



76TH
INTERNATIONAL
ASTRONAUTICAL
CONGRESS
SYDNEY

29 . SEP - 03 . OCT . 2025
SYDNEY AUSTRALIA



SUSTAINABLE SPACE :
RESILIENT EARTH

CALL FOR PAPERS &
REGISTRATION OF INTEREST

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IAF Alliance Programme Partners 2024



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1. Message from the International Astronautical Federation (IAF)

As the organizer of the world's premier space event, the International Astronautical Congress (IAC), I am excited to invite you to the 76th edition in Sydney, Australia from 29 September – 3 October 2025. The IAC has been organized twice before in the Commonwealth of Australia, most recently in 2017 with the 68th IAC in Adelaide, and the 49th IAC in Melbourne 1998. The IAF is delighted to return to the unique continent of Australia and to bring the IAC to the beautiful harbor city, Sydney. It is our pleasure to work with our dedicated member the Space Industry of Australia (SIAA) who has already proven to be an excellent host.

The theme for IAC 2025, "*Sustainable Space: Resilient Earth*," will guide pivotal discussions on space-based applications for Earth, sustainable space activities, and life beyond our planet. This is a perfect theme for a country with a singularity of plant and animal life found nowhere else on Earth. We aim to spotlight the Asia-Pacific region, inspire the next generation of space professionals, and engage a wide range of industries. Sustainability in both Space and on Earth is of highest importance, and we want to foster a future where space-based applications and services help improve life for all on our planet.

The IAC is a unique event, being the one place and time of the year where all global space actors come together. Covering all space sectors and topics, the Congress offers everyone the latest space information and developments in academia and industry, networking opportunities, contacts, and potential partnerships. This upcoming IAC in Sydney marks a significant opportunity to highlight the tremendous growth of both Australia's space sector as well as the whole Asia-Pacific region. Join us and the whole space community in Sydney for the 76th International Astronautical Congress and be part of the journey!



Clay MOWRY

President,
International Astronautical Federation (IAF),
France

2. Message from the Local Organizing Committee (LOC)

Welcome to IAC 2025 Sydney

Dear Delegates,

As Chair of Space Industry Association of Australia (SIAA) and Chair of the IAC 2025 Sydney Local Organizing Committee (LOC), I, together with my IAC 2025 co-hosts, Australian Space Agency and NSW Government, extend a warm welcome to you and invite you, your colleagues, and your families, to join us in beautiful Sydney, Australia for IAC 2025.

Australia has a rich history of space activities, including above all our First Nations Australians who are recognised as the world's earliest astronomers.

Australia has been at the forefront of space research for decades, being one of the earliest nations in the world to launch a satellite from its own territory in 1967. Our contributions to space science have been pivotal, from supporting the Apollo 11 mission with the first images of the moon landing, to our ongoing advancements in Space Domain Awareness (SDA) and research and development.

The Australian space industry is booming, with over 600 companies driving innovation across the ecosystem. Together with the rest of our Indo-Pacific region, we provide an incredible opportunity for the space industry and economy.

This will be the third time Australia has hosted the IAC, with previous events held in Melbourne in 1998 and Adelaide in 2017, when the establishment of the Australian Space Agency was announced.

The theme of IAC 2025, 'Sustainable Space : Resilient Earth,' covers: space-based application for Earth; sustainable space activities; and sustaining life off earth.

IAC 2025 will offer a unique opportunity to further our collective understanding of space through a robust academic program. IAC 2025 will serve as a platform for the entire space community to exchange knowledge, present groundbreaking research, and form collaborations that will shape the future of space exploration and innovation. The academic sessions have been carefully curated to challenge conventional thinking and inspire new avenues of inquiry.

In addition to a strong academic program, we are excited to incorporate a commercial element to IAC 2025. The congress will facilitate true business partnerships, provide opportunities for start-ups and scale-ups including investor matching, and, for the first time, invite space-enabled industries into the program. These industries include: resources; agriculture; manufacturing; construction; Smart Cities; health; financial services; ICT; utilities; and emergency management.

Together, we can achieve remarkable advancements that will not only propel our space endeavours forward but also inspire the next generation.

We encourage you to submit abstracts across the spectrum of the Technical Sessions, and we look forward to welcoming you to Sydney for what promises to be a transformative event.



Jeremy HALLETT
Chair,
IAC 2025 Sydney Local Organizing Committee (LOC),
Chair,
Space Industry Association of Australia (SIAA),
 Australia

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

On behalf of the International Programme Committee, it is our pleasure to invite you to submit an abstract for the 76th International Astronautical Conference that will be held in Sydney, Australia. The IAC is an international event that brings engineers, scientists, entrepreneurs and leaders of the space industry and government agencies together in order to facilitate interactions and discussions on technological and scientific enhancements, exciting space missions and future opportunities.

Participating in IAC 2025 will significantly enhance public's understanding of space science and technology, which is critical in cementing public support for space related projects and scientific space exploration. Outreach achieved by IAC is also essential to inspire young people and accelerate STEM education all around the world.

