
	Co-Chairs		
	Vincenzo Giorgio <i>Thales Alenia Space Italia — ITALY</i>	Pierre W. Bousquet <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i>	
	Rapporteurs		
	Cheryl Reed <i>The John Hopkins University Applied Physics Laboratory — UNITED STATES</i>	Amalia Ercoli Finzi <i>Politecnico di Milano — ITALY</i>	
A3.4	Small Bodies Missions and Technologies		
	This session will present the missions and technological aspects related to the exploration of small bodies including a search for pre-biotic signatures.		
	Co-Chairs		
	Susan McKenna-Lawlor <i>Space Technology (Ireland) Ltd. — IRELAND</i>	Stephan Ulamec <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i>	
	Rapporteurs		
	Marc D. Rayman <i>Jet Propulsion Laboratory - California Institute of Technology — UNITED STATES</i>	Norbert Frischauf <i>ORF — AUSTRIA</i>	
A3.5	Solar System Exploration		
	This session covers robotic missions for Solar System exploration (inner and outer planets and their satellites, and space plasma physics) except the Earth, Moon, Mars, and small bodies covered in other sessions of this symposium. Papers covering both new mission concepts as well as the associated specific technologies are invited.		
	Co-Chairs		Rapporteur
	Junichiro Kawaguchi <i>Japan Aerospace Exploration Agency (JAXA) — JAPAN</i>	Mariella Graziano <i>GMV Aerospace & Defence SAU — SPAIN</i>	William H. Siegfried <i>The Boeing Company — UNITED STATES</i>
A3.P	Poster Session		
A4	44TH SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps		
	This symposium organised by the IAA deals with the scientific, technical and interdisciplinary aspects of the search for extra-terrestrial intelligence (SETI) including a discussion of all kinds of contacts. The technical side is not limited to the microwave window, but includes also optical and any kinds of radiation. The interdisciplinary aspects include all societal implications, risk communication and philosophical considerations of any kind of discovery or contact.		
	Coordinator		
	Claudio Maccone <i>International Academy of Astronautics (IAA) — ITALY</i>		

A4.1	SETI 1: SETI Science and Technology		
	All technical aspects involved in the search for extraterrestrial intelligence, including current and future search strategies.		
	Co-Chairs		
	Douglas Vakoch <i>SETI Institute and California Institute of Integral Studies — UNITED STATES</i>		
A4.2	SETI 2: SETI and Society		
	All aspects concerning the societal implications of extraterrestrial intelligence are considered, including public reaction to a discovery, risk communication and the possible.		
	Co-Chairs		
	Lori Walton <i>Tigerstar Geoscience — CANADA</i>		
A4.P	Poster Session		
A5	HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM		
	This Symposium, organised by the International Academy of Astronautics (IAA), covers the strategic plans, architectural concepts and technology development for future human exploration of the Moon, Mars, Lagrangian Points and NEO's.		
	Coordinators		
	Christian Sallaberger <i>Canadensys Aerospace Corporation — CANADA</i>	Maria Antonietta Perino <i>Thales Alenia Space Italia — ITALY</i>	
A5.1	Human Exploration of the Moon and Cislunar Space		
	This session will examine the scenarios and infrastructure required to support human exploration of the Moon and Cislunar space. Papers are invited to discuss technology roadmaps as well as interfaces to allow international cooperation.		
	Co-Chairs		
	Nadeem Ghafoor <i>Canadensys Aerospace Corporation — CANADA</i>	Michael Raftery <i>Boeing Defense Space & Security — UNITED STATES</i>	
	Rapporteur		
	Uwe Apel <i>Hochschule Bremen — GERMANY</i>	Kathy Laurini <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i>	
A5.2	Human Exploration of Mars		
	This session will examine the scenarios and infrastructure required to support human exploration of Mars and the moons of Mars. Papers are invited to discuss technology roadmaps as well as interfaces to allow international cooperation.		
	Co-Chairs		
	Maria Antonietta Perino <i>Thales Alenia Space Italia — ITALY</i>	Nadeem Ghafoor <i>Canadensys Aerospace Corporation — CANADA</i>	Rapporteur
			Norbert Frischauf <i>— AUSTRIA</i>
A5.3 B3.6	Joint session on Human and Robotic Partnerships to Realize Human Spaceflight Goals		
	This 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 such as onboard robotic assistants, habitat / infrastructure construction support, human mobility support systems (e.g. EVA mobility aids, rovers); and robotic precursor activities to human spaceflights for test, validation, and demonstration of systems. This session also welcomes papers considering how the roles of humans, machines and intelligent systems are likely to evolve in the coming years and the corresponding impact on complex mission design, implementation, and operations.		
	Co-Chairs		
	Christian Sallaberger <i>Canadensys Aerospace Corporation — CANADA</i>	Pierre Jean <i>Canadian Space Agency — CANADA</i>	Rapporteur
			M. Hemsell <i>The British Interplanetary Society — UNITED KINGDOM</i>
A5.4 D2.8	Human Missions to Libration points and NEO's		
	This session will explore heavy-lift launch capabilities for human deep space exploration missions, program architectures, technology demonstrations as well as the issues of scientific and political motivations and international cooperation.		
	Co-Chairs		
	Steve Creech <i>NASA Marshall Space Flight Center — UNITED STATES</i>	Yuguang Yang <i>China Aerospace Science & Industry Corporation (CASIC) — CHINA</i>	Rapporteur
			Kenneth Bruce Morris <i>Booz Allen Hamilton — UNITED STATES</i>
A5.P	Poster Session		
A6	SPACE DEBRIS SYMPOSIUM		
	This symposium will address the complete spectrum of technical issues of space debris: measurements, modelling, risk assessment in space and on the ground, reentry, hypervelocity impacts and protection, mitigation and standards, and Space Surveillance.		
	Coordinators		
	Nicholas L. Johnson <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i>	Christophe Bonnal <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i>	
A6.1	Measurements		
	This session will address advanced ground and space-based measurement techniques, related processing methods, and results characterization of orbital and physical properties of space debris.		
	Co-Chairs		
	Thomas Schildknecht <i>SwissSpace — SWITZERLAND</i>	Heather Cowardin <i>Jacobs Technology, ESCG — UNITED STATES</i>	Rapporteur
			Vladimir Agapov <i>— RUSSIA</i>

- A6.2 Modelling and Risk Analysis**
This session will address the characterisation of the current and future debris population and methods for in-orbit and on-ground risk assessments. The in-orbit analysis will cover collision risk estimates based on statistical population models and deterministic catalogues, and active avoidance.
- Co-Chairs**
Carmen Pardini
ISTI-CNR — ITALY
- Rapporteur**
Sven Kevin Flegel
Fraunhofer Institute for High Frequency Physics and Radar Techniques (FHR) — GERMANY
- A6.3 Hypervelocity Impacts and Protection**
The session will address passive protection, shielding and damage predictions. Shielding aspects will be supported by experimental and computational results of HVI tests. Use of HVI techniques for debris mitigation.
- Co-Chairs**
Frank Schaefer
Fraunhofer - Institut für Kurzzeitdynamik, Ernst-Mach-Institut (EMI) — GERMANY
- James Hyde
Barrios Technology/ESC Group - NASA — UNITED STATES
- Rapporteur**
Alessandro Francesconi
University of Padova - DI/CISAS — ITALY
- A6.4 Mitigation and Standards**
This session will focus on the definition and implementation of debris prevention and reduction measures and vehicle passive protection. The session will also address space debris mitigation guidelines and standards that exist already or are in preparation at the national or international level.
- Co-Chairs**
Holger Krag
European Space Agency (ESA) — GERMANY
- Christian Cazaux
Centre National d'Etudes Spatiales (CNES) — FRANCE
- Rapporteur**
Akira Kato
Japan Aerospace Exploration Agency (JAXA) — Japan
- A6.5 Space Debris Removal Technologies**
This session will address active removal techniques "ground and space based" and identify implementation difficulties and maturity of proposed technologies.
- Co-Chairs**
M.Y.S. Prasad
Indian Space Research Organization (ISRO) — INDIA
- Fabrizio Piergentili
University of Rome "La Sapienza" — ITALY
- Rapporteur**
Fabio Santoni
University of Rome "La Sapienza" — ITALY
- A6.6 Space Debris Removal Concepts**
This session will address active removal techniques "ground and space based" and identify innovative solutions and the steps for developing the concepts into reality.
- Co-Chairs**
Nicolas Bérend
Office National d'Etudes et de Recherches Aérospatiales (ONERA) — FRANCE
- Satomi Kawamoto
Japan Aerospace Exploration Agency (JAXA) — JAPAN
- Rapporteur**
Mark Matney
National Aeronautics and Space Administration (NASA)/ Johnson Space Center — UNITED STATES
- A6.7 Operations in Space Debris Environment, Situational Awareness**
This session will address the multiple aspects associated with safe operations in space dealing with Space Debris, including operational assessment from observations, catalogue build-up and maintenance, data aggregation from different sources, relevant data exchange standards and conjunction analyses.
- Co-Chairs**
T.S. Kelso
Center for Space Standards and Innovation — UNITED STATES
- David Finkleman
— UNITED STATES
- Rapporteur**
Juan Carlos Dolado Perez
Centre National d'Etudes Spatiales (CNES) — FRANCE
- A6.8 (Joint session with Space Security Committee): Policy, Legal, Institutional and Economic Aspects of Space Debris Detection, Mitigation and Removal**
This session will deal with the non-technical aspects of space debris detection, mitigation and removal. Policy, legal and institutional aspects includes role of IADC and UNCOPUOS and other multilateral bodies. Economic issues including insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation in addressing these issues will be considered.
- Co-Chairs**
Darren McKnight
Integrity Applications Incorporated (IAI) — UNITED STATES
- Brett Biddington
Space Industry Association of Australia — AUSTRALIA
- Rapporteur**
Charlotte Mathieu
European Space Agency (ESA) — FRANCE
- A6.P Poster Session**
Chairman
Christophe Bonnal
Centre National d'Etudes Spatiales (CNES) — FRANCE
- A7 SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS**
In the current difficult economic situation resulting in serious uncertainties in the planning of the major (flagship) missions of the future, space agencies also offer opportunities for small and medium-size missions in support of the scientific community. NASA re-emphasised the Explorer and Discovery lines of medium-size missions, JAXA promotes a small mission programme and ESA released calls for small and medium missions. Not to mention the programmes of other space agencies consisting mainly of such medium/small missions. In order to achieve a good balance between the various classes of missions and to avoid unnecessary duplication in planning missions worldwide, from small to large scale, addressing the same science questions, it is of utmost importance to coordinate planning activities internationally at an early stage and to promote international collaboration. Therefore, it seems appropriate to arrange an international symposium involving the main actors of this field of space research, the scientific community, space industry and space agencies. Capitalising on the science and technology driven road maps at worldwide level, such as the recently released COSPAR Astronomy Roadmap for the post 2015 decade, the broad objective of the symposium will be to promote the exchange of information and ideas related to new technologies for all the space astronomy and solar-system missions of the future. The symposium will consist of both invited talks and contributed papers. The programme will cover the major scientific priorities in space astronomy and solar-system research worldwide and prospects for future missions including space agency and academia updated plans and will also address associated technology needs for both instruments and platforms. In the initial session the prime scientific motivations and needs in different fields will be reviewed with the various types of missions required. This will be followed by invited and contributed talks on the space-agency long-term views on a mix of small, medium and large-scale missions, including updates on their science programs. The following sessions will see invited talks on the required technology plans and challenges. Next sessions will focus on different scientific topics identifying also in this case the required technological developments for future payloads. For each topic, ample time will be devoted to contributed talks on the related technology studies and developments within industry and research laboratories.
- Coordinator**
Jacobus van Zyl
SunSpace — SOUTH AFRICA
- Willem Hermsen
Netherlands Institute for Space Research (SRON) — THE NETHERLANDS

- A7.1 Space-Agencies Long-Term Views**
In this session will be presented in invited and contributed talks, the space-agencies long-term views on a mix of small, medium and large-scale missions addressing space astronomy and solar system science, including updates on their science programs.
- Co-Chairs**
Jakob van Zyl
National Aeronautics and Space Administration (NASA) — UNITED STATES
- A7.2 Scientific Motivation and Requirements for Future Space Astronomy and Solar System Science Missions**
In this session the prime scientific motivations and needs in different fields of space astronomy and solar-system science missions will be reviewed with the various types of missions required. There will be room for presentations of road maps proposed for the research fields addressed in this event.
- Co-Chairs**
Jakob van Zyl
National Aeronautics and Space Administration (NASA) — UNITED STATES
- A7.3 Technology Needs for Future Missions, Platforms**
This session addresses the technologies required for future space astronomy and solar system science missions with the plans of, and challenges for industry and research institutes to realize the required functionalities of e.g. platforms.
- Co-Chairs**
Jakob van Zyl
National Aeronautics and Space Administration (NASA) — UNITED STATES
- A7.4 Technology Needs for Future Scientific Payloads**
This session will focus on different topics in space astrophysics and solar system science identifying the required technological developments for future payloads. Related technology studies and developments within industry and research laboratories can be presented in this session.
- Co-Chairs**
Jakob van Zyl
National Aeronautics and Space Administration (NASA) — UNITED STATES

Category
B

APPLICATIONS AND OPERATIONS

On-going and future operational applications, including Earth observation, communication, navigation, human space endeavours and small satellites

- B1 EARTH OBSERVATION SYMPOSIUM
- B2 SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM
- B3 HUMAN SPACE ENDEAVOURS SYMPOSIUM
- B4 22ND SYMPOSIUM ON SMALL SATELLITE MISSIONS
- B5 SYMPOSIUM ON INTEGRATED APPLICATIONS
- B6 SPACE OPERATIONS SYMPOSIUM

Category coordinated by Otto Koudelka, *Graz University of Technology (TU Graz)*

- B1 EARTH OBSERVATION SYMPOSIUM**
This symposium focuses on space missions which deal with collecting information about the Earth and its environment. Session topics deal with all aspects of Earth observation missions including the policy and infrastructure of international cooperation and coordination, the emergence of commercial systems to satisfy market needs, the technical descriptions of new missions and sensors to be used, data processing and GIS, environmental applications and global change studies and the use of space-based technologies.
- Coordinators**
John Hussey
Consultant — UNITED STATES
- Pierre Ranzoli
Eumetsat — GERMANY
- B1.1 International Cooperation in Earth Observation Missions**
Focus is on sensors now being developed or tested for all aspects of Earth observation. Particular emphasis is on new sensors for meeting the growing demand of user markets.
- Co-Chairs**
John W. Hussey
Consultant — UNITED STATES
- Pierre Ranzoli
Eumetsat — GERMANY
- Rapporteur**
David Brent Smith
National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES
- B1.2 Future Earth Observation Systems**
Emphasis is on technical descriptions of planned and new space systems and missions for experimental and operational Earth observation. Descriptions of new concepts and innovative Earth observation systems are encouraged.
- Co-Chairs**
Benoit Boissin
Centre National d'Etudes Spatiales (CNES) — FRANCE
- Gilles Corlay
Sodern — FRANCE
- Rapporteur**
Gunter Schreier
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY
- B1.3 Earth Observation Sensors and Technology**
Focus is on sensors now being developed or tested for all aspects of Earth observation. Particular emphasis is on new sensors for meeting the growing demand of user markets.
- Co-Chairs**
Andrew Court
TNO — THE NETHERLANDS
- Ralph Girard
Canadian Space Agency — CANADA
- Rapporteur**
Yean Joo Chong
National University of Singapore — REP. OF SINGAPORE

B1.4 Earth Observation Data Management Systems
Earth Observation Data Acquisition, Communication, Processing, Dissemination and Archiving.