IAC 2025 will be hosted by Space Industry Association of Australia and co-hosted by the NSW Government and the Australian Space Agency. The third IAC to be hosted in Australia, IAC 2025 Sydney will showcase the rich traditions of Australia's and the world's First Nations communities in engaging with space, the rapid development of Australia's space sector, and how space technologies directly impact the lives of those in Australia and the Indo-Pacific region. IAC 2025 will also draw participation from a broad cross-section of adjacent industries including health, agriculture, telecommunications and more.

The theme, Sustainable Space : Resilient Earth, invites prospective authors to look beyond the space sector itself and explore how space technologies improve lives, shape economies, and influence our future.

In today's rapidly growing space sector, innovative/advanced technologies, products and services are becoming increasingly important to sustainability and resiliency. The development of advanced technologies, space missions and scientific discoveries can be best achieved by international collaborations and exchange of information. IAC as a major organization that gathers top international experts, leaders and decision makers of the world, serves as a great platform to share innovations and ideas through the presentation of technical papers. More than 10,000 leading figures in the international space community from 80-100 countries are expected at IAC 2025. Presenting in one of the 180 technical sessions will allow you to share your work with the foremost experts in the field. All abstracts will be peer reviewed and a limited number of them will be selected as oral or interactive presentations.

We are looking forward to receiving your abstracts for IAC 2025 in Sydney which will bring together the world leaders in space to share their views and to discuss new technologies, missions, opportunities and exciting scientific break throughs in space. These important discussions and interactions will continue to forge the future of space in IAC 2026 that will be hosted in Antalya, Türkiye.



Annie HANDMER
IPC Co-Chair,
Faculty of Science,
University of Sydney,
 Australia



Arif KARABEYOĞLU
IPC Co-Chair,
Turkish Space Agency (TUA),
 Türkiye

4. Messages from the Supporting Organizations

Message from the International Academy of Astronautics (IAA)

For well over the past sixty years the International Academy of Astronautics, created at the outset of a new Space Age, has provided answers and solutions to the immense challenges that have faced the world community. This has made it a foremost center of excellence in Astronautics, thanks to the concerted efforts of its dedicated members who developed its vision for the role of humankind in Space.

Aiming to mobilize the best talents from many fields of science and technology, the Academy has been most successful in developing a wide array of new activities to explore the unlimited possibilities of Space to improve the quality of life for people all over the world. Decades of continuous progress have been achieved through important international events such as the highly successful Summits in Washington DC and Mexico attended by 25 to 35 Heads of Space Agencies, as well as nearly 25 standalone IAA conferences in the world and 13 symposia each year at the International Astronautical Congress.

The International Academy of Astronautics (IAA) is pleased to invite you to attend the IAA Academy Day open meeting on Sunday and the various IAA symposia throughout the week. The Academy is organizing 13 symposia at next year's IAC in Milan, Italy, representing about one third of the IAC technical program, and will co-host some interesting sessions with the IAF and the IISL. On the occasion of the Academy Day, newly elected Academicians will be introduced and the major IAA Awards will be given.

Please join with us in advancing humankind's reach into the Space frontier!



John SCHUMACHER

President,

International Academy of Astronautics (IAA)

Message from the International Institute of Space Law (IISL)

On behalf of the International Institute of Space Law, I am pleased to invite you to attend our 67th Colloquium on the Law of Outer Space in Milan, Italy. This year's Colloquium consists of seven exciting sessions and explores a range of highly relevant issues. Legal questions raised by current public and private space activities will be addressed and debated by the world's finest space lawyers as well as students and young professionals. IISL will also co-host a session with the IAA: The 38th IAA-IISL 'Scientific Legal Roundtable' will provide an opportunity for lawyers, scientists, and engineers to address current developments in space in an interdisciplinary setting. These are all issues, to which, we believe, IISL can and should contribute to. No other Institution has this global inclusive reach and such a top-level experienced expert membership paired with bright young scholars, which guarantees relevant contributions.

The World Finals of the 33rd Manfred Lachs Space Law Moot Court Competition will take place in Milan, welcoming university students from Africa, the Asia Pacific, Europe, Latin America, and North America, and we are proud and honoured that they will, as always, be judged by sitting members of the International Court of Justice. The IISL is proud to be an integral part of the Congress and its Technical Programme and to further the discourse between disciplines so fundamental to our shared ways forward in this new era of the use of space. We are greatly looking forward to welcoming you in Milan!



Kai-Uwe SCHROGL

President,

International Institute of Space Law (IISL)

Message from the Space Generation Advisory Council (SGAC)

The Space Generation Congress (SGC) stands as SGAC's flagship event, eagerly anticipated by students and young professionals from all corners of the globe. Far more than just a gathering, SGC unites the future leaders of the space industry, offering a vital platform for creating connections, sharing cutting-edge ideas, and addressing the critical issues that shape the global space landscape. This Congress cultivates an environment where young talent can collaborate with seasoned experts and industry leaders, driving innovation and progress.