Co-Chairs

Carlo Olivieri
University of Rome "La Sapienza" — ITALY

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

Rapporteurs

Bruce K. Quirk
U.S. Geological Survey — UNITED STATES

James E. Graf
National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory — UNITED STATES

B1.5 Earth Observation Applications and Economic Benefits
Earth Observation value-added products.

Co-Chairs

Luigi Bussolino
Bussolino and Associates — ITALY

Paul Kamoun
Thales Alenia Space France — FRANCE

Rapporteur

Yean Joo Chong
National University of Singapore — REP. OF SINGAPORE

B1.6 Water resources management
Use of Earth Observation in water resources management.

Co-Chairs

Ralph Girard
Canadian Space Agency — CANADA

David Brent Smith
National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES

Rapporteur

Simonetta Cheli
European Space Agency (ESA) — ITALY

B1.P Poster Session

B2 SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM

This symposium examines developments in technology, applications and systems as they relate to fixed and mobile communication services, satellite broadcasting, position determination, navigation and timing, and interactive multimedia provisioning.

Coordinator

Otto Koudelka
Joanneum Research — AUSTRIA

Manfred Wittig
European Space Agency (ESA) retired — THE NETHERLANDS

B2.1 Mobile Satellite Communications and Navigation Technology
New and emerging technologies for mobile and personal satellite communications and navigation will be presented.

Co-Chairs

Robert D. Briskman
Sirius XM Radio — UNITED STATES

Jean-Paul Aguttes
Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteur

Peter Buist
Netherlands Space Society (NVR) — THE NETHERLANDS

B2.2 Joint Session on Dual Use (civil and military) Aspects of Telecommunications and GNSS
This session, organised jointly by the Space Communication & Navigation Committee and the Space Security Committee («Dual Use» Subcommittee), will address the dual use (civil and military) aspects of telecommunications and GNSS missions at programmatic, organisational and technical levels. Emphasis will be given to the lessons learned from programmes under development or in operation, particularly the bridges and barriers, and on future opportunities of such a dual approach in future programmes.

Co-Chairs

Kristian Pauly
OHB System AG — GERMANY

Agnieszka Lukaszczuk
European Commission - DG Enterprise — BELGIUM

Rapporteur

Stephanie Wan
OSpace Generation Advisory Council (SGAC) — UNITED STATES

B2.3 Space-Based Navigation Systems and Services
New and emerging systems for satellite-based position, navigation and timing will be presented, including end user applications.

Co-Chairs

Rita Lollock
The Aerospace Corporation — UNITED STATES

Cédric Balty
Thales Alenia Space France — FRANCE

Rapporteur

Norbert Frischauf
— AUSTRIA

B2.4 Near-Earth and Interplanetary Communications
Systems with relative motion between space and ground segments, in both near-Earth and interplanetary environments, will be discussed with particular emphasis on unique concepts, techniques and technologies.

Co-Chairs

Manfred Wittig
European Space Agency (ESA) retired — THE NETHERLANDS

Ramon P. De Paula
National Aeronautics and Space Administration (NASA) — UNITED STATES

Rapporteur

Dipak Srinivasan
The Johns Hopkins University Applied Physics Laboratory — UNITED STATES

B2.5 Advanced Technologies for Space Communications and Navigation
Future promising space communication and navigation technologies will be presented, as applied to existing and developing systems.

Co-Chairs

Edward W. Ashford
Delft University of Technology — THE NETHERLANDS

Elemer Bertenyi
E. Bertenyi & Associates Inc. — CANADA

Rapporteur

Eva Maria Aicher
Tesat-Spacecom GmbH & Co. KG — GERMANY

B2.6 Advanced Space Communications and Navigation Systems
Advanced satellite communications and applications will be presented.

Co-Chairs

Robert Prevaux
Space Systems/Loral — UNITED STATES

Morio Toyoshima
National Institute of Information and Communications Technology — JAPAN

Rapporteur

Amane Miura
National Institute of Information and Communications Technology — JAPAN

B2.7 Fixed and Broadcast Communications
Advances in fixed and broadcast systems will be presented, including Ka band operation and radio/television direct-to-user applications.

Co-Chairs

Joe M. Straus
The Aerospace Corporation — UNITED STATES

Desaraju Venugopal
Devas Multimedia Pvt. Ltd. — INDIA

Rapporteur

K.R. Sridhara Murthi
NIAS — India

B2.8 Space Communications and Navigation Young Professionals Virtual Forum
A virtual session to present and discuss developments in a wide range of satellite communication topics, including fixed, mobile, broadcasting, and data relay technologies and services, as well as those for satellite based position determination, navigation, and timing. Both Earth orbital and interplanetary space communications topics can be addressed. This session is co-sponsored by the Space Communications and Navigation Committee and the Workforce Development/Young Professionals Programme Committee.

Co-Chairs

Edward W. Ashford
Delft University of Technology — THE NETHERLANDS

Kevin Shortt
Canadian Space Society — CANADA

B2.P Poster Session

B3 HUMAN SPACE ENDEAVOURS SYMPOSIUM

The symposium addresses all practical aspects of human spaceflight including the design, development, operations, utilization and future plans of space missions involving humans. The scope covers actual past, present and future space missions and programmes.

Coordinators

Cristian Bank
EADS Astrium Space Transportation GmbH — GERMANY

John Uri
National Aeronautics and Space Administration (NASA)/Johnson Space Center — UNITED STATES

B3.1 Governmental Human Spaceflight Programs (Overview)
The session provides the forum for "Overview" presentations on present and evolving governmental Human Space programs. This Session will include the latest status of human space flight programs and the spacecraft being developed to support them, including the International Space Station and the Chinese Space Station. Emerging nations' manned spaceflight programmes, evolution concepts (e.g. ISS 2020 and beyond) and governmental manned exploration initiatives are also addressed in this session.

Co-Chairs

Carlo Mirra
EADS Astrium — THE NETHERLANDS

John Uri
National Aeronautics and Space Administration (NASA)/Johnson Space Center — UNITED STATES

Rapporteur

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

B3.2 Commercial Human Spaceflight Programs
This session provides a forum for papers describing commercial human orbital and sub-orbital spacecraft and stations in development, as well as human-rated launch vehicles and human-tended modules. Topics include the status of development, testing, and operations; the architecture and performance of various systems; launch infrastructure development; and other pertinent areas of commercial human spaceflight development. Programs such as Atlas 5, B330, CST-100, Cygnus, Dream Chaser, Dragon, Falcon 9, Lynx, New Shepard, Spaceplane, SpaceShipTwo, WhiteKnightTwo, and others are appropriate for this session.

Co-Chairs

Sergey K. Shaevich
Khurichkev State Research & Production Space Center — RUSSIA

Michael W. Hawes
Lockheed Martin Corporation — UNITED STATES

Michael E. Lopex Alegria
Commercial Spaceflight Federation — UNITED STATES

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 Tjanganong) and other manned vehicles as test beds for exploration.

Co-Chairs

Kevin D. Foley
The Boeing Company — UNITED STATES

Maria Stella Lavitola
Thales Alenia Space Italia — ITALY

Rapporteur

Shannon Ryan
Defence Science and Technology Organisation (DSTO) — AUSTRALIA

B3.4 Flight & Ground Operations of HSF Systems – Joint Session of the Human Spaceflight and Space Operations Symposia
This session addresses key challenges and their solutions related to flight and ground operations in governmental and commercial human spaceflight, their systems and elements. Topics include operational problems and solutions, cost reduction, new and proposed ground facilities or infrastructure, and ground segment operations and planning. Also included are logistics and mission planning, ground transportation, and sustainment. would be topics such as logistics and logistics planning, transportation, sustainment, and the geopolitical value as a tool for promoting international cooperation.

Co-Chairs

Maria Stella Lavitola
Thales Alenia Space Italia — ITALY

Helmut Luttmann
Astrium Space Transportation — GERMANY

Rapporteur

Rachid Amekrane
Astrium GmbH — GERMANY

B3.5 Astronaut Training, Accommodation, and Operations in Space
This session concentrates on all aspects of spaceflight that are unique to the presence of astronauts. It encompasses astronaut activities such as selection, training, workload management, and task division between flight and ground segments. It includes spacecraft systems and robotic tools; interfaces; international command, control and communications; payloads; research; and utilization. It addresses the unique spacecraft systems required to safely accommodate astronauts during intravehicular and extravehicular activities. The session includes astronaut pre-mission, mission, and post mission support of technological and scientific space based research and utilization of human space complexes and the space environment.

Co-Chairs

Igor V. Sorokin
S.P. Korolev Rocket and Space Corporation Energia — RUSSIA

Alan T. DeLuna
— UNITED STATES

Rapporteur

Tai Nakamura
Japan Aerospace Exploration Agency (JAXA) — JAPAN

B3.6
A5.3

Joint session on Human and Robotic Partnerships to Realize Human Spaceflight Goals

This 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 such as onboard robotic assistants, habitat / infrastructure construction support, human mobility support systems (e.g. EVA mobility aids, rovers); and robotic precursor activities to human spaceflights for test, validation, and demonstration of systems. This session also welcomes papers considering how the roles of humans, machines and intelligent systems are likely to evolve in the coming years and the corresponding impact on complex mission design, implementation, and operations.

Co-Chairs

Christian Sallaberger
MDA Corporation – CANADA

Pierre Jean
Canadian Space Agency – CANADA

Rapporteur

M. Hempzell
The British Interplanetary Society – UNITED KINGDOM

B3.7

Advanced Systems, Technologies, and Innovations for Human Spaceflight

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

Co-Chairs

Martin Zell
European Space Agency (ESA) – THE NETHERLANDS

Lionel Suchet
Centre National d'Etudes Spatiales (CNES) – FRANCE

Rapporteur

Gi-Hyuk Choi
Korean Aerospace Research Institute – KOREA, REPUBLIC OF

B3.8
E7.7

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

This session hosts papers on topics related to the legal framework governing collaborative space programmes, in particular governmental LEO and Exploration programmes. For the IAC 2014, the session will put special emphasis on highlighting the impact of ITAR and similar export control regimes on the development and operation phases of collaborative international space programmes, including lessons learned.

Co-Chairs

Cristian Bank
EADS Astrium Space Transportation GmbH – GERMANY

Lesley Jane Smith
Leuphana University of Lüneburg/Weber-Steinhaus & Smith – GERMANY

B3.9
YPVF.2

Human Space Endeavours Young Professionals Virtual Forum

The Human Space Endeavours Young Professionals Virtual Forum is targeting individuals and organisations with the objective of sharing best practices, future projects, research and issues for the future of Human Space Endeavours. This is a virtual session co-sponsored by the Human Space Endeavours Committee and the Workforce Development/Young Professionals Programme Committee.

Co-Chairs

Cristian Bank
EADS Astrium Space Transportation GmbH – GERMANY

Guillaume Girard
INSYEN AG – GERMANY

B3.P

Poster Session

B4

22ND SYMPOSIUM ON SMALL SATELLITE MISSIONS

"Small Satellite Missions" refers to the class of missions conducted using satellites weighing less than 1000 kg. For clarity, we further classify small satellites as microsats if they weigh less than 100 kg; nanosats or cubesats if they weigh less than 10 kg; and picosats if they weigh less than 1 kg. This Symposium, organised by the International Academy of Astronautics (IAA), addresses Small Satellite missions and projects in Science, Exploration, and Technology for government, industry, and academic programmes. The Symposium scope encompasses space science (B4.2), earth observation (B4.4), and exploration (B4.8) missions, as well as the cross-cutting topics of small satellite programmes in developing countries (B4.1), cost-effective operations (B4.3), affordable and reliable space access (B4.5), emerging and promising technologies (B4.6A and B4.6B), and cross-platform compatibility applications and standards (B4.7A). For IAC 2014, the Symposium is continuing the topic of Small Distributed Space Missions (B4.7B), to be held in cooperation with B4.7A as a possible implementation of modular, reconfigurable, rapid systems. Abstracts highlighting ingenuity or innovation are preferred. Where possible, abstracts should have a wide interest in the community and include transferable knowledge or lessons learned. This is in keeping with our commitment to meeting the needs of the small satellite community. This Symposium will be accepting submissions for oral presentations only.

Coordinator

Rhoda Shaller Hornstein
National Aeronautics and Space Administration (NASA) – UNITED STATES

Alex da Silva Curiel
Surrey Satellite Technology Ltd – UNITED KINGDOM

B4.1

16th UN/IAA Workshop on Small Satellite Programmes at the Service of Developing Countries

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

Co-Chairs

Sias Mostert
Space Commercial Services Holdings (Pty) Ltd – SOUTH AFRICA

Sergei Chernikov
United Nations Office at Vienna – AUSTRIA

Rapporteurs

Pierre Molette
– FRANCE

Danielle Wood
John Hopkins University – UNITED STATES

B4.2

Small Space Science Missions

This session will address the current and near-term approved small/micro/nano missions whose objective is to achieve returns in the fields of Earth science, solar, interplanetary, planetary, astronomy/astrophysics observations, and fundamental physics. Emphasis will be given to results achieved, new technologies and concepts, and novel management techniques.

Co-Chairs

Stamatios Krimigis
The Johns Hopkins University Applied Physics Laboratory – UNITED STATES

Larry Paxton
The Johns Hopkins University Applied Physics Laboratory – UNITED STATES

B4.3

Small Satellite Operations

This session covers the planning for, and execution of, cost-effective approaches for Small Satellite Operations, with emphasis on new missions with new models of operation to reduce mission lifecycle costs and to minimise the cost impact of mission extensions. Papers addressing innovation, an entrepreneurial approach to new business opportunities, novel finance and business models, management techniques, and international cooperation in support of Small Satellite Operations are particularly encouraged. Papers that discuss the application of novel technology to mission operations, such as automation and autonomy, constraint resolution, and timeline planning, as well as reports on missions recently accomplished and lessons learned, are also welcome. For papers not addressing small satellites, please refer to Symposium B6.

Co-Chairs

Peter M. Allan
STFC – UNITED KINGDOM

Karen McBride
University of California, Los Angeles – UNITED STATES

B4.4

Small Earth Observation Missions

We call for papers that will present information to decision makers, scientists, engineers, and managers about cost-effective small satellite missions, instruments, technologies, and designs of both current and planned Earth- and near-Earth missions. This session addresses the technologies, applications and missions achieved through the use of small, cost-effective satellites to observe the Earth and near-Earth space. Innovative cost-effective solutions to the needs of the science and applications communities are sought. Satellite technologies suited for use on small satellites including those in the single to multiple cubesat range are particularly encouraged. Satellite or technology development efforts that make use of innovative launch opportunities, such as the developing space tourism market and commercial launch capability, hold significant promise for low-cost access to space make Earth observation missions attainable to non-governmental organizations as well as traditional users: papers addressing these evolving opportunities would be welcomed.