Whether you are a trusted sponsor, a long-standing SGAC member, or new to our community, SGC offers unmatched opportunities to engage with the bright minds shaping the future of space. The event is designed to go beyond conventional conference formats, fostering deep collaboration and interactive discussions that will cement interpersonal bonds reaching far in your career.

Taking place just before the 76th International Astronautical Congress (IAC) in Sydney, SGC sets the stage for the global dialogue that will follow. We highly encourage students and young professionals worldwide to consider submitting abstracts for the 2025 IAC as well. This presents a rare chance to showcase your ideas on a global platform, be inspired by leading experts, and contribute to the ongoing evolution of the space sector.

Engaging in SGC not only amplifies your experience at IAC but also places you at the heart of the space industry's future. It's an opportunity to forge connections and gain insights that will significantly influence your professional trajectory in the space community.

We look forward to welcoming you Down Under



Antonino SALMERI
Chair,
Space Generation Advisory Council (SGAC)



Joshua CRITCHLEY-MARROWS
Co-Chair,
Space Generation Advisory Council (SGAC)



5. International Astronautical Federation (IAF)

Founded in 1951, the International Astronautical Federation is the world's leading space advocacy body. The IAF has 513 members from 77 countries, including all leading space agencies, companies, societies, associations and institutes worldwide.

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

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

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



International Astronautical Federation

100 Avenue de Suffren
75015 Paris, France

Tel: +33 1 45 67 42 60

Website: www.iafastro.org

Members of IAF Bureau 2024 - 2025



IAF PRESIDENT

Clay MOWRY

*Chief Revenue Officer,
Voyager Space Holdings,
United States*



IAF INCOMING PRESIDENT

Gabriella ARRIGO

*Director of International Affairs
Directorate,
Italian Space agency (ASI),
Italy*



VP: DEVELOPING COUNTRIES AND EMERGING COMMUNITIES

Pilar ZAMORA ACEVEDO

*Executive Director,
Colombian Space Agency (AEC),
Colombia*



VP: DIVERSITY INITIATIVES

Mishaal ASHEMIMRY

*Aerospace Consultant & Special
Advisor to CEO,
Saudi Space Commission (SSC),
Saudi Arabia*



VP: EDUCATION AND WORKFORCE DEVELOPMENT

Amal ALBINALI

*Director of Strategic Planning and
Projects,
National Space Science Agency
(NSSA),
Kingdom of Bahrain*



VP: GLOBAL MEMBERSHIP DEVELOPMENT AND FINANCIAL MATTERS

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*Head,
Slovak Investment and Trade
Development Agency (SARIO) -
Slovak Space Office,
Slovakia*



VP: HONOURS AND AWARDS

Asanda NTISANA

*Acting Managing Director,
South African National Space Agency
(SANSA),
South Africa*



VP: IAF GLOBAL NETWORKING FORUM

David SPENCER

*Vice President for Publications,
American Astronautical Society (AAS)
Senior staff Member,
The Aerospace Corporation,
United States*



VP: INDUSTRY RELATIONS AND SPACE ECONOMY

Geraldine NAJA

*Director of Commercialisation,
Industry and Competitiveness,
European Space Agency (ESA),
France*



VP: RELATIONS WITH INTERNATIONAL ORGANIZATIONS

Anil KUMAR

*Associate Director, ISTRAC,
Chief General Manager, Safe &
Sustainable Space Operations
Management,
Indian Space Research Organisation
(ISRO),
India*



VP: SCIENCE AND ACADEMIC RELATIONS

Samaddin ASADOV

*Chairman of the Board,
Space Agency of the Republic of
Azerbaijan, Azercosmos,
Azerbaijan*



VP: SOCIETIES AND MUSEUMS

Daming LI

*President,
China Academy of Space Technology
(CAST),
China*



VP: SPACE AGENCY RELATIONS

Enrico Palermo

*Head,
Australian Space Agency (CAST),
Australia*



VP: TECHNICAL ACTIVITIES

Tanja MASSON-ZWAAN

*Assistant Professor and Deputy
Director of the International Institute
of Air and Space Law (IIASL),
Leiden University
The Netherlands*



GENERAL COUNSEL

Sergio MARCHISIO

*Full Professor of International Law,
Sapienza University of Rome,
Italy*



HONORARY SECRETARY

Geir HOVMORK

*Norsk Astronautisk Forening,
Norway*



IAF EXECUTIVE DIRECTOR

Christian FEICHTINGER

*Executive Director,
IAF Secretariat,
Austria*

IAF Secretariat

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Giulia Angeletti, Office Manager
Martina Fabbiani, Projects Manager
Alessandra D'argenio, Projects Manager

Evelina Hedman, Communications & Marketing Manager
Stefano Pascali, Projects Manager
Constance Delaune, Projects Assistant
Svetlana Vakhrina, Projects Assistant

Martin Feichtinger, Administrative & Project Support
Sebastian Feichtinger, Social Media
Elena Feichtinger, Projects Manager and Special Advisor (Volunteer)