Co-Chairs

Larry Paxton
The John Hopkins University Applied Physics Laboratory – UNITED STATES

Amnon Ginati
European Space Agency (ESA) – THE NETHERLANDS

Rapporteur

Carsten Tobehn
European Space Agency (ESA) – THE NETHERLANDS

B4.5

Access to Space for Small Satellite Missions

A key challenge facing the viability and growth of the small satellite community is affordable and reliable space access. Topics of interest for this session include utilization of dedicated launches, ride-share systems, auxiliary payload systems, separation and dispenser systems, and small spacecraft sub-system development that will enable efficient small satellite access to space and orbit change (e.g., propulsion systems). Includes lessons learned from users on technical and programmatic approaches. For a discussion of small launchers concepts and operations, please refer to session D2.7.

Co-Chairs

Alex da Silva Curiel
Surrey Satellite Technology Ltd – UNITED KINGDOM

Jeffery Emdee
The Aerospace Corporation – UNITED STATES

B4.6A

Generic Technologies for Small/Micro Platforms

This session covers emerging and promising generic technologies for small and micro platforms. Real-life examples are particularly encouraged, both recently launched and shortly to be launched (next 3 years).

Co-Chairs

Nicholas Waltham
Rutherford Appleton Laboratory – UNITED KINGDOM

Philip Davies
Deimos Space UK Ltd – UNITED KINGDOM

Rapporteur

Jian Guo
Delft University of Technology (TU Delft) – THE NETHERLANDS

B4.6B

Generic Technologies for Nano/Pico Platforms

This session covers emerging and promising generic technologies for nano and pico platforms. Real-life examples are particularly encouraged, both recently launched and shortly to be launched (next 3 years).

Co-Chairs

Nicholas Waltham
Rutherford Appleton Laboratory – UNITED KINGDOM

Philip Davies
Deimos Space UK Ltd – UNITED KINGDOM

Rapporteur

Joost Elstak
ISIS - Innovative Solutions In Space B.V. – THE NETHERLANDS

B4.7

Space Systems and Architectures Featuring Cross-Platform Compatibility

Ideas are solicited for Modular, Reconfigurable, Adaptable systems (spacecraft, ground systems and networks) that feature cross-platform compatibility as a way to achieve mission lifecycle effectiveness. Applications are sought in Science, Exploration, Commerce, and other areas requiring rapid but stable system design and deployment. System-enabling plug-and-play interface definitions and recommendations for standardisation (mechanical, electrical, software and fluids) are particularly desirable.

Co-Chairs

Jaime Esper
National Aeronautics and Space Administration (NASA) – UNITED STATES

Marco D'Errico
Seconda Università di Napoli – ITALY

Rapporteur

Massimiliano Pastena
SSBV – UNITED KINGDOM

B4.8

Small Spacecraft for Deep-Space Exploration

This session focuses on innovative small spacecraft designs, systems, missions and technologies for the exploration of space beyond Earth orbit. Target destinations for these miniaturized space probes include the Earth's Moon, Mars, small bodies and other deep-space destinations, as well as near Earth vicinity for necessary development and technology demonstration missions. Small exploration probes covered by this session may come in many different forms, including special-purpose miniature spacecraft, standard format small platforms such as cubesats, or other microsats, nanosats, picosats, etc. Topics include new and emerging technologies in miniaturized subsystems including propulsion, avionics, guidance navigation & control, power supply, communication, thermal management, and sensors and instruments. Main aspect on this session is on new and emerging systems and mission applications for deep-space exploration using small spacecraft.

Co-Chairs

Leon Alkalai
National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory – UNITED STATES

Rene Laufer
Baylor University – UNITED STATES

Rapporteur

Amanda Stiles
SpaceX – UNITED STATES

B5 SYMPOSIUM ON INTEGRATED APPLICATIONS

Space systems are more and more involved in the delivery of global utilitarian services to end-users. The concept of Integrated Applications encompasses the simultaneous use of basic space services and technologies. This symposium will address various aspects of integrated applications. Integrated applications combine different space systems (Earth observation, navigation, telecommunications, etc) with airborne and ground-based systems to deliver solutions to local, national and global needs. They exploit the synergies between different data sources to provide the right information at the right time to the right user in a cost-effective manner and deliver the data to users in a readily usable form. The goal of the symposium is to enable the development of end-to-end solutions by connecting the communities that are driving toward end-to-end solutions with those that are developing enabling technologies for integrated applications. For the purposes related to the small satellites, please refer also to the session B4.4.

Coordinators

Amnon Ginati European Space Agency (ESA) — THE NETHERLANDS	Larry Paxton The John Hopkins University Applied Physics Laboratory — UNITED STATES
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B5.1 Tools and Technology in Support of Integrated Applications

The session will focus on specific systems, tools and technology in support of integrated applications and address the various issues associated with the design of space and ground systems, the kind of data they collect, how they collect data, and how the data are integrated and distributed to address key user needs. Possible topics include: ground-truthing of space data; innovative, low-cost tools for space data distribution and access; new ways of distributing integrated data products; data fusion and visualisation tools especially those using COTS systems; managing integrated applications programmes; education and outreach for integrated programmes, etc...

Co-Chairs

Larry Paxton The John Hopkins University Applied Physics Laboratory — UNITED STATES	Carsten Tobehn European Space Agency (ESA) — THE NETHERLANDS	Rapporteur David Y. Kusnierkiewicz The John Hopkins University — UNITED STATES
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B5.2 Integrated Applications End-to-End Solutions

The session will be a forum for end-to-end solutions, including case studies, proof-of-concept missions, and current projects that provide, or could provide, innovative user-driven solutions. Applications that combine ground- and space-based data sources with models to address specific user requirements will be presented. These examples can cover a variety of domains, like disaster/crisis monitoring and management, energy, food security, space situational awareness, transportation, health, etc. The user needs, the structure of the user communities, the value chain, the business case and the sustainability of the solutions are among the many aspects that can be considered. Examples of projects with established partnerships and fluent working relationships between space and non-space stakeholders.

Co-Chairs

David Y. Kusnierkiewicz The John Hopkins University — UNITED STATES	Amnon Ginati European Space Agency (ESA) — THE NETHERLANDS	Rapporteur Boris Penné Kayser-Threde GmbH — GERMANY
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B6 SPACE OPERATIONS SYMPOSIUM

The Space Operations Symposium addresses all aspects of spaceflight operations. The sessions address both manned and un-manned space operations, from low-Earth and geosynchronous orbit, to lunar, planetary, and exploration missions. The symposium covers both flight and ground systems, and included mission planning, training, and real time operations. Particular focus is provided for commercial space operations, advanced systems, new operations concepts, and small satellite operations.

Coordinators

Manfred Warhaut — GERMANY	H. Neal Hammond Space Bridges LLC — UNITED STATES
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B6.1 Human Spaceflight Operations

This session focuses on all aspects of operations unique to human spaceflight. Papers may address any phase in the mission lifecycle including concept development, mission planning, ground operations, ascent, on-orbit and entry operations, as well as recovery and post mission analysis.

Co-Chairs

Michael McKay European Space Agency (ESA) — GERMANY	Mario Cardano Thales Alenia Space France — ITALY	Rapporteur Helmut Luttmann Astrium Space Transportation — GERMANY
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B6.2 New Operations Concepts, Advanced Systems and Commercial Space Operations

This session included commercial and new space operations, and addressed advanced concepts, systems and tools for operating new types of missions, improving mission output in quality and quantity, and reducing costs in both commercial and governmental space enterprises.

Co-Chairs

Pierre Lods Centre National d'Etudes Spatiales (CNES) — FRANCE	Thomas Kuch Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY	Rapporteur Keiichiro Sakagami Japan Aerospace Exploration Agency — JAPAN
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B6.3 Mission Operations, Validation, Simulation and Training

This session addresses the broad topic of operations, from preparation through validation, simulation and training, including operations execution and lessons learned. It included concepts, methods and tools, as well as experience gained.

Co-Chairs

Paolo Ferri European Space Agency (ESA) — GERMANY	John Auburn Telespazio S.p.A. — ITALY	Rapporteur Lionel Baize Centre National d'Etudes Spatiales (CNES) — FRANCE
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B6.4 Flight Control Operations Virtual Forum

YPVF.1 This session is a virtual forum (not a paper session) co-sponsored by the Space Operations Committee and the Workforce Development/Young Professionals Program Committee. The forum targets hands-on flight control/operations personnel from multiple international organisations with objectives of sharing best practices, lessons learned and issues.

Co-Chairs

Philip Harris National Aeronautics and Space Administration (NASA)/Johnson Space Center — UNITED STATES	Katja Leuoht Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY	Rapporteur Ahmed Farid Telespazio VEGA Deutschland GmbH — GERMANY
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B6.5 Flight & Ground Operations of HSF Systems – Joint Session of the Human Spaceflight and Space Operations Symposia

B3.4 This session addresses key challenges and their solutions related to flight and ground operations in governmental and commercial human spaceflight, their systems and elements. Topics include operational problems and solutions, cost reduction, new and proposed ground facilities or infrastructure, and ground segment operations and planning. Also included are logistics and mission planning, ground transportation, and sustainment.

Co-Chairs

Dieter Sabath Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY	Helmut Luttmann Astrium Space Transportation — GERMANY	Rapporteur Rachid Amekrane Astrium GmbH — GERMANY
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B6.P Poster Session



TECHNOLOGY

Common technologies to space systems, including astrodynamics, structures, power and propulsion

- C1 ASTRODYNAMICS SYMPOSIUM**
- C2 MATERIALS AND STRUCTURES SYMPOSIUM**
- C3 SPACE POWER SYMPOSIUM**
- C4 SPACE PROPULSION SYMPOSIUM**

Category coordinated by Junichiro Kawaguchi, Japan Aerospace Exploration Agency (JAXA) - JAPAN

C1

ASTRODYNAMICS SYMPOSIUM

This symposium addresses advances in orbital mechanics, attitude dynamics, guidance, navigation, and control of single or multi-spacecraft systems as well as space robotics.

Coordinators

Alfred Ng Canadian Space Agency — CANADA	Anna Guerman CAST - Centre for Aerospace Science and Technologies, University of Beira Interior — PORTUGAL
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C1.1

Mission Design, Operations & Optimisation (1)

The theme covers design, operations and optimisation of Earth-orbiting and interplanetary missions, with emphasis on studies and experiences related to current and future missions.

Co-Chairs

Johannes Schoenmaekers European Space Operations Centre — GERMANY	Vincent Martinot Thales Alenia Space France — FRANCE	Rapporteur Moriba Jah Air Force Research Laboratory (AFRL) — UNITED STATES
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C1.2

Mission Design, Operations & Optimisation (2)

The theme covers design, operations and optimisation of Earth-orbiting and interplanetary missions, with emphasis on studies and experiences related to current and future missions.

Co-Chairs

Kathleen Howell Purdue University — UNITED STATES	Richard Epenoy Centre National d'Etudes Spatiales (CNES) — FRANCE
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C1.3

Orbital Dynamics (1)

This theme discusses advances in the knowledge of natural motions of objects in orbit around the Earth, planets, minor bodies, Lagrangian points and more generally natural orbital dynamics of spacecraft in the Solar System. It also covers advances in orbit determination.

Co-Chairs

Filippo Graziani University of Rome "La Sapienza" — ITALY	Shoji Yoshikawa Mitsubishi Electric Corporation — JAPAN
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C1.4

Orbital Dynamics (2)

This theme discusses advances in the knowledge of natural motions of objects in orbit around the Earth, planets, minor bodies, Langrangian points and more generally natural orbital dynamics of spacecraft in the Solar System. It also covers advances in orbit determination.

Co-Chairs

Josep J. Masdemont Universitat Politècnica de Catalunya (UPC) — SPAIN	Antonio Prado INPE — BRAZIL	Rapporteur Gwanghyeok Ju Korea Aerospace Research Institute — KOREA, REPUBLIC OF
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C1.5

Attitude Dynamics (1)

This theme discusses advances in spacecraft attitude dynamics and control, as well as design, testing and performance of attitude sensors and actuators. This theme also covers dynamics and control of multiple interconnected rigid and flexible bodies, including tethered systems, and in-orbit assembly.

Co-Chairs

Mikhail Ovchinnikov Keldysh Institute of Applied Mathematics, RAS — RUSSIA	Amalia Ercoli Finzi Politecnico di Milano — ITALY	Rapporteur Hao-Chi Chang National Space Organization — TAIWAN, CHINA
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C1.6

Attitude Dynamics (2)

This theme discusses advances in spacecraft attitude dynamics and control, as well as design, testing and performance of novel attitude sensors and actuators. This theme also covers dynamics and control of multiple interconnected rigid and flexible bodies, including tethered systems, and in-orbit assembly.

Co-Chairs

KSimei Ji Beijing Institute of Technology — CHINA	Paolo Teofilatto University of Rome "La Sapienza" — ITALY	Rapporteur Yongchun Xie Beijing Institute of Control Engineering — CHINA
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C1.7

Guidance, Navigation and Control (1)

The emphasis of this theme is on the studies and application related to the guidance, navigation and control of Earth-orbiting and interplanetary spacecraft and rockets, including formation flying, rendezvous and docking.

Co-Chairs

James O'Donnell National Aeronautics and Space Administration (NASA)/Goddard Space Flight Center — UNITED STATES	Igor V. Belokonov Samara State Aerospace University — RUSSIA
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C1.8

Guidance, Navigation and Control (2)

The emphasis of this theme is on the studies and application related to the guidance, navigation and control of Earth-orbiting and interplanetary spacecraft and rockets, including formation flying, rendezvous and docking.

Co-Chairs

Bernhard Lübke-Ossenbeck OHB System AG — GERMANY	Daniel Scheeres University of Colorado — UNITED STATES	Rapporteur Fuyuto Terui Japan Aerospace Exploration Agency (JAXA) — JAPAN
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C1.9 Guidance, Navigation and Control (3)

The emphasis of this theme is on the studies and application related to the guidance, navigation and control of Earth-orbiting and interplanetary spacecraft and rockets, including formation flying, rendezvous and docking.

Co-Chairs

Benedicte Escudier
Institut Supérieur de l'Aéronautique et de l'Espace (ISAE) — FRANCE

Arun Misra
McGill University — CANADA

C2 MATERIALS AND STRUCTURES SYMPOSIUM

This symposium provides an international forum for recent advancements in assessment of the latest technology achievements in space structures, structural dynamics and materials. The Symposium addresses the design and development of space vehicle structures and mechanical/thermal/fluidic systems. Future advances in a number of space systems applications for space power, space transportation, astrodynamics, space exploration, space propulsion and space station will depend increasingly on the successful application of innovative materials and the development of structural concepts - particularly those relating to very large deployable (and assembled) space structures. For these applications to occur, increased interaction between these technology communities, and collaboration among technologists and mission planners needs to be pursued. Substantial improvements are essential in a wide range of current technologies, including nanotechnologies, to reduce projected costs and increase potential scientific returns from respective mission system applications. Papers in this symposium will review the projected advances in materials and space structures in this domain for advanced space systems applications.