IAF Member Organizations 2024

A9C Capital	Bahrain	American Institute of Physics	United States
AAKA SPACE STUDIO CORP	Canada	Andart Global	United Arab Emirates
Access	Germany	Andøya Space Center	Norway
ADA SPACE	China	Angelantoni Test Technologies Srl	Italy
Adriatic Aerospace Association	Croatia	Angolan National Space Program Management Office (GGPEN)	Angola
Advanced Space	United States	ANU Institute for Space (InSpace)	Australia
AED Cluster Portugal	Portugal	ArianeGroup	France
Aerojet Rocketdyne	United States	Arianespace	France
Aerospace Industries Association (AIA)	United States	Arizona State University	United States
Aerospace Research Institute	Iran	ArkEdge Space	Japan
Aerospace Valley	France	Armenian Aerospace Agency	Armenia
Agence Spatiale Algérienne (ASAL)	Algeria	ASELSAN	Türkiye
Agencia Espacial Mexicana (AEM)	Mexico	Asgardia	Austria
AGH University of Krakow	Poland	Asher Space Research Institute (ASRI)	Israel
AGI	United States	Asia-Pacific Space Cooperation Organization (APSCO)	China
Agrupacion Astronautica Espanola	Spain	Asociacion Civil Universidad de Ciencias y Humanidades	Peru
AIPAS – Association Of Italian Space Enterprises	Italy	Association Aéronautique & Astronautique de France (3AF)	France
Air and Space Academy (AAE)	France	Association for Astronautics and Space Technologies (UAST)	Croatia
Airbus Defence and Space GmbH	Germany	Association of Space Explorers (ASE)	United States
Airbus Defence and Space SA	Spain	Associazione Italiana di Aeronautica e Astronautica (AIDAA)	Italy
Airbus Defence and Space SAS	France	Astralintu Space Technologies	Ecuador
Airbus Ltd.	United Kingdom	Astra-Terra Ltd.	United Kingdom
Airbus Netherlands B.V.	The Netherlands	Astrax	Japan
Akula Tech	Australia	Astronautical Society of India	India
ALATYR	France	Astroscale	Japan
ALE	Japan	Australian Space Agency	Australia
Alén Space	Spain	Austrian Research Promotion Agency (FFG)	Austria
All Nations University	Ghana	AUSTROSPACE	Austria
Alma Mater Studiorum - University of Bologna	Italy	Axiom Space	United States
Alpha Impulsion	France	Azercosmos Space Agency of the Republic of Azerbaijan	Azerbaijan
ALTEC	Italy		
American Astronautical Society (AAS)	United States		
American Institute of Aeronautics and Astronautics (AIAA)	United States		

Baku State University	Azerbaijan	COMSPOC	United States
Bauman Moscow State Technical University	Russian Federation	Council of European Aerospace Societies (CEAS)	Belgium
Beihang University	China	Croatian Astronautical and Rocket Federation (HARS)	Croatia
Beijing FutureSpace Space Technology Institute	China	CSIRO Astronomy & Space Science	Australia
Beijing Infinite Education	China	CubeSpace	South Africa
Beijing Interstellar Glory Space Technology	China	Curtin University	Australia
Beijing Minospace Technologies	China	Cyprus Space Exploration Organisation (CSEO)	Cyprus
Beijing Smart Satellite Technology	China	Czech Aerospace Research Centre	Czech Republic
Beijing SpaceD Aerospace Application & Science Education Technology	China	Czech Space Alliance	Czech Republic
Beijing Sunwise Space Technology	China	Dalian University of Technology (DUT)	China
Belgian Federal Science Policy Office (BELSPO)	Belgium	Danish Aerospace Company	Denmark
Ben-Gurion University of the Negev	Israel	Danish Astronautical Society	Denmark
Berkeley SETI Research Center	United States	Dassault Aviation	France
beSpace	Germany	Deep Space Exploration Laboratory (Tiandu Laboratory)	China
beyond gravity	Switzerland	Deimos Space	Spain
BIOSEC SOLUTIONS LIMITED	Nigeria	Delft University of Technology	The Netherlands
Black Engine Aerospace	Germany	Department of Space Studies, University of North Dakota	United States
Blue Origin	United States	Deployables Cubed (DcubeD)	Germany
Boryung Corporation	Republic of Korea	Dereum Labs	Mexico
Brazilian Space Agency (AEB)	Brazil	Deutsche Gesellschaft für Luft-und Raumfahrt, Lilienthal-Oberth (DGLR)	Germany
Bryce Space and Technology	United States	Deutsches Zentrum für Luft-und Raumfahrt (DLR)	Germany
Budapest University of Technology and Economics	Hungary	Dhruva Space Private Limited	India
C6 Launch Systems	Canada	D-Orbit	Italy
Canadensys Aerospace Corporation	Canada	Dragonfly Aerospace	South Africa
Canadian Aeronautics & Space Institute (CASI)	Canada	Dynamic Genesis	Sweden
Canadian Space Agency	Canada	Dynetics	United States
Canadian Space Society	Canada	Ecole Polytechnique Fédérale de Lausanne (EPFL)	Switzerland
C-Astra Technologies	United States	Ecosmic s.r.l.	Italy
Center for Space Commerce and Finance	United States	Edge Aerospace	United States
Center of Space Exploration, Ministry of Education (COSE)	China	Edrive Space Technology	China
Central American Association for Aeronautics and Space (ACAE)	Costa Rica	Egyptian Space Agency	Egypt
Central Research Institute for Machine Building (JSC TSNIMASH)	Russian Federation	EllipSpace	China
Centre for Mechanical and Aerospace Science and Technologies (C-MAST)	Portugal	Embedded Instruments and Systems (EMXYS)	Spain
Centre for the development of Industrial Technology (CDTI)	Spain	Embry-Riddle Aeronautical University	United States
Centre National de la Cartographie et de la Teledetection (CNCT)	Tunisia	EMPOSAT	China
Centre National d'Etudes Spatiales (CNES)	France	EMROD	Germany
Centre Royal de Télédétection Spatiale (CRTS)	Morocco	EnduroSat	Bulgaria
Centre Spatial de Liège (CSL)	Belgium	Engineers Australia	Australia
Centro de Investigacion y Difusion Aeronautico Espacial (CIDA-E)	Uruguay	EngineRoom.io	Australia
China Head Aerospace Technology	China	EOS Data Analytics	United States
Chinese Society of Astronautics (CSA)	China	Equatorial Launch Australia	Australia
CIRA Italian Aerospace Research Centre	Italy	Estonian Business Innovation Agency	Estonia
Colegio Federado de Ingenieros y de Arquitectos de Costa Rica (CFIA)	Costa Rica	EUMETSAT	Germany
Colombian Space Agency	Colombia	EURISY	France
Colorado Center for Astrodynamics Research, University of Colorado	United States	Euroconsult	France
Comision Nacional de Actividades Espaciales (CONAE)	Argentina	EURO2MOON	Luxembourg
Commission d'Astronautique de l'Academie Roumaine	Romania	EUROLAB Laboratory	Türkiye
Community of Ariane Cities (CVA)	France	European Conference for Aero-Space Sciences (EUCASS)	Belgium
		European Organization for Nuclear Research (CERN)	Switzerland
		European Space Agency (ESA)	France
		European Space Foundation	Poland
		European Space Policy Institute (ESPI)	Austria
		European Test Services (ETS)	The Netherlands