Coordinators

Constantinos P. Stavrinidis
European Space Agency (ESA) — THE NETHERLANDS

Pavel M. Trivailo
RMIT University, Australia — AUSTRALIA

C2.1 Space Structures I - Development and Verification (Space Vehicles and Components)

The topics to be addressed include evaluation of analysis versus test results, spacecraft and launch vehicles system and subsystems, e.g. pressurised structures, tanks, loads introduction, primary structures, fluidic equipment, control surfaces; examination of both on-ground and in-orbit testing, launch dynamic environment as related to structural design, space vehicle development and launch verification such as sine, random and acoustic vibration testing, and lessons learned.

Co-Chairs

Alwin Eisenmann
IABG Industrieanlagen - Betriebsgesellschaft mbH — GERMANY

Andreas Rittweger
DLR (German Aerospace Center) — GERMANY

Rapporteur

Jochen Albus
Astrium GmbH — GERMANY

C2.2 Space Structures II - Development and Verification (Deployable and Dimensionally Stable Structures)

The topics to be addressed include evaluation of analysis versus test results for deployable and dimensionally stable structures, e.g. reflectors, telescopes, antennas; examination of both on-ground and in-orbit testing, thermal distortion and shape control, structural design, development and verification; lessons learned.

Co-Chairs

Paolo Gasbarri
Università di Roma "La Sapienza" — ITALY

Jean-Alain Massoni
Thales Alenia Space France — FRANCE

Rapporteur

Pierre Rochus
CSL, Université de Liège — BELGIUM

C2.3 Space Structures - Dynamics and Microdynamics

The topics to be addressed include dynamics analysis and testing, modal identification, landing and impact dynamics, pyroshock, test facilities, vibration suppression techniques, damping, micro-dynamics, in-orbit dynamic environment, wave structural propagation, excitation sources and in-orbit dynamic testing.

Co-Chairs

Peter M. Bainum
Howard University — UNITED STATES

Ijar M. Da Fonseca
Instituto Nacional de Pesquisas Espaciais (INPE) and UNINOVE University — BRAZIL

Rapporteur

Harijono Djojodihardjo
Universitas Al Azhar Indonesia — INDONESIA

C2.4 Advanced Materials and Structures for High Temperature Applications

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

Co-Chairs

Marc Lacoste
Herakles (Safran group) — FRANCE

David E. Glass
National Aeronautics and Space Administration (NASA) — UNITED STATES

Rapporteur

Luigi Scatteia
Strategy& - Formerly Booz and Company — THE NETHERLANDS

C2.5 Smart Materials and Adaptive Structures

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

Co-Chairs

Pavel M. Trivailo
RMIT University, Australia — AUSTRALIA

Hiroshi Furuya
Tokyo Institute of Technology — JAPAN

Rapporteur

Paolo Gaudenzi
University of Rome "La Sapienza" — ITALY

C2.6 Space Environmental Effects and Spacecraft Protection

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

Co-Chairs

Giuliano Marino
CIRA Italian Aerospace Research Centre — ITALY

Iuri Moshnenko
Yuzhnoye State Design Office — UKRAINE

Rapporteur

Yeong-Moo Yi
Korea Aerospace Research Institute — KOREA, REPUBLIC OF

C2.7 Space Vehicles – Mechanical/Thermal/Fluidic Systems

The topics to be addressed include novel technical concepts for mechanical/thermal/fluidic systems and subsystems of launchers, manned and unmanned spacecraft, re-entry vehicles and small satellites. Advanced subsystems and design of future exploration missions will be covered, considering issues arising from material selection, cost efficiency and reliability, and advancements in space vehicle development with respect to engineering analysis, manufacturing, and test verification.

Co-Chairs

Oleg Alifanov
Moscow Aviation Institute — RUSSIA

Brij Agrawal
Naval Postgraduate School — UNITED STATES

Rapporteur

Guoliang Mao
Beijing Institute of Aerodynamics — CHINA

C2.8

Specialised Technologies, Including Nanotechnology

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

Co-Chairs

Mario Marchetti
Associazione Italiana di Aeronautica e Astronautica (AIDAA) — ITALY

Pierre Rochus
CSL, Université de Liège — BELGIUM

Rapporteur

Pavel M. Trivailo
RMIT University, Australia — AUSTRALIA

C2.9

Advancements in Materials Applications and Rapid Prototyping

The topics to be addressed include advancements in materials applications, and novel technical concepts in the rapid prototyping of mechanical systems.

Co-Chairs

Giuliano Marino
CIRA Italian Aerospace Research Centre — ITALY

Zijun Hu
China Academy of Launch Vehicle Technology — CHINA

Rapporteur

Luigi Scatteia
Strategy& - Formerly Booz and — The Netherlands

C2.P

Poster Session

C3

SPACE POWER SYMPOSIUM

Reliable energy systems continue to be key for all space missions. The future exploration and development of space depends 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 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.

Coordinator

Leopold Summerer
European Space Agency (ESA) — THE NETHERLANDS

Koji Tanaka
ISAS, JAXA — JAPAN

C3.1

Space-Based Solar Power Architectures / Space & Energy Concepts

This session deals with all aspects of architectures and concepts 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 organisational 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. Typically it will include all system-level, architectural, organisational and commercial aspects, including modelling and optimisation as well as related non-technical aspects.

Co-Chairs

Leopold Summerer
European Space Agency (ESA) — THE NETHERLANDS

John C. Mankins
ARTEMIS Innovation Management Solutions, LLC — UNITED STATES

Rapporteurs

Nobuyuki Kaya
Kobe University — JAPAN

Rapporteur

Koji Tanaka
ISAS/JAXA — JAPAN

C3.2

Wireless Power Transmission Technologies, Experiments and Demonstrations

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.

Co-Chairs

Nobuyuki Kaya
Kobe University — JAPAN

Frank Little
Texas A&M University — UNITED STATES

Rapporteurs

Massimiliano Vasile
University of Strathclyde — UNITED KINGDOM

C3.3

Advanced Space Power Technologies and Concepts

This session covers all type of advanced space power technologies and concepts. These include technologies and concepts related to power generation (solar, nuclear, other) and harvesting, power conditioning, management and distribution, energy storage, and energy generation. This session focuses on the power systems in the hundreds of watts and above, including large power systems for telecom spacecraft and novel power architectures for planetary, asteroid and lunar exploration scenarios up to MW size nuclear reactor systems.

Co-Chairs

Carla Signorini
European Space Agency (ESA) — THE NETHERLANDS

Lee Mason
National Aeronautics and Space Administration (NASA)/Glenn Research Center — UNITED STATES

Rapporteurs

Koji Tanaka
ISAS/JAXA — JAPAN

Matthew Perren
ASTRIUM EADS — FRANCE

C3.4

Small and Very Small Advanced Space Power Systems

This session is devoted to emerging concepts of very small power systems typically below the tens of watts but including micro- and milli-watt power harvesting technologies. While the space power market is still dominated by increasing power systems for large platforms, essentially telecom platforms, a dynamic market is emerging on the low power and low performance fringes of space in the form of nano, micro and mini spacecraft. This session is dedicated to power systems for such applications as well as for very low power, long-duration exploration probes and sensors.

Co-Chairs

Massimiliano Vasile
University of Strathclyde — UNITED KINGDOM

Shoichiro Mihara
Japan Space Systems (J-spacesystems) — JAPAN

Rapporteur

Alex Ignatiev
University of Houston — UNITED STATES

C3.5 C4.7 **Joint Session on Nuclear Power and Propulsion**
This session, organised jointly between the Space Power and the Space Propulsion Symposia, includes papers addressing all aspects related to nuclear power and propulsion for space applications.

Co-Chairs		Rapporteur
Leopold Summerer European Space Agency (ESA) – THE NETHERLANDS	Jacques Gigou European Space Agency (ESA) – FRANCE	George Schmidt National Aeronautics and Space Administration (NASA) – UNITED STATES

C3.P **Poster Session**

C4 **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, and various combinations of air-breathing and rocket propulsion and nuclear, electric, solar and other advanced rocket systems. The Symposium is concerned with component technologies, the operation and application to missions of overall propulsion systems and unique propulsion test facilities.

Coordinators		Toru Shimada Japan Aerospace Exploration Agency (JAXA) – JAPAN
Giorgio Saccoccia European Space Agency (ESA) – THE NETHERLANDS	Richard Blott Space Enterprise Partnerships Limited – UNITED KINGDOM	
Helen Webber Reaction Engines Ltd. – UNITED KINGDOM		

C4.1 **Propulsion System (1)**
This session is dedicated to all aspects of Liquid Rocket Engines.

Co-Chairs		Rapporteur
Christophe Bonhomme Centre National d'Etudes Spatiales (CNES) – FRANCE	Patrick Danous Snecma – FRANCE	Vanniyaperumal Narayanan Indian Space Research Organization (ISRO) – INDIA

C4.2 **Propulsion System (2)**
This session is dedicated to all aspects of Solid and Hybrid Propulsion.

Co-Chairs		Rapporteur
Stéphane Henry Herakles (Safran group) – FRANCE	Toru Shimada Japan Aerospace Exploration Agency (JAXA) – JAPAN	M. Badrinayana Murthy Indian Space Research Organization (ISRO) – INDIA

C4.3 **Propulsion Technology (1)**
This session includes all science and technologies supporting all aspects of space propulsion. The emphasis in this session is placed in particular on components for propulsion.

Co-Chairs		Rapporteur
Didier Boury Herakles (Safran group) – FRANCE	Angelo Cervone Delft University of Technology (TU Delft) – THE NETHERLANDS	John Harlow Aerogjet Rocketdyne – UNITED KINGDOM

C4.4 **Electric Propulsion**
This session is dedicated to all aspects of electric propulsion technologies, systems and applications.

Co-Chairs		Rapporteur
Garri A. Popov Research Institute of Applied Mechanics and Electrodynamics – RUSSIA	Norbert Puettmann Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) – GERMANY	Vanessa Vial Snecma – FRANCE

C4.5 **Propulsion Technology (2)**
This session includes all science and technologies supporting all aspects of space propulsion. An objective is to attract papers from students and young professionals with a more technical rather than programmatic or organisational focus.

Co-Chairs		Rapporteur
Walter Zinner Astrium GmbH – GERMANY	Max Calabro The Inner Arch – FRANCE	Davina Di Cara European Space Agency (ESA) – THE NETHERLANDS

C4.6 **New Missions Enabled by New Propulsion Technology and Systems**
Many missions are precluded by limitations on current propulsion technologies and systems. The session will explore concepts for new missions that can be enabled by specific advancements in propulsion and/or integration of various propulsion technologies and systems.

Co-Chairs		Rapporteur
Giorgio Saccoccia European Space Agency (ESA) – THE NETHERLANDS	Jerrol Littles Aerogjet Rocketdyne – UNITED STATES	Mariano Andreucci Alta S.p.A. – ITALY

C4.7 C3.5 **Joint Session on Nuclear Propulsion and Power**
This session, organised jointly between the Space Power and the Space Propulsion Symposium, includes papers addressing all aspects related to nuclear power and propulsion for space applications.

Co-Chairs		Rapporteur
Leopold Summerer European Space Agency (ESA) – THE NETHERLANDS	Jacques Gigou European Space Agency (ESA) – FRANCE	George Schmidt National Aeronautics and Space Administration (NASA) – UNITED STATES

C4.8 **Advanced and Combined Propulsion Systems**
The session is for the presentation of advanced propulsion concepts being studied or considered. The advanced concepts should seek to deliver breakthroughs in overcoming the limitations of propulsion systems in current use or development. For advanced concepts technologies should normally be in the range TRL 0 to TRL 2. Advanced concepts with higher TRL technologies may also be presented where a combination of propulsion technologies can lead to performance breakthroughs which cannot be achieved with a single technology. A combination can include for example both chemical and electric or solid and liquid chemical.

Co-Chairs		Rapporteur
Zvika Zuckerman Rafael Advanced Defense Systems Ltd. – ISRAEL	Young min Yoon KARI – KOREA, REPUBLIC OF	Constance Syring University of Stuttgart – GERMANY

C4.9 **Hypersonic and Combined Cycle Propulsion**
This session covers papers on Hypersonic and Combined Cycle Propulsion for space applications.

Co-Chairs		Rapporteur
Patrick Danous Snecma – FRANCE	Riheng Zheng Chinese Society of Astronautics – CHINA	Helen Webber Reaction Engines Ltd. – UNITED KINGDOM

C4.P **Poster Session**

Category

D

INFRASTRUCTURE

Systems sustaining space missions, including space system transportation, future systems and safety

- D1 SPACE SYSTEMS SYMPOSIUM
- D2 SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM
- D3 SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT
- D4 SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FAR FUTURE
- D5 47TH SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES
- D6 47TH SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES

Category coordinated by John-David F. Bartoe, National Aeronautics and Space Administration (NASA) – UNITED STATES

D1 **SPACE SYSTEMS SYMPOSIUM**
This symposium addresses the present and future development of space systems and technologies, with sessions on System Engineering Methods, Processes, and Tools; Enabling Technologies for Space Systems; Significant Achievements in space systems with implications for Lessons Learned and future Training and Practice; Advanced System Architectures; and Innovative and Visionary Space Systems of the future. A special session addresses the emerging technologies and potential applications in the area of supplementary payloads "hosted" on spacecraft and constellations, where the mission of the hosted payload can be unrelated to the primary mission of the hosting system.

Coordinators		
Reinhold Bertrand European Space Agency (ESA) – GERMANY	Geilson Loureiro Instituto Nacional de Pesquisas Espaciais (INPE) – BRAZIL	

D1.1 **Innovative and Visionary Space Systems Concepts**
Dreams of yesterday are a reality today. Dreams of tomorrow need to be looked at today to make them real in the future. With emerging new technologies, it is now possible to conceptualise new and innovative space systems and new potential applications for the future. This session will explore innovative technologies, services, software and concepts for space systems for the future.

Co-Chairs		Rapporteur
Mauricio Moshe Guelman Asher Space Research Institute, Technion, I.I.T. – ISRAEL	Jill Prince National Aeronautics and Space Administration (NASA) /Langley Research Center – UNITED STATES	Peter Dieleman National Aerospace Laboratory (NLR) – THE NETHERLANDS

D1.2 **Enabling Technologies for Space Systems**
This session will focus on innovative, technological developments that are usually high risk, but which have the potential to significantly enhance the performance of existing and new space systems. Enabling innovative technologies for space applications often result from spin-ins which will be discussed during the session, together with potential spin-offs. Examples include instrumentation, biotechnology, components, micro- and nano-technology, MEMS, advanced new structures.

Co-Chairs		Rapporteur
Xavier Roser Thales Alenia Space France – FRANCE	Jean-Paul Aguttes Centre National d'Etudes Spatiales (CNES) – FRANCE	Eiichi Tomita Japan Aerospace Exploration Agency (JAXA) – JAPAN

D1.3 **System Engineering - Methods, Processes and Tools (1)**
This session will focus on state-of-the-art system engineering methodologies - the methods, process, and tools that reduce the time and cost, and improve the quality of space system design. Of special interest are multi-disciplinary methods, tools, and processes including modelling and simulation used to define system architectures to improve risk management, safety, reliability, testability, and quality of life cycle cost estimates.

Co-Chairs		Rapporteur
Dmitry Payson Skolkovo Foundation – RUSSIA	Tibor Balint Royal College of Art – UNITED KINGDOM	Franck Durand-Carrier Centre National d'Etudes Spatiales (CNES) – FRANCE

D1.4 **Space Systems Architectures**
The subject of this session is current and future space system architectures to increase performance, efficiency, reliability, and flexibility of application. Topics of interest include the design of flight and ground system (hardware & software) architectures and the partitioning of functions between them, small satellite constellations and formations (swarms), and the use of on-board autonomy and autonomous ground operations.

Co-Chairs		Rapporteur
Peter Dieleman National Aerospace Laboratory (NLR) – THE NETHERLANDS	Franck Durand-Carrier Centre National d'Etudes Spatiales (CNES) – FRANCE	Jill Prince National Aeronautics and Space Administration (NASA)/Langley Research Center – UNITED STATES

D1.5 Training, Achievements and Lessons Learned in Space Systems
System engineering training, the achievement of significant mission accomplishments in the face of challenges, both expected and unexpected, and the consequent lessons learned in design, development, and operation form basis for steady improvement of space system engineering practice for ensuring missions success. This session focuses on all aspects of this process, with papers on mission achievements with critical lessons learned and the application to future missions and development practice.

Co-Chairs		Rapporteur
Klaus Schilling <i>University Wuerzburg – GERMANY</i>	Eiichi Tomita <i>Japan Aerospace Exploration Agency (JAXA) – JAPAN</i>	Marco Guglielmi <i>European Space Agency (ESA) – THE NETHERLANDS</i>

D1.6 System Engineering - Methods, Processes and Tools (2)
This session will focus on state-of-the-art system engineering methodologies - the methods, processes, and tools that reduce the time and cost, and improve the quality of space system design. Of special interest are multi-disciplinary methods, tools, and processes including modelling and simulation used to define system architectures to improve risk management, safety, reliability, testability, and quality of life cycle cost estimates.

Co-Chairs		Rapporteur
Norbert Frischauf <i>ORF – AUSTRIA</i>	Geilson Loureiro <i>National Institute for Space Research - INPE – BRAZIL</i>	Tibor Balint <i>Royal College of Art – UNITED KINGDOM</i>

D1.7 Hosted Payloads - Concepts, Techniques and Challenges, Missions and Applications
Across the space community there is increasing interest and activity in the area of hosted payloads. In this concept, one or more additional payloads are incorporated onto a main spacecraft, where the objectives of the hosted payloads are unrelated to the principal mission (e.g. commercial communications) of the main spacecraft. In this way, specialized observational, scientific, or experimental or operational payloads can be brought to orbit, even to geostationary orbit, for a fraction of the cost of building and launching independent satellites. The concept also provides for unique observational conditions, e.g. 24/7 global observation, that would be otherwise unaffordable for the instrument or payload classed under consideration. The approach presents unique challenges, that range from organisational relationships, through adaptation of mission requirements (e.g. observation geometry, RF susceptibility and emissions) to meet conditions required by the host spacecraft, to development, integration, test, and compatible on-orbit operation of divergent systems. Papers in this session will look at current missions and future opportunities and address both benefits and challenges as the world-wide space community moves into this exciting area.

Co-Chairs		Rapporteur
Igor V. Belokonov <i>Samara State Aerospace University – RUSSIA</i>	Ming Li <i>China Academy of Space Technology (CAST) – CHINA</i>	

D1.P Poster Session

D2 SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM

Topics should address worldwide space transportation solutions and innovations. The goal is to foster understanding and cooperation amongst the world's space-faring organisations.

Coordinators		Secretary
John M. Horack <i>Teledyne Brown Engineering Inc – UNITED STATES</i>	Ulf Palmnäs <i>GKN Aerospace Engine Systems – SWEDEN</i>	Stephen Creech <i>NASA Marshall Space Flight Center – UNITED STATES</i>

D2.1 Launch Vehicles in Service or in Development
Review of up to date status of launch vehicles currently in use in the world or under short term development.

Co-Chairs		Rapporteur
Julio Aprea <i>European Space Agency (ESA) – FRANCE</i>	Randolph Kendall <i>Aerospace Corporation – UNITED STATES</i>	Ko Ogasawara <i>Mitsubishi Heavy Industries, Ltd. – JAPAN</i>

D2.2 Launch Services, Missions, Operations and Facilities
Review of the current and planned launch services and support, including economics of space transportation systems, financing, insurance, licensing. Advancements in ground infrastructure, ground operations, mission planning and mission control for both expendable and reusable launch services.

Co-Chairs		Rapporteur
Yves Gérard <i>Astrium Space Transportation – FRANCE</i>	Luigi Bussolino <i>Bussolino and Associates – ITALY</i>	Igor V. Belokonov <i>Samara State Aerospace University – RUSSIA</i>

D2.3 Upper Stages, Space Transfer, Entry and Landing Systems
Discussion of existing, planned or new advanced concepts for cargo and human orbital transfer. Includes current and near term transfer, entry and landing systems, sub-systems and technologies for accommodating crew and cargo transfer in space.

Co-Chairs		Rapporteur
Oliver Kunz <i>RUAG Space AG – SWITZERLAND</i>	Christophe Bonnal <i>Centre National d'Etudes Spatiales (CNES) – FRANCE</i>	Oleg Ventskovskiy <i>– UKRAINE</i>

D2.4 Future Space Transportation Systems
Discussion of future system designs and operational concepts for both expendable and reusable systems for Earth-to orbit transportation and exploration missions.

Co-Chairs		Rapporteur
José Gavira Izquierdo <i>European Space Agency (ESA) – THE NETHERLANDS</i>	Charles Cockell <i>Open University – UNITED KINGDOM</i>	Philippa Davies <i>Reaction Engines Ltd. – UNITED KINGDOM</i>

D2.5 Future Space Transportation Systems Technologies
Discussion of technologies enabling new reusable or expendable launch vehicles and in-space transportation systems. Emphasis is on hardware development and verification before flight.

Co-Chairs		Rapporteur
Patrick M. McKenzie <i>RUAG Space – UNITED STATES</i>	Sylvain Guédrón <i>Centre National d'Etudes Spatiales (CNES) – FRANCE</i>	Pier Paolo de Matteis <i>CIRA Italian Aerospace Research Centre – ITALY</i>

D2.6 Future Space Transportation Systems Verification and In-Flight Experimentation
Discussion of system, subsystems and technologies flight testing for future space transportation systems. Emphasis is on flight experimentation/verification including technology demonstrators and test experience.

Co-Chairs		Rapporteur
Giorgio Tumino <i>European Space Agency (ESA) – FRANCE</i>	David E. Glass <i>National Aeronautics and Space Administration (NASA) – UNITED STATES</i>	Tetsuo Hiraawa <i>Japan Aerospace Exploration Agency (JAXA) – JAPAN</i>

D2.7 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 and flexible, highly responsive concepts. Also includes mission operations, associated operations and specific constraints.

Co-Chairs		Rapporteur
Nicolas Bérend <i>Office National d'Etudes et de Recherches Aérospatiales (ONERA) – FRANCE</i>	Harry A. Cikanek <i>National Oceanic and Atmospheric Administration (NOAA) – UNITED STATES</i>	Emmanuelle David <i>German Aerospace Center (DLR) – GERMANY</i>

D2.8 A5.4 Going To and Beyond the Earth-Moon System: Human Missions to Mars, Libration Points and NEO's
This joint session will explore heavy-lift launch 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 heavy lift launchers.

Co-Chairs		Rapporteur
Kenneth Bruce Morris <i>Booz Allen Hamilton – UNITED STATES</i>	Yuguang Yang <i>China Aerospace Science & Industry Corporation (CASIC) – CHINA</i>	Steve Creech <i>National Aeronautics and Space Administration (NASA) – UNITED STATES</i>

D2.9 D6.2 Commercial Point-to-Point Safety Issues
This special joint session will address safety matters related to commercial point-to-point space transportation. Topics include air and space traffic, airport and spaceport operations, communications, vehicle design optimization and human factors as they relate to safety.

Co-Chairs		Rapporteur
Christophe Chavagnac <i>Airbus Defence & Space – FRANCE</i>	Randolph Kendall <i>Aerospace Corporation – UNITED STATES</i>	

D2.P Poster Session

D3 SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT

This symposium 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 symposium is organised by the International Academy of Astronautics (IAA). 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 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.

Coordinators		Co-Chairs
John C. Mankins <i>ARTEMIS Innovation Management Solutions, LLC – UNITED STATES</i>	Alain Pradier <i>European Space Agency (ESA) – THE NETHERLANDS</i>	

D3.1 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 high-value 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		Rapporteurs
John C. Mankins <i>ARTEMIS Innovation Management Solutions, LLC – UNITED STATES</i>	Maria Antonietta Perino <i>Thales Alenia Space Italia – ITALY</i>	

Co-Chairs		Rapporteurs
Horst Rauck <i>DLR, German Aerospace Center – GERMANY</i>	Anouk Girard <i>University of Michigan – UNITED STATES</i>	

D3.2 Systems and Infrastructures to Implement Future Building Blocks in Space Exploration and Development
The emergence of novel systems and infrastructures will be needed to enable ambitious scenarios for sustainable future space exploration and utilisation. 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.

Co-Chairs		Rapporteurs
William H. Siegfried <i>The Boeing Company – UNITED STATES</i>	Scott Hovland <i>European Space Agency (ESA) – THE NETHERLANDS</i>	

Co-Chairs		Rapporteurs
Horst Rauck <i>DLR, German Aerospace Center – GERMANY</i>	Paivi Jukola <i>Aalto University – FINLAND</i>	

D3.3 Novel Concepts and Technologies for Enable Future Building Blocks in Space Exploration and Development
In order to realise future, sustainable programmes of space exploration, utilisation and commercial development, a focused suite of transformational new concepts and supporting technologies must be advanced during the coming years. The technical objectives to be pursued should be drawn from a broad, forward looking view of the technologies and systems needed, but must be sufficiently well focused to allow tangible progression—and dramatic improvements over current capabilities—to be realised in the foreseeable future. This session will address cross cutting research topics and/or technologies to enable future building blocks in Space Exploration and Development. Papers are solicited in these and related areas.

Co-Chairs

Alain Pradier
European Space Agency (ESA) – THE NETHERLANDS

Alain Dupas
– FRANCE

Rapporteurs

Christopher Moore
National Aeronautics and Space Administration (NASA) – UNITED STATES

Junjiro Onoda
Japan Society for Aeronautics and Space Sciences (JSASS) – JAPAN

D3.4

Space Technology and System Management Practices and Tools

The effective management of space technology and systems development is critical to future success in space exploration, development and discovery. This session is the next in an ongoing series at the International Astronautical Congress that provides a unique international forum to further the development of a family of 'best practices and tools' in this important field. Specific areas of potential interest include: (1) Technology Management Methodologies and Best Practices; (2) R&D Management Software Tools and Databases; and (3) Systems Analysis Methods and Tools. The full range of R&D activities are appropriate for discussion, ranging from technology development long-term planning, through technology R&D programmes, to system development projects, with special emphasis on the transition of new technologies from one stage to the next. Particular topics could include: Technology Readiness Levels (TRLs) and Technology Readiness Assessments, Technology R&D Risk Assessments and Management, Advanced Concepts Modelling Approaches and Tools, etc. Either more theoretical discussions, or examples of applications of R&D management techniques and/or tools to specific R&D programmes and projects are of interest for the session.

Co-Chairs

John C. Mankins
ARTEMIS Innovation Management Solutions, LLC – UNITED STATES

Paivi Jukola
Aalto University – FINLAND

Rapporteurs

Maria Antonietta Perino
Thales Alenia Space Italia – ITALY

Hans E.W. Hoffmann
International Astronautical Federation (IAF) – GERMANY

D3.P

Poster Session

D4

13th IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE

This 13th Symposium is organised by the International Academy of Astronautics. In Space Activities the focus is usually kept on the short term developments, at the expense of future goals. The Symposium will discuss topics with at least 20 to 30 years prospective lead time and identify technologies and strategies that need to be developed. These developments will be examined with the goal to support also short/medium term projects and to identify priorities required for their development. The Sessions in the Symposium will address innovative technologies and Strategies to develop Space Elevator as well as Interstellar Precursor Missions. A session will address also how Space activities can contribute to the resolution of World Societal Changes as well as to increasing the countries engaged in space activities.

Coordinators

Giuseppe Reibaldi
International Academy of Astronautics (IAA) – FRANCE

Hans E.W. Hoffmann
International Astronautical Federation (IAF) – GERMANY

D4.1

Innovative Concepts and Technologies

In order to realize future, sustainable programmes of space exploration and utilisation, a focused suite of transformational new system concept and supporting technologies must be developed during the coming decade. The technical objectives to be pursued should be drawn from a broad, forward looking view of the technologies and system needed, but must be sufficiently focused, to allow tangible progression and dramatic improvements over current capabilities. This session will address cross cutting considerations in which a number of discipline research topics and/or technologies may be successful developed to support transformational new system concept. Papers are solicited in these and related areas.

Co-Chairs

Roger X. Lenard
LPS – UNITED STATES

Giorgio Saccoccia
European Space Agency (ESA) – THE NETHERLANDS

Rapporteur
Paivi Jukola
Aalto University – FINLAND

D4.2

Contribution of Space Activities to Solving Global Societal Issues

The session will discuss the contributions, in the future, of space exploration and utilisation to the solution of global challenges (e.g. energy, population, sustainable development) and how the space systems will support the understanding of the global societal issues. The session will include also the identification of the related technologies that needs to be developed. The definition of a roadmap will be encouraged. Environmental issues including global climate change will not be covered in this particular session.

Co-Chairs

John C. Mankins
ARTEMIS Innovation Management Solutions, LLC – UNITED STATES

Giuseppe Reibaldi
International Academy of Astronautics (IAA) – FRANCE

Rapporteur
Hans E.W. Hoffmann
International Astronautical Federation (IAF) – GERMANY

D4.3

Technology Assessment and Space Elevators Components

The recently completed IAA study, "Space Elevators - Feasibility and Next Steps" looked at engineering, operational, and funding steps towards an operational capability. This session will evaluate the current and near-term potential of the necessary technologies. They will be evaluated with respect to the NASA TRL's and identify risks associated. In addition, the session can accept the analysis of other issues leveraging this remarkable transportation capability of routine, inexpensive and safe access to our solar system.

Co-Chairs

Peter Swan
SouthWest Analytic Network – UNITED STATES

Robert E Penny
Cholla Space Systems – UNITED STATES

Rapporteur
Bruce Chesley
Boeing Space and Intelligence Systems – UNITED STATES

D4.4

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, 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 2030 are sought.

Co-Chairs

Louis Friedman
The Planetary Society – UNITED STATES

Mae Jemison
100 Year Starship – UNITED STATES

Rapporteur
Stephanie Wilson
University of Boston – UNITED STATES

D4.P

Poster Session

D5

48th SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES

This 48th Symposium organised by the International Academy of Astronautics addresses management approaches, methods, design solutions and regulations to improve the quality, efficiency, and collaborative ability of space programs. All aspects are considered: risk management, complexity of systems and operations, knowledge management, human factors, economical constraints, international cooperation, norms, and standards.