European Union Agency for the Space Programme (EUSPA)	Czech Republic	Indian National Space Promotion and Authorization Centre (IN-SPACe)	India
Eurospace	France	Indian Space Association (ISpA)	India
Eutelsat	France	Indian Space Research Organization (ISRO)	India
Everlight Space	China	Indian Technology Congress Association	India
Exobotics Ltd	United Kingdom	Indonesian Space Agency Secretariat (INASA)	Indonesia
Fachhochschule Wiener Neustadt	Austria	Infostellar	Japan
Faculty of Electrical Engineering and Information Technology of Slovak University of Technology in Bratislava	Slovakia	IngeniArs	Italy
Federal Aviation Administration Office of Commercial Space Transportation (FAA/AST)	United States	INNOSPACE	Korea, Republic of
Felix & Paul Studios	Canada	Innovation Academy for Microsatellites, Chinese Academy of Sciences	China
Finnish Astronautical Society	Finland	Institut d'Estudis Espacials de Catalunya	Spain
Firefly Aerospace	United States	Institut Français d'Histoire de l'Espace	France
Flinders University	Australia	Institut Polytechnique des Sciences Avancées (IPSA)	France
Fondazione E. Amaldi	Italy	Institut Supérieur de l'Aéronautique et de l'Espace (ISAE)	France
For all Moonkind	United States	Institute for Q-shu Pioneer of Space (iQPS)	Japan
FOSSA Systems	Spain	Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS)	Russian Federation
Fraunhofer Alliance Space	Germany	Institute of Experimental and Applied Physics, Czech Technical University in Prague	Czech Republic
Fundación Cydonia	Colombia	Institute of Mechanics, Chinese Academy of Sciences	China
Fundacion para el Desarrollo de las Ciencias la Sociedad y el Estado (FUNDECISE)	Costa Rica	Institute of Space Systems, University of Stuttgart	Germany
Future Space Leaders Foundation	United States	Instituto de Aeronáutica e Espaço (IAE)	Brazil
G.A.U.S.S.	Italy	Instituto Nacional de Pesquisas Espaciais (INPE)	Brazil
Geoestudios Ingenieria	Colombia	Instituto Nacional de Técnica Aeroespacial (INTA)	Spain
Geo-Informatics and Space Technology Development Agency (GISTDA)	Thailand	Instituto Tecnológico de Costa Rica (TEC)	Costa Rica
Georgia Tech Center for Space Technology and Research	United States	Intella S.r.l.	Italy
German Aerospace Industries Association (BDLI)	Germany	International Alliance of Aerospace Information Industry Ltd.	Singapore
Ghulam	Kazakhstan	International Association for the Advancement of Space Safety	The Netherlands
GIFAS	France	International Lunar Observatory Association	United States
GK Launch Services	Russian Federation	International Peace Alliance	China
GKN Aerospace Engine Systems	Sweden	International Space Center - Space Park Israel Ashkelon	Israel
GMV Aerospace & Defence	Spain	International Space University (ISU)	France
Gokmen Space and Aviation Training Center (GUHEM)	Turkey	Internationaler Förderkreis für Raumfahrt – Hermann Oberth – Wernher von Braun	Germany
GomSpace Aps	Denmark	Intersputnik International Organization of Space Communications	Russian Federation
Gran Sasso Science Institute	Italy	Invap	Argentina
Graz University of Technology (TU Graz)	Austria	Ionosphere institute	Kazakhstan
Guangzhou Zhongke Aerospace Exploration Technology (CAS Space)	China	Iranian Space Agency	Iran
Gumush Aerospace & Defense	Turkey	iSaisei Corporation	Italy
Habitat Company GR	Mexico	Isar Aerospace Technologies	Germany
HAVELSAN	Türkiye	ispace	Japan
HE Space	Germany	Israel Aerospace Industries	Israel
Hebrew University of Jerusalem	Israel	Israel Space Agency	Israel
Hellenic Space Centre	Greece	Italian Space Agency (ASI)	Italy
Hermann-Oberth-Raumfahrt Museum	Germany	Japan Aerospace Exploration Agency (JAXA)	Japan
High Technology Unit (UAT) Faculty of Engineering	Mexico	Japan Manned Space Systems Corporation (JAMSS)	Japan
Hong Kong Polytechnic University	China	Japan Society for Aeronautics and Space Sciences (JSASS)	Japan
Hungarian Astronautical Society (MANT)	Hungary	Japanese Rocket Society	Japan
IABG Industrieanlagen Betriebsgesellschaft	Germany	Joanneum Research	Austria
Iceland Space Agency	Iceland	JSC Glavkosmos	Russian Federation
ICEYE	Finland	JSC NPO Energomash	Russian Federation
Idea Space	Brazil	JSC SRC Progress	Russian Federation
IHI Aerospace	Japan		

Karman Project	Germany	Monacosat S.A.M.	Monaco
KazSat	Kazakhstan	Moonshot Space	Israel
KBR	United States	Moon Village Association (MVA)	Austria
Keldysh Research Center	Russian Federation	Moscow Aviation Institute (MAI)	Russian Federation
Kenya Space Agency	Kenya	MT Aerospace	Germany
Khalifa University of Science and Technology	United Arab Emirates	Mudd Law	United States
Khrunichev State Research & Production Space Center	Russian Federation	Nanjing University of Aeronautics and Astronautics	China
King Abdulaziz City for Science & Technology (KACST)	Saudi Arabia	Nanoracks	United States
Kongsberg NanoAvionics	Lithuania	Nara Space	Republic of Korea
Kongsberg Satellite Services	Norway	National Aeronautics and Space Administration (NASA)	United States
Korea Advanced Institute of Science and Technology (KAIST)	Republic of Korea	National Aerospace Agency (NASA) of Azerbaijan Republic	Azerbaijan
Korea Aerospace Industries	Korea, Republic of	National Astronomical Research Institute of Thailand	Thailand
Korea Aerospace Research Institute (KARI)	Korea, Republic of	National Autonomous University of Honduras	Honduras
Korea Association for Space Technology Promotion (KASP)	Korea, Republic of	National Institute of Information and Communications Technology (NICT)	Japan
Korea Astronomy and Space Science Institute	Korea, Republic of	National Oceanic and Atmospheric Administration (NOAA)	United States
Korea Electrotechnology Research Institute	Republic of Korea	National Space Centre	Ireland
Korea Testing Laboratory	Republic of Korea	National Space Research and Development Agency (NASRDA)	Nigeria
Kyushu Institute of Technology	Japan	National Space Science Agency (NSSA)	Bahrain
LandSpace Technology Corporation	China	National Space Society	United States
Lavochkin Science and Production Association	Russian Federation	National Space Society Colombia	Colombia
Law Offices of Sterns and Tennen	United States	National University of Science and Technology	Pakistan
Leanspace	France	NEC Corporation	Japan
Leonardo	Italy	Netherlands Aerospace Centre (NLR)	The Netherlands
Libre Space Foundation	Greece	Netherlands Space Office (NSO)	The Netherlands
LIQUIFER Systems Group	Austria	Netherlands Space Society (NVR)	The Netherlands
Lithuanian Museum of Ethnocosmology	Lithuania	NeuraSpace	Portugal
Lithuanian Space Association (LSA)	Lithuania	New Zealand Space Agency	New Zealand
Lockheed Martin Corporation	United States	NGC Aerospace	Canada
Loft Orbital Solutions	United States	Northrop Grumman Corporation	United States
Łukasiewicz Research Network – Institute of Aviation (ILOT)	Poland	Northwestern Polytechnical University	China
Luxembourg Space Agency	Luxembourg	Norwegian Space Agency (NOSA)	Norway
Malaysian Space Agency (MYSA)	Malaysia	Nova Systems	Australia
Malaysia Space Industry Consortium (MASIC)	Malaysia	Novespace	France
MARS Exploration Pvt Ltd	India	Office for Space Technology & Industry, Singapore	Singapore
Mars Planet	Italy	Office National d'Etudes et de Recherches Aéropatiales (ONERA)	France
Massachusetts Institute of Technology	United States	OffWorld	United States
Maxar	United States	OHB Italia	Italy
McGill Institute for Aerospace Engineering (MIAE)	Canada	OHB System AG - Munich	Germany
MDA Corporation	Canada	OHB System AG-Bremen	Germany
MEDES - IMPS	France	Oman National Space Center, Advanced Technology and AI	Oman
Microcosm	United States	Open Cosmos	United Kingdom
MicroDrive Space	China	Open Lunar Foundation	United States
Miprons	Italy	Orbit Fab	United Kingdom
MISI - MOROCCAN INITIATIVE FOR SPACE INDUSTRY	Morocco	Orbital Express Launch Limited (Orbex)	United Kingdom
Mission Control Space Services	Canada	Orbital Space Technologies	Costa Rica
Mission Space	Luxembourg	Orienspace Technology	China
Mitsubishi Electric Corporation	Japan	Orion Applied Science & Technology	United States
Mitsubishi Heavy Industries	Japan	Pacific West Data Pty Ltd - Trading as ACME SpaceTek	Australia
Mohammed Bin Rashid Space Centre (MBRSC)	United Arab Emirates	Pakistan Space and Upper Atmosphere Research Commission (SUPARCO)	Pakistan
Monaco Office of Space Affairs	Monaco		