Coordinator

Jeanne Holm
University of California, Los Angeles – UNITED STATES

Roberta Mugellesi-Dow
European Space Agency (ESA) – GERMANY

D5.1

Safety and quality: "SUCCESS" is the goal

Space missions support great ambitions, but also great failures, the worse of them being when safety is at stake. Fortunately, product assurance methods have been developed, and lessons learned carry forth a really increasing know how. Real success can be claimed in now both small and ambitious missions. This session deals with the methods, tests, lessons learned, standards for analysis and mitigation of such risks. It provides an opportunity for exchanges on all aspects of the development philosophy, risk management, norms and cost index of development of novel transportation systems, orbital systems, exploration vehicles, test procedures, and operations to meet this challenge for every kind of aerospace missions.

Co-Chairs

Alexander S. Filatyev
Central Aero-HydroDynamic Institute – RUSSIA

Pierre Molette
– FRANCE

Rapporteur

Manola Romero
Office National d'Etudes et de Recherches Aéropatiales (ONERA) – FRANCE

D5.2

Knowledge Management and Collaboration in Space Activities

Working on complex space missions requires virtual teaming, learning lessons from the past, transferring knowledge from experts to younger generations and developing deep expertise within an organisation.

- How are aerospace organisations managing the ability to share knowledge to develop new missions?
- What solutions are in place to work securely across corporate and international boundaries?
- How is knowledge captured, shared, and used to drive innovation?

This session focuses on the processes and technologies that organisations are using to sustain, energise and invigorate their ability to learn, innovate, and share knowledge within and amongst organisations for sustainable, peaceful exploration of space. Case studies and defined approaches will discuss:

- Analysis of successful projects and innovations in the application of knowledge management
- Grounded research in knowledge and risk management
- Capture of technical expertise and lessons learned from previous successful projects that are applicable to new programmes and focus on driving innovation.
- Methods that allow data, information or knowledge exchange within or amongst organisations in support of actual programmes or missions are of particular interest.

Co-Chairs

Roberta Mugellesi-Dow
European Space Agency (ESA) – GERMANY

Lionel Baize
Centre National d'Etudes Spatiales (CNES) – FRANCE

Rapporteurs

Patrick Hambloch
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) – GERMANY

Jeanne Holm
University of California, Los Angeles – UNITED STATES

D5.3

Prediction and measurement of space weather conditions and impacts on space missions

Space weather and its fluctuations strongly impacts space missions. Environmental conditions yield constraints at design phase, and important risks in the course of the mission. The evaluation of the average and worst case conditions to be met, and of their impact on missions and sub-systems are thus of prime importance. This session will encompass the following topics: Space weather: -flight measurements; - physical processes; - prediction of average or worst case conditions. Environment effects on missions: -ground testing; - flight experiments and lessons learnt; -modelling and prediction.

Co-Chairs

Jean-Francois Roussel
Office National d'Etudes et de Recherches Aéropatiales (ONERA) – FRANCE

Mengu Cho
Kyushu Institute of Technology – JAPAN

D5.P

Poster Session

D6

SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES

Topics should address commercial safety and regulatory policy issues for orbital and suborbital space transportation and spaceports. The goal is to identify issues common to commercial operators of both human and robotic space vehicles to increase international safety and interoperability.

Coordinator

John Sloan
Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) – UNITED STATES

Christophe Chavagnac
Airbus Defence & Space – FRANCE

D6.1

Commercial Space Flight Safety and Emerging Issues

Topics for this session cover commercial space transportation and safety issues including human and robotic vehicles, spaceports, reentry vehicles, in-space transportation vehicles, and regulations. Papers related to commercial space transportation are also encouraged on: policy and law; operations and training; best practices and standards; pilot, crew and participant safety; and ground operations and launch site safety.

Co-Chairs

John Sloan
Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) – UNITED STATES

Christophe Chavagnac
Airbus Defence & Space – FRANCE

Rapporteur

Gennaro Russo
Associazione Italiana di Aeronautica e Astronautica (AIDAA) – ITALY

D6.2

Commercial Point-to-Point Safety Issues

This special joint session will address safety matters related to commercial point-to-point space transportation. Topics include air and space traffic, airport and spaceport operations, communications, vehicle design optimization and human factors as they relate to safety.

Co-Chairs

Christophe Chavagnac
Airbus Defence & Space – FRANCE

Randolph Kendall
Aerospace Corporation – UNITED STATES

D6.3

Spaceports and Site Selection for Space Transportation

This session addresses new and existing spaceports and factors that launch vehicle and spaceplane operators may use in evaluating the selection of a launch and/or landing location. Topics include: safety, air and spaceport facilities, runways, geography, air and space traffic, weather, population density, access to workforce and technical support, customer needs, regulations, and other areas. Papers are welcome from spaceports, airports, space transportation providers, support equipment providers, academia, commercial companies and governments.

Co-Chairs

Christophe Chavagnac
Airbus Defence & Space – FRANCE

John Sloan
Federal Aviation Administration Office of Commercial
Space Transportation (FAA/AST) – UNITED STATES

Category



SPACE AND SOCIETY

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

- E1** SPACE EDUCATION AND OUTREACH SYMPOSIUM
- E2** 44TH STUDENT CONFERENCE
- E3** 27TH SYMPOSIUM ON SPACE POLICY, REGULATIONS AND ECONOMICS
- E4** 48TH IAA HISTORY OF ASTRONAUTICS SYMPOSIUM
- E5** 25TH SYMPOSIUM ON SPACE ACTIVITY AND SOCIETY
- E6** BUSINESS INNOVATION SYMPOSIUM
- E7** 57TH IISL COLLOQUIUM ON THE LAW OF OUTER SPACE
- E8** MULTILINGUAL ASTRONAUTICAL TERMINOLOGY SYMPOSIUM

Category coordinated by Chris Welch, International Space University (ISU) - FRANCE

E1

SPACE EDUCATION AND OUTREACH SYMPOSIUM

This symposium deals with activities, methods and techniques for formal and informal space education at different educational levels, space outreach to the general public, space workforce development, etc. Each of the sessions in the symposium features an invited key note speaker followed by presentation of selected papers. Symposium sessions may also include panel discussions. When submitting abstracts for consideration, please note that: • Papers should have clear education or outreach content • technical details of projects, even if carried out in an educational context, will not usually qualify. • Papers reporting on programmes/activities that have already taken place will usually be received more favourably than those dealing with concepts and plans for the future. • More weight will usually be given to papers that clearly identify target groups, benefits, lessons-learned, good practice and that include measures of critical assessment. Papers covering topics/activities which have been reported at a prior IAC must state this explicitly and detail both the additional information to be presented and the added value that will result.

Coordinators

Naomi Mathers
Advanced Instrumentation and Technology Centre
(AITC) – AUSTRALIA

Chris Welch
International Space University (ISU) – FRANCE

E1.1

Ignition - Primary Space Education

This session will focus on all aspects of primary space education, i.e. up to a student age of 11.

Co-Chairs

Jeong-Won Lee
Korea Aerospace Research Institute – KOREA,
REPUBLIC OF

Shamim Hartevelt-Velani
European Space Agency (ESA) – THE NETHERLANDS

Rapporteur

Michael Pakakis
Victorian Space Science Education Centre – AUSTRALIA

E1.2

Lift Off - Secondary Space Education

This session will focus on all aspects of secondary space education, for students of age 12-18.

Co-Chairs

Kerrie Dougherty
Powerhouse Museum – AUSTRALIA

Shamim Hartevelt-Velani
European Space Agency (ESA) – THE NETHERLANDS

Rapporteur

Vera Mayorova
Bauman Moscow State Technical University – RUSSIA

E1.3

On Track - Undergraduate Space Education

This session will focus on all aspects of undergraduate space education.

Co-Chairs

David Cook
University of Alabama in Huntsville –
UNITED STATES

Naomi Mathers
Advanced Instrumentation and Technology Centre
(AITC) – AUSTRALIA

Rapporteur

Maria Victoria Alonsoperez
IEETECH – URUGUAY

E1.4

In Orbit - Postgraduate Space Education

This session will focus on all aspects of (post)graduate space education.

Co-Chairs

Angela Diaz Phillips
Purdue University – UNITED STATES

Franco Bernelli-Zazzera
Politecnico di Milano – ITALY

Rapporteur

David B. Spencer
The Pennsylvania State University –
UNITED STATES

E1.5

Enabling the Future - Developing the Space Workforce

This session will focus on the challenges, opportunities and innovative approaches to developing the current and future global space workforce.

Co-Chairs

Olga Zhdanovich
European Space Agency (ESA) – THE
NETHERLANDS

Amalio Monzon
Airbus Group – UNITED KINGDOM

Rapporteurs

Edward J. Hoffman
National Aeronautics and Space Administration
(NASA) – UNITED STATES

Bettina Boehm
European Space Agency (ESA) – FRANCE

E1.6

Calling Planet Earth - Space Outreach to the General Public

This session will focus on the challenges, opportunities and innovative approaches to developing the current and future global space workforce.

Co-Chairs

Carol Christian
STScI – UNITED STATES

Carolyn Knowles
National Aeronautics and Space Administration (NASA)
– UNITED STATES

Rapporteur

Michael Pakakis
Victorian Space Science Education Centre – AUSTRALIA

E1.7

New Worlds - Innovative Space Education and Outreach

This session will focus on novel and non-standard methods of space education and outreach in non-traditional areas and to non-traditional target groups.

Co-Chairs

Vera Mayorova
Bauman Moscow State Technical University –
RUSSIA

Olga Zhdanovich
European Space Agency (ESA) – THE NETHERLANDS

Rapporteur

Carol Christian
STScI – UNITED STATES

E1.8

Open Space: Participatory Space Education and Outreach

This session will focus on the involvement and participation of target groups in space education and outreach-related activities which are internet - or digitally mediated or reply on an "open source" approach, e.g. hackathons, unconferences, barcamps, etc.

Co-Chairs

Chris Welch
International Space University (ISU) – FRANCE

Lisa La Bonte
United Nations Association-UAE / AYYF – UNITED
ARAB EMIRATES

Rapporteur

Jessica Culler
San Jose State University – UNITED STATES

E1.9

Space Culture: Innovative Approaches for Public Engagement in Space

This Session is co-sponsored by the IAF Technical Committee on the Cultural Utilization of Space (ITACCUS) and will focus the activities of institutions such as museums, space agencies and non-profit organizations involving space that engage the cultural sector.

Co-Chairs

Roger Malina
University of Texas – FRANCE

Franco Bernelli-Zazzera
Politecnico di Milano – ITALY

Rapporteur

Carol Christian
STScI – UNITED STATES

E1.P

Poster Session

E2

45TH STUDENT CONFERENCE

Presentation of space-related papers by undergraduate and graduate students who participate in an international student competition.

Coordinators

Stephen Brock
American Institute of Aeronautics and Astronautics
(AIAA) – UNITED STATES

Marco Schmidt
Bochum University of Applied Sciences – GERMANY

E2.1

Student Conference – Part 1

Undergraduate and graduate level students (no more than 28 years of age) present technical papers on any project in space sciences, industry or technology. These papers will represent the specific work of the author(s) (no more than two students). The students presenting in this session will compete in the 44th International Student Competition. This session is NOT for team projects. Team project papers should be submitted to session E2.3. French, German, US, British and Canadian students submitting abstracts for the sessions E2.1 and E2.2 should apply via the national coordinators: - for France: Benedicte Escudier at: benedicte.escudier@supaero.fr - for Germany: Marco Schmidt at: schmidt.marco@informatik.uni-wuerzburg.de - for USA: Stephen Brock at: stephenb@aiaa.org - for Great Britain: Chris Welch at: Welch@isu.isunet.edu - for Canada: Jason Clement: Jason.Clement@asc-csa.gc.ca The guidelines for the student competition will be distributed from the session chairs to the authors after abstract acceptance.

Co-Chairs

Rachid Amekrane
Astrium GmbH – GERMANY

Benedicte Escudier
Institut Supérieur de l'Aéronautique et de l'Espace
(ISAE) – FRANCE

Rapporteur

Jeong-Won Lee
Korea Aerospace Research Institute –
KOREA, REPUBLIC OF

E2.2

Student Conference – Part 2

Undergraduate and graduate level students (no more than 28 years of age) present technical papers on any project in space sciences, industry or technology. These papers will represent the specific work of the author(s) (no more than two students). The students presenting in this session will compete in the 44th International Student Competition. This session is NOT for team projects. Team project papers should be submitted to session E2.3. French, German, US, British and Canadian students submitting abstracts for the sessions E2.1 and E2.2 should apply via the national coordinators: - for France: Benedicte Escudier at: benedicte.escudier@supaero.fr - for Germany: Marco Schmidt at: schmidt.marco@informatik.uni-wuerzburg.de - for USA: Stephen Brock at: stephenb@aiaa.org - for Great Britain: Chris Welch at: Welch@isu.isunet.edu - for Canada: Jason Clement: Jason.Clement@asc-csa.gc.ca The guidelines for the student competition will be distributed from the session chairs to the authors after abstract acceptance.

Co-Chairs

Marco Schmidt
Bochum University of Applied Sciences –
GERMANY

Jeong-Won Lee
Korea Aerospace Research Institute –
KOREA, REPUBLIC OF

Rapporteur

Benedicte Escudier
Institut Supérieur de l'Aéronautique et de l'Espace
(ISAE) – FRANCE

E2.3

Student Team Competition

YPVP.4

Undergraduate and graduate level student teams present papers on any subject related to space sciences, industry or technology. These papers will represent the work of the authors (three or more students). Students presenting in this session will compete for the Hans von Muldau Team Award. The guidelines for the student competition will be distributed from the session chairs to the authors after abstract acceptance.

Co-Chairs

Naomi Mathers
Advanced Instrumentation and Technology Centre
(AITC) – AUSTRALIA

Carolyn Knowles
National Aeronautics and Space Administration (NASA)
– UNITED STATES

E2.4

Educational Pico and Nano Satellites

Proposed session with SUAC.

Co-Chairs

Volker Gass
Swiss Space Center – SWITZERLAND

Muriel Richard
Swiss Space Center – SWITZERLAND

Rapporteur

Franco Bernelli-Zazzera
Politecnico di Milano – ITALY

E3 28TH SYMPOSIUM ON SPACE POLICY, REGULATIONS AND ECONOMICS
This symposium, organized by the International Academy of Astronautics, will provide a systematic overview of the current trends in space policy, regulation and economics, by covering national as well as multilateral space policies and plans. The symposium also integrates the 30th IAA/IISL Scientific-Legal roundtable.

Coordinators

Jacques Masson <i>European Space Agency (ESA) – FRANCE</i>	Bernard Schmidt-Tedd <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) – GERMANY</i>
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E3.1 Regional cooperation in space: policies, governance and legal tools
This session will provide a forum for the discussion of existing or emerging schemes for regional cooperation in space. Three key domains are considered: political aspects (balance between common objectives, regional integration, and sovereignty, national pride, ...) economic aspects (level of funding, contribution mechanisms, "return rules", ...) and legal regimes (e.g. ESA Convention, EU "space competence", ...). Papers are expected from Europe, North America, South America, Asia, Africa. This session will support the activities of the IAA on-going Study Group on the same topic.