Paraguayan Space Agency	Paraguay	Science Malta	Malta
Philippine Space Agency (PhilSA)	Philippines	SDA Bocconi School of Management, Bocconi University	Italy
PIESAT Information Technology Co.,Ltd.	China	Secure World Foundation	United States
PJSC "Elmiz"	Ukraine	SEMECCEL Cité de l'Espace	France
Planet Labs Germany	Germany	Serbian Office for Space Sciences, Research and Development (SERBSPACE)	Serbia
Plan-S Satellite and Space Technologies	Turkey	SES	Luxemburg
Polish Academy of Sciences	Poland	SETI Institute	United States
Polish Astronautical Society	Poland	Shaanxi Engineering Laboratory for Microsatellites	China
Polish Space Agency (POLSA)	Poland	Shaanxi XingYi Space Technologies	China
Polish Space Industry Association	Poland	Shamakh Astrophysical Observatory	Azerbaijan
Politecnico di Milano	Italy	Shanghai Azimuth Data Technology	China
Politecnico di Torino	Italy	Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST)	United Arab Emirates
Portuguese Space Agency	Portugal	Shenzhen MagicCubeSat Technology Co., Ltd.	China
Poznan University of Technology	Poland	Shoal Group	Australia
PricewaterhouseCoopers Advisory (PwC)	France	SIDERALIS Foundation	Ecuador
Privateer Space	United States	Sierra Space	United States
Proximai	United States	Simera Sense	Belgium
Purple Mountain Observatory (PMO)	China	Singapore Space and Technology (SSTL)	Singapore
Qosmosys	Singapore	Singapore Technologies Engineering Limited	Singapore
QSTC	Canada	Sitael	Italy
Qwaltec	United States	Slovak Investment and Trade Development Agency (SARIO) - Slovak Space Office	Slovakia
Rafael Advanced Defense Systems	Israel	SMARTCIRCUITS INNOVATION Private Limited	India
Rakia Mission	Israel	SODERN	France
Ramirez de Arellano y Abogados, S.C. Law Firm	Mexico	Solar MEMS Technologies S.L	Spain
Reaction Engines	United Kingdom	South African National Space Agency (SANSA)	South Africa
Redwire Space	United States	South African Space Association (SASA)	South Africa
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Romanian Space Agency (ROSA)	Romania	Space Commercial Services Holdings	South Africa
ROSCOSMOS	Russian Federation	Space Entrepreneurship Institute	Poland
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Safran Aircraft Engines	France	Space Policy Institute, George Washington University	United States
SAHA Istanbul Defence & Aerospace Cluster	Turkey	Space Products and Innovation (SPiN)	Italy
Saint Petersburg State University of Aerospace Instrumentation	Russian Federation	Space Renaissance International (SRI)	Italy
Sant'Anna School of Advanced Studies	Italy	Space Research Institute (IKI), Russian Academy of Sciences (RAS)	Russian Federation
Samara National Research University	Russian Federation	Space Sustainability Rating	Switzerland
Sapienza University of Rome	Italy	Space Tech Expo - Smarter Shows	United Kingdom
SARS Technology and Innovation Private Limited	India	Space Trust	United Kingdom
SARsatX	Saudi Arabia	SpaceBrainx	France
Satellite Research Center, Nanyang Technological University (NTU)	Singapore	SpaceBuzz	The Netherlands
SATELIOT	Spain	SpaceForest	Poland
Satellogic	Spain	SpaceLand Africa	Mauritius
Satrec Initiative	Korea, Republic of	Spacely Chile	Chile
Saudi Space Agency (SSA)	Saudi Arabia	SpaceNav	United States
Savunma Teknolojileri Muhenislik ve Ticaret A.S. (STM)	Turkey		