Co-Chairs

Ciro Arevalo Yepes <i>– COLOMBIA</i>	Elisabeth Back Impallomeni <i>University of Padova – ITALY</i>
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E3.2 International Space Exploration Policies and Programmes
Space Exploration is an important space policy domain and international cooperation plans and partnerships have been gaining momentum in recent years, as reflected by the International Space Exploration Forum and the IAA Heads of Space Agencies Summit on Exploration planned on January 2014. This session will provide a forum to reflect on the trends in space exploration and present the latest developments in the field, including the results from these events. This session is supporting the activities of an IAA Study Group on "Dynamics of Space Exploration Strategies and Future Outlook".

Co-Chairs

Nicolas Peter <i>European Space Agency (ESA) – FRANCE</i>	Pascale Ehrenfreund <i>Space Policy Institute, George Washington University – UNITED STATES</i>
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E3.3 The space economy: what are the socio-economic impacts?
The 'space economy' covers the value-chain of the space sector (from launchers to satellites and space services) and its various downstream applications. This session will focus on actual illustrations (with figures), where the returns of investing in space systems and/or its downstream uses are discussed, either at country, regional or even corporate levels (e.g. job creation due to a space activity, direct and indirect value-added derived from applications, cost-savings, productivity gains). Papers should also present the underlying methodologies used to get to the results.

Co-Chairs

Claire Jolly <i>Organisation for Economic Co-operation and Development (OECD) – FRANCE</i>	Joan Harvey <i>Canadian Space Agency – CANADA</i>
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Rapporteur

Luigi Scatteia
Strategy& - Formerly Booz and Company – THE NETHERLANDS

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 realise that in order to continue the many benefits the world community has come to depend on, the international community will have to develop the 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 reaching a safe, secure and sustainable space environment. It will especially examine activities within the UN Committee for the Peaceful Uses of Outer Space; the European Union proposed Code of Conduct for Space Activities, and other efforts to create the conditions for this desired end.

Co-Chairs

Ray Williamson <i>Secure World Foundation – UNITED STATES</i>	Chen Shenyang <i>Beihang University – CHINA</i>
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Rapporteur

Charlotte Mathieu
European Space Agency (ESA) – FRANCE

E3.5 30th IAA/IISL Scientific-Legal Roundtable: Controlling the Eyes in the Sky: Preventing Abuse of Space Data
E7.6
With the increasingly high resolution of space EO data, combined moreover with increasing location and navigation information provided by satellites, new questions arise regarding the risks and threats of abuse of such data, for example in areas of privacy, human rights and public order (terrorism). This concerns in particular the governments regulating, controlling and often even themselves undertaking such space activities but also, increasingly, private operators who undertake them, either for the governments or for their own private gain. Clearly, regulations, mechanisms and concepts to counteract such risks, both legally and technically/operationally, exist, but their usage is not necessarily beyond discussion. Which technical measures and which legal instruments would be suitable to realistically safeguard future use of space EO data? What would be the possibilities as well as the effects of introducing, for example, 'firewalls', 'informed consent', or the 'criminalization' of leaking data in a comprehensive manner into these space sectors? The 2014 IAA/IISL Scientific-Legal Roundtable is to address this issue from an interdisciplinary perspective.

Co-Chairs

Kai-Uwe Schrogl <i>European Space Agency (ESA) – FRANCE</i>	Willem (Herman) Steyn <i>Stellenbosch University – SOUTH AFRICA</i>
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Rapporteur

Marc Haese
DLR, German Aerospace Center – GERMANY

E3.P Poster Session

E4 49TH IAA HISTORY OF ASTRONAUTICS SYMPOSIUM
History of space sciences, technology and development, rocketry, personal memoirs. The entire spectrum of space history, at least 25 years old, is covered as well as history of rocketry and astronautics in China.

Coordinators

Ake Ingemar Skoog <i>– GERMANY</i>	Philippe Jung <i>Association Aéronautique & Astronautique de France (AAF) – FRANCE</i>
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Christophe Rothmund
Snecma – FRANCE

Tal Inbar
Fisher Institute for Air and Space Strategic Studies – ISRAEL

E4.1 Memoirs and Organisational Histories
Autobiographical and biographical memoirs of individuals who have made original contributions to the development and application of astronautics and rocketry. History of government, industrial, academic and professional societies & organisations long engaged in astronautical endeavours.

Co-Chairs

Marsha Freeman <i>21st Century Science & Technology – UNITED STATES</i>	Niklas Reinke <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) – GERMANY</i>
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Rapporteurs

Theo Pirard <i>Space Information Center – BELGIUM</i>	Hervé Moulin <i>Institut Français d'Histoire de l'Espace – FRANCE</i>
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E4.2 Scientific and Technical Histories
Historical summaries of rocket and space programmes, and the corresponding technical and scientific achievements.

Co-Chairs

Kerrie Dougherty <i>Powerhouse Museum – AUSTRALIA</i>	Christophe Rothmund <i>Snecma – FRANCE</i>
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Rapporteurs

William Jones <i>– UNITED STATES</i>	Paivi Jukola <i>Aalto University – FINLAND</i>
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E4.3 History of Israeli contribution to astronautics
Special session with invited & proposed speakers. Origin (technical & political aspects) of the space activities & programs of Israel.

Co-Chairs

Otfrid Liepack <i>National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory – UNITED STATES</i>	Tal Inbar <i>Fisher Institute for Air and Space Strategic Studies – ISRAEL</i>
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Rapporteurs

John Harlow <i>Aerjet Rocketdyne – UNITED KINGDOM</i>	Charles Lundquist <i>University of Alabama in Huntsville – UNITED STATES</i>
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E5 26TH SYMPOSIUM ON SPACE ACTIVITY AND SOCIETY
This 26th symposium organised by the International Academy of Astronautics (IAA) will review the impact and benefits of space activities on the quality of life on Earth, including arts and culture, society's expectations from space, life in space, as well as technology and knowledge transfer.

Coordinators

Geoffrey Langedoc <i>Canadian Aeronautics & Space Institute (CASI) – CANADA</i>	Olga Bannova <i>University of Houston – UNITED STATES</i>
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E5.1 Space Architecture: technical aspects, design, engineering, concepts and mission planning
The session welcomes papers on all aspects of the challenges of emplacing, sustaining, and growing accommodations for space habitation throughout the inner solar system: Earth orbits, Lagrange points, the Moon's surface, interplanetary space, Near Earth Objects, the moons of Mars, Mars' surface, and the asteroid Main Belt. These places share a need for basic protection against space radiation, vacuum, and thermal extremes, but vary widely in remoteness, proximity to gravity wells and resources, and socio-psychological impact. Architectural solutions, including pressurized volume, shielding, life support, food production, transportation access, and social accommodation will stretch concepts and technologies for space architecture. The session seeks papers on topics including, but not limited to: integration of architecture, structures, space systems, life-support systems, man-machine interfaces, and new technologies.

Co-Chairs

Olga Bannova <i>University of Houston – UNITED STATES</i>	Brent Sherwood <i>Caltech/JPL – UNITED STATES</i>
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Rapporteur

Anna Barbara Imhof
Liquifer Systems Group (LSG) – AUSTRIA

E5.2 Models for Successfully Applying Space Technology Beyond Its Original Intent
Many R&D organizations look for ways to demonstrate the value of their technology portfolio to educate as well as accommodate a broad community of onlookers and users. Academia- and government-sponsored space programs need to depict how their science and technology activities are relevant to technology transfer, knowledge sharing, and technology commercialization. Papers will explore a variety of approaches that organizations can adopt for the successful transfer of technologies that impact new products and services for space and non-space applications. Relevant legislation, business structures, models, metrics, and alternative technology transfer models will be discussed. Papers will provide examples of successful models with descriptions of the approach and tools used, results to date, issues addressed, and ongoing changes made.

Co-Chairs

Olga Bannova <i>University of Houston – UNITED STATES</i>	Nona Minnifield Cheeks <i>National Aeronautics and Space Administration (NASA)/Goddard Space Flight Center – UNITED STATES</i>
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Rapporteur

Anna Barbara Imhof
Liquifer Systems Group (LSG) – AUSTRIA

E5.3 Space Architecture: Designing Human Systems Interaction
In response to the diversifying needs of users in space exploration and commercial spaceflight, interest in a more detailed analysis of human-machine interfaces has been growing in space agencies, industry, and academia. At the same time, the wider individual and societal implications of the human-technology relationship have evolved into a key theme of interdisciplinary engagement with space. This session explores conceptual and applied issues related to the design of human interaction with space systems. In the context of habitats and infrastructure in the space and ground segment, these include interfaces of work stations, consoles, and devices; tools and payload hardware used in EVA and IVA; remote interaction; human-robotic partnerships; ambient intelligence, ubiquitous computing, and beyond. The application of these concepts to designs must provide humans with the necessary tools for work and off-duty settings while addressing their psychological and physiological needs, in full recognition of the technical challenges presented by the space environment. Focusing on the discussion of solutions developed in collaboration with architects and designers, we invite submissions from practitioners and theorists working on human-rated systems within, or collaborating across, the humanities, life sciences, human factors engineering, systems engineering, and planning in space and analogous environments.

Co-Chairs

Jackelynne Silva <i>Georgia Institute of Technology – UNITED STATES</i>	Anna Barbara Imhof <i>Liquifer Systems Group (LSG) – AUSTRIA</i>
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Rapporteur

Regina Peldszus
European Space Agency (ESA-ESOC) – GERMANY

E5.4 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 organisations, critiquing or making experiential the exploration and utilisation of space, or re-purposing space technology, materials or data independently or in direct exchange with the space sector. Today, this practice is branching into a several directions, ranging from performance, installation, video, or conceptual work situated in the 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; representatives from space industry, space agencies and the cultural sector facilitating or programming related projects crossing over the increasingly blurred boundaries of creative practice.

Co-Chairs

Richard Clar
Art Technologies – FRANCE

Regina Peldszus
European Space Agency (ESA) – GERMANY

Rapporteur

Daniela De Paulis
Rietveld Academy/ASCA-University of Amsterdam – THE NETHERLANDS

E5.5 Space Assets and Disaster Management

This session will explore the role space assets can play in situations requiring disaster management and emergency response. Papers will discuss how space assets and applications can be brought to bear to assist with situation monitoring and assessment, shortening response times and mitigating impact on affected populations

Co-Chairs

Peter Swan
SouthWest Analytic Network – UNITED STATES

Geoffrey Languedoc
Canadian Aeronautics & Space Institute (CASI) – CANADA

Rapporteur

Natasha Jackson
Faculty of Engineering, Carleton University – CANADA

E5.6 Space Societies and Museums

Space Societies form a special and important group of IAF members, in size the second largest after space industries. They include professional societies, non-profit organisations and other organisations interested in space activities. Some have a large membership of 10.000 or more, others can be small to very small. There are some which are already a century old, others are just being created. They exist in traditional and emerging space nations. Together, they constitute an impressive number of individuals who all are connected to space. If things move according to plan, as of 2013 Space Museums are also entitled to become members of the IAF, providing their own interaction possibilities to space enthusiasts. This symposium, organised by the IAF Space Societies Committee, is the first of its nature. It is intended to offer a podium for ideas and proposals to enhance the interaction between the societies, their members and the Federation. Papers could for example address proposals to exchange experiences and good practices, sharing articles, exhibition or educational material, novel ideas to help outreach to the general public, etc. In particular also papers are invited on ways to integrate young societies, representatives of emerging space nations and museums in the IAF family and to develop mutual benefits.

Co-Chair

Scott Hatton
The British Interplanetary Society – UNITED KINGDOM

E5.P Poster Session

E6 BUSINESS INNOVATION SYMPOSIUM

The symposium will address creative business approaches to serving government and private sector customers, as well as government options for encouraging this activity. The symposium will address the general role of government in encouraging space industry applications, new business models in traditional space industry applications (e.g. satellite-based services involving Earth observation, navigation and communications), and new space industry applications (e.g., space tourism, space-industrialisation, space resource utilisation).

Coordinator

Ken Davidian
Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) – UNITED STATES

E6.1 Case Studies and Prizes in Commercial Space

The entrepreneurial space movement can benefit from the experience of other programs, companies and individuals and new ideas that are built on these histories can be better positioned in a competitive market. This session is intended to collect and tell the histories of past and new space business attempts and successes as well provide insights into the use of incentive prizes to spur the emergence of a New Space movement.

Co-Chair

Aude de Clercq
European Space Agency (ESA) – THE NETHERLANDS

E6.2. Public/Private Human Access to Space - Supporting Studies

The International Academy of Astronautics (IAA) Commission 3 "Space Technology & System Development" has initiated a study group (#3.14) entitled "Public/Private Human Access to Space". The papers presented in this session either support this activity directly or indirectly through the use of management theory models as applied to select commercial space industry segments.

Co-Chair

Ken Davidian
Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST) – UNITED STATES

E6.3 New Space and New Science

The space industry has been predominated by government programs with a major focus on scientific exploration (both robotic or human). More recently, the world has seen the emergence of private organizations embarking on ambitious scientific space programs of their own. This session is designed to compile a sampling of these programs, providing a description and update of their activities in the non-profit world of science.

Co-Chairs

Farnaz Ghadaki
Canadian Space Commerce Association – CANADA

Luigi Scatteia
Strategy&Amsterdam – THE NETHERLANDS

Rapporteur

Daniel Faber
Deep Space Industries – AUSTRALIA

E6.P Poster Session

E7 58TH IISL COLLOQUIUM ON THE LAW OF OUTER SPACE

This symposium, organised by the International Institute of Space Law (IISL), addresses various aspects of the law of outer space and is structured in five sessions.

Coordinators

Lesley Jane Smith
Leuphana University of Lüneburg/Weber-Steinhaus & Smith – GERMANY

Mahulena Hofmann
University of Luxembourg – LUXEMBURG

Publication officer

Rafael Moro-Aguilar
OrbSpace – AUSTRIA

E7.1 7th Nandasiri Jasentuliyana Keynote Lecture on Space Law and Young Scholars Session

In the first part of this session, the IISL will invite a prominent speaker to address the members of the Institute and other congress attendants on a highly topical issue of broad interest. The second part of this session will be especially dedicated to the space lawyers of the future, in that young scholars (under 35 years old) are invited to present a paper.

Co-Chairs

Tanja Masson-Zwaan
International Institute of Air and Space Law, Leiden University – THE NETHERLANDS

Orna Ben Naftali
The Hebrew University of Jerusalem – ISRAEL

Rapporteur

Neta Palkovitz
ISIS- Innovative Solutions In Space B.V. – THE NETHERLANDS

E7.2 The relationship of international humanitarian law and territorial sovereignty with the legal regulation of outer space

The regulation of outer space is 'embedded' in international law, and the Outer Space Treaty expressly confirms that activities in outer space shall be conducted in accordance with international law. Given the rapid development of space-related technology, outer space is more frequently being used during the course of armed conflict, as well as for the purposes of the protection of, and threats to, territorial integrity and sovereign independence. As such, the legal regulation of outer space intersects with inter alia the principles of the jus in bello, as well as those of the jus ad bellum. This session seeks papers that discuss the significance of these interactions, with particular focus on precisely how and in what circumstances these 'terrestrial' areas of international law can be applied in practice to the unique environment of outer space.

Co-Chairs

Steve Freeland
University of New South Wales – AUSTRALIA

Ulrike M. Bohlmann
ESA – FRANCE

Rapporteur

Simona Spassova
University of Luxembourg – LUXEMBURG

E7.3 The portrayal of Space (Law) in Media and Movies

Science-fiction and anticipation are closely connected to the history of the film industry, since its early days, with, from time to time, incursion within the legal or political aspects related to the human adventure in outer space. Under this topic, the presentation and representation of international space law and, more generally, legal or political aspects related to space activities would be reviewed and analyzed, with regard to their relevance and exactitude and with regard to the impact they may have on the large public. Papers presented under this topic could address a particular movie or provide a general analysis through a number of movies.

Co-Chairs

Melissa K. Force
MK Force Consultants – UNITED STATES

Steven Mirmina
National Aeronautics and Space Administration (NASA) – UNITED STATES

Rapporteur

Michael Chatzipanagiotis
– GREECE

E7.4 Legal Issues of Space Traffic Management

The current amount of 10.000 man-made space objects larger than 10 cm including approx. 650 spacecraft and the fact that the number of launches as well as the number of actors (governmental as well as non-governmental) are growing lead to the expectation of a growing number of space debris in the future. This makes space traffic management necessary which may limit the present enjoyment of the freedoms of outer space: In the IAA Cosmic study of 2010 Space Traffic Management is defined as "the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from space to Earth free of physical or radio-frequency interference". Speakers in this session are invited to highlight legal problems and present proposals for the frame of the legal regime for space traffic management.

Co-Chairs

Corinne Jorgenson
Advancing Space – USA/France

Jana Robinson
EUROPEAN EXTERNAL ACTION SERVICE, EEAS – BELGIUM

Rapporteur

Olga Volynskaya
Roscosmos – RUSSIAN FEDERATION

E7.5 Recent Developments in Space Law

In this session, papers are invited to address legal aspects of the most recent developments in space activities that have taken place since Spring 2014.

Co-Chairs

Sai'd Mosteshar
London Institute of Space Policy and Law – UK

Martha Mejia-Kaiser
IISL – GERMANY / MEXICO

Rapporteur

Maria Pozza
UCL – UK/NZ

E7.6 E3.5 30th IAA/IISL Scientific-Legal Round Table: Universities as Actors in Space

Over the past years universities in all regions of the world have become a new player in space activities. They get involved in various ways, the most prominent one being cubesat missions, but also experiments on the ISS or other missions are cost-effective and less complex means to gain access to space. Cubesats and the opportunity of secondary payloads also allow new cooperation between academia and industry, fostering spin-off effects and triggering innovation. University space projects often enjoy a higher participation of women, thus allowing an early engagement with the space industry, which may trigger future career changes. However, questions related to technical issues such as standardisation, legal boundary conditions and operation of cubesats and secondary payloads often are difficult to answer yet. And still, flight opportunities remain limited and operation via foreign ground stations is not always easy. Generally, there is potential to enlarge and enhance the involvement of universities in space activities. Issues, but also benefits for education, industry and agencies should be identified and debated. The 2015 IAA/IISL Scientific-Legal Roundtable is to address those questions, thereby allowing an interdisciplinary perspective.

Co-Chairs

Kai-Uwe Schrogl
European Space Agency (ESA) – FRANCE

Willem (Herman) Steyn
Stellenbosch University – SOUTH AFRICA

Rapporteur

Marc Haese
DLR, German Aerospace Center – GERMANY

E7.7 B3.8 Joint IAF/IISL Session on Legal Framework for Cooperative Space Activities

This session hosts papers on topics related to the legal framework governing collaborative space programmes, in particular governmental LEO and Exploration programmes. For the IAC 2015, the session will put special emphasis on highlighting the impact of ITAR and similar export control regimes on the development and operation phases of collaborative international space programmes, including lessons learned.

Co-Chairs

Cristian Bank
EADS Astrium Space Transportation GmbH – GERMANY

Bernhard Schmidt-Tedd
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) – GERMANY

Rapporteur

Olga S. Stelmakh
Parliament of Ukraine / V.Koretsky Institute of State and Law, National Academy of Sciences of Ukraine – UKRAINE

E7.P Poster Session

E8 **MULTILINGUAL ASTRONAUTICAL TERMINOLOGY SYMPOSIUM**

This symposium, organised 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 standardisation 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

Tetsuo Yoshimitsu
ISAS/JAXA — JAPAN

E8.1 **Multilingual Astronautical Terminology**

This symposium, organised 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 standardisation 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

Tetsuo Yoshimitsu
ISAS/JAXA — JAPAN

Rapporteur

Fabrice Dennemont
International Academy of Astronautics (IAA) — FRANCE

Category



YOUNG PROFESSIONALS VIRTUAL FORUM

The Young Professional Virtual Forum is a technical session oriented towards young space professionals allowing for sharing of information on a global scale with presenters and audience both at the IAC venue and online at their home/work/university locations. There are two types of VFs: 1- Separate or supplemental IAC session with abstract selection. 2- Broadcast of existing IAC session at the venue.

- YPVF.1 FLIGHT CONTROL OPERATIONS YOUNG PROFESSIONALS VIRTUAL FORUM - JOINT SESSION OF THE SPACE OPERATIONS AND YOUNG PROFESSIONALS VIRTUAL FORUM SYMPOSIA
- YPVF.2 HUMAN SPACE ENDEAVOURS YOUNG PROFESSIONALS VIRTUAL FORUM
- YPVF.3 SPACE COMMUNICATIONS AND NAVIGATION YOUNG PROFESSIONALS VIRTUAL FORUM
- YPVF.4 STUDENT TEAM COMPETITION

Coordinated by Kathleen Coderre, Lockheed Martin Corporation — UNITED STATES and Guillaume Girard, INSYEN AG — GERMANY

YPVF.1 **B6.4** **Flight Control Operations Young Professionals Virtual Forum - Joint Session of the Space Operations and Young Professionals Virtual Forum Symposia**

This session is a virtual forum co-sponsored by the Space Operations Committee and the Workforce Development/Young Professionals Programme Committee. The forum targets hands-on flight control/operations personnel from multiple international organisations with objectives of sharing best practices, lessons learned and issues. This is a joint session with session B6.4.

Co-Chairs

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

Philip Harris
National Aeronautics and Space Administration (NASA)/Johnson Space Center — UNITED STATES

Rapporteur

Ahmed Farid
Telespazio VEGA Deutschland GmbH — GERMANY

YPVF.2 **B3.9** **Human Space Endeavours Young Professionals Virtual Forum**

The Human Space Endeavours Young Professionals Virtual Forum is targeting individuals and organisations with the objective of sharing best practices, future projects, research and issues for the future of Human Space Endeavours. The is a virtual session co-sponsored by the Human Space Endeavours Committee and the Workforce Development/Young Professionals Programme Committee.

Co-Chairs

Cristian Bank
EADS Astrium Space Transportation GmbH — GERMANY

Guillaume Girard
INSYEN AG — GERMANY

YPVF.3 **B2.8** **Space Communications and Navigation Young Professionals Virtual Forum**

A virtual session to present and discuss developments in a wide range of satellite communication topics, including fixed, mobile, broadcasting, and data relay technologies and services, as well as those for satellite based position determination, navigation, and timing. Both Earth orbital and interplanetary space communications topics can be addressed. This session is co-sponsored by the Space Communications and Navigation Committee and the Workforce Development/Young Professionals Programme Committee.

Co-Chairs

Edward W. Ashford
Delft University of Technology — THE NETHERLANDS

Kevin Shortt
Canadian Space Society — CANADA

YPVF.4 **E2.3** **Student Team Competition**

Undergraduate and graduate level students teams present papers on any subject related to space sciences, industry or technology. These papers will represent the work of the authors (three or more students). Students presenting in this session will compete for the Hans von Muldau Team Award. The guidelines for the student competition will be distributed from the session chairs to the authors after abstract acceptance.

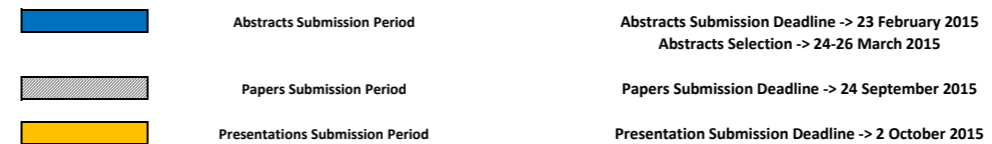
Co-Chairs

Naomi Mathers
Advanced Instrumentation and Technology Centre (AITC) — AUSTRALIA

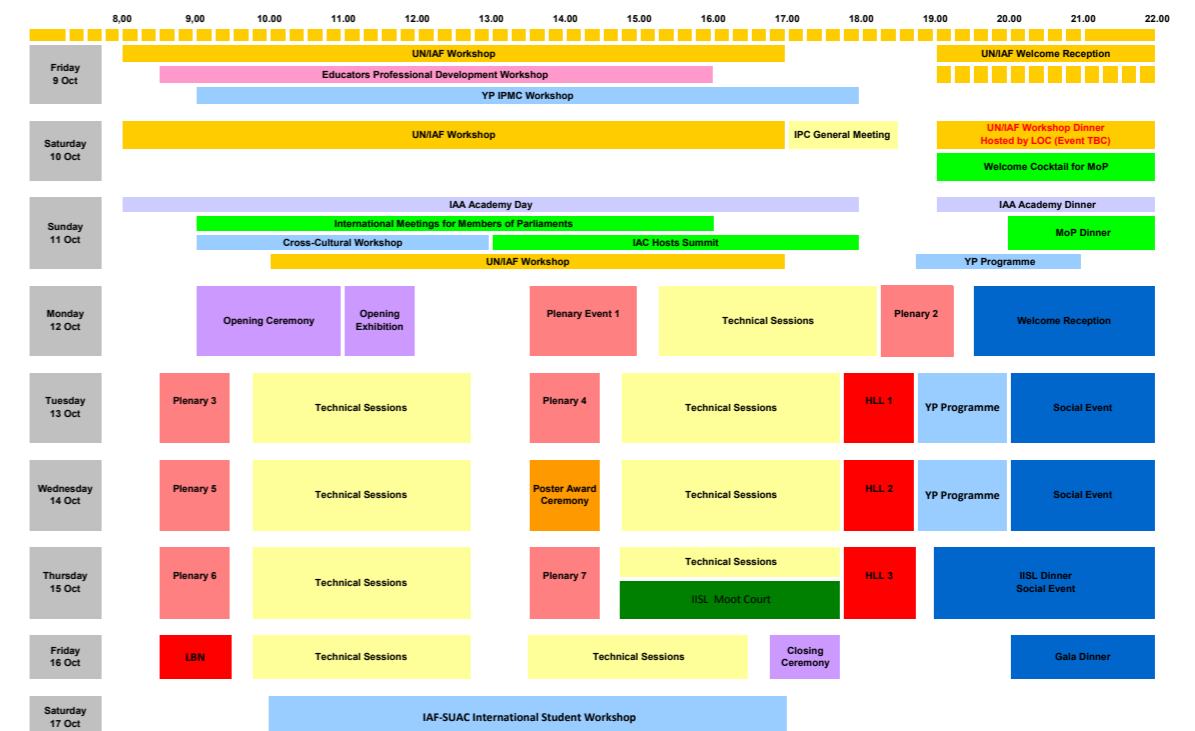
Carolyn Knowles
National Aeronautics and Space Administration (NASA) — UNITED STATES

Calendar of Main IAC 2015 Deadlines

	November 2014	December 2014	January 2015	February 2015	March 2015	April 2015	May 2015	June 2015	July 2015	August 2015	September 2015	October 2015
1												Deadline
2												
3												
4												
5							START					
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Preliminary Congress at a Glance Chart



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 toolbox 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 at www.iafastro.org.
- 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 your presentation preference: oral presentation only, poster presentation only, oral or poster.
- 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 2014 to deliver and present the paper is assured.

Note: An abstract can be submitted to only one Technical Session

Abstract Selection

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 eventual oral or poster 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 www.iafastro.org by mid-April.
- Authors with a paper accepted for an oral presentation will be offered a presentation slot of 10 to 20 minutes.
- Authors with a paper accepted for a poster presentation will be asked to prepare and bring an A0-sized poster to the Congress (portrait format).

International Astronautical Federation (IAF)

The IAC proceedings will be distributed as a DVD to all regular Congress participants. More information about the IAC paper archive is available on www.iafastro.org.

International Academy of Astronautics (IAA)

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.

International Institute of Space Law (IISL)

Authors should follow the above instructions for the submission of their abstracts. In addition to the IAC Proceedings DVD, 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	23 February 2015 (14:00 CET)
Paper Submission	24 September 2015 (14:00 CET)
Presentation Submission	2 October 2015 (14:00 CET)

Please make sure to check the IAF website regularly to get the latest updates on the Technical Programme!

ISRAEL SPACE HERITAGE and PROSPECTS



Israel Space Agency-ISA is a government entity affiliated with the Ministry of Science, Technology and Space. ISA's goals and purposes are to chart Israel's Space strategy and guiding principle; to promote Israel's national goals for civilian space industry; to coordinate between the various space exploration entities and industries, scientific, academia, commercial, and community.

Israel Space Agency's vision is set forth in the following manner: *"Space exploration and exploitation is an essential instrument for the protection of life on earth; it is the key to understand the cosmos and planet earth; a leverage for technological advancement; a source and basis for the development of modern economy based on knowledge and excellent scientific human resource."*

Israel Space Agency's objective and aspiration is to preserve and expand Israel comparativeness, advancing and positioning Israel within the leading countries in space science and exploration.

Israel Space Agency - Prime Objectives, Vision and Goals

- Build and maintain advanced satellite systems for space exploration and earth observation from space
- Develop technologies, expertise, and scientific infrastructure, including professional personnel skills necessitated for space science and exploration
- Expand and promote international cooperation in space science and exploration with other international space agencies; with relevant international and domestic space related entities; to advance and enhance Israel and ISA overall goals and objectives

- Strengthen the alliance and partnership between space users in research, exploration and science, education, community, and the public sectors, in all it's stratum
- Broaden and expand space science, research, exploration and technology within the academia; amplifying Israel's status in space affiliated sciences
- Establish and promote space educational activities within the Israeli community to expand and ensure future generations' activities in space science and exploration
- Contribute to the survival of our plant earth and its life quality

Israel Space - Key Features and Assets

- Industrial Infrastructure for space systems, including communication satellites and earth observation satellites
- Exceptional know-how, expertise, and space experience in the domain of small but, high performance satellites
- High quality and gifted scientific human resources, with international reputation for their work and achievements in space exploration, astrophysics, and its oriented planet earth research
- Israel is a high tech nation; technologies, developments, and innovations; space products, commodities, services; with the capabilities of advanced analysis of macro systems; an expanding, progressive and stable economy



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