SpaceNed	The Netherlands	TNO	The Netherlands
SPACETIDE Foundation	Japan	TRANSPACE TECHNOLOGIES PVT LTD	India
Spacety	China	Trapp Networks PR Social Media	Germany
SpaceX	United States	Tsinghua University	China
Spade	France	Turkish Space Agency (TUA)	Turkey
Spartan Space	France	TURKSAT	Türkiye
Starbound Space Solutions	Australia	TY-Space Technology (Beijing) Ltd.	China
STAR.VISION Aerospace Group Limited	China	U.S. Geological Survey	United States
Stardust	Canada	UAE Space Agency	United Arab Emirates
Starfire 7	United States	UK Space Agency	United Kingdom
STARS International University	Uzbekistan	UNIO Enterprise GmbH	Germany
State Space Agency of Ukraine (SSAU)	Ukraine	United Launch Alliance	United States
Stichting Space Professionals Foundation (SSPF)	The Netherlands	United States Accreditation	United States
Surrey Satellite Technology (SSTL)	United Kingdom	Universitas Telkom	Indonesia
Swedish Society for Aeronautics and Astronautics	Sweden	Universiti Teknologi Mara (UITM)	Malaysia
Swedish Space Corporation (SSC)	Sweden	University Mediterranea of Reggio Calabria	Italy
Swissmem	Switzerland	University of Adelaide	Australia
Swiss Space Office (SSO)	Switzerland	University of Alabama in Huntsville	United States
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The Aerospace Corporation	United States	Victorian Space Science Education Centre	Australia
The Andy Thomas Space Foundation	Australia	Vieira de Almeida & Associados	Portugal
The Astro Ben Podcast	United Kingdom	Vietnam National Space Center (VNSC)	Vietnam
The Boeing Company	United States	Virgin Galactic	United States
The British Interplanetary Society	United Kingdom	Viterbi School of Engineering (USC)	United States
The Chinese Aeronautical and Astronautical Society located in Taipei	Taiwan, China	VITO nv	Belgium
The Exploration Company	Germany	Von Karman Institute for Fluid Dynamics	Belgium
The Federal University of Technology, Akure (FUTA)	Nigeria	Voyager Space Holdings	United States
The Institute for Earth and Space Exploration	Canada	WeMe Global	Austria
The Johns Hopkins University Applied Physics Laboratory	United States	Wenchang International Aerospace City Administration	China
The Korean Society for Aeronautical and Space Sciences	Korea, Republic of	WeSpace Technologies Limited	Israel
The National Space Science and Technology Center (NSSC)	United Arab Emirates	Wirtschaftsförderung Bremen (WFB)	Germany
The Ohio State University College of Engineering	United States	Women in Aerospace Europe (WIA-E)	The Netherlands
The Planetary Society	United States	World Space Week Association	United States
The Sergei Korolev Space Museum	Ukraine	Yinhe Hangtian (Beijing) Internet Technology Company Limited (GalaxySpace)	China
The Space Research and Technology Agency under the Ministry of digital technologies of the Republic of Uzbekistan (Uzbekspace agency)	Uzbekistan	Yuzhnoye State Design Office	Ukraine
The University of Sydney	Australia	ZARM Fab	Germany
The University of Winnipeg	Canada	Zhuhai Orbita Aerospace Science & Technology	China
ThrustMe	France		

6. International Academy of Astronautics (IAA)

The International Academy of Astronautics is a community of leading experts committed to expanding the frontiers of space, the newest realm of human activity. To foster the development of astronautics, the Academy undertakes a number of activities, including the recognition of outstanding contributors through elections and awards. It also facilitates professional communication, develops and promotes new ideas and initiatives, engages the public and fosters a sense of community among the members. The IAA is a unique independent non-governmental organization established in 1960 and recognized by the United Nations in 1996. It is an honorary society with an action agenda. With about 1200 elected members and corresponding members from 90 nations, the International Academy of Astronautics works closely with space agencies, industry, the academic community and the national science and engineering academies to determine needs and objectives and to help shape policy and forge cooperation by means of studies, position papers, conferences and publications. The IAA has published more than 70 studies to date and is engaged in the preparation of about 40 others. The Academy also publishes four book series and its journal *Acta Astronautica* ranked 1st in the space area in the world and containing each year about 3500 refereed papers. The Academy organizes about 25 conferences and regional meetings

per year focused on the development and promotion of all space activities and covering all continents including space developing countries. In addition, the Academy activity also includes, in cooperation with the International Astronautical Federation and the International Institute of Space Law, the traditional contribution to the International Astronautical Congress (IAC), where the Academy organizes 13 symposia. The Academy also continues to enjoy its participation in the COSPAR Assemblies and the International Society for Photogrammetry and Remote Sensing (ISPRS) congress. Although the IAA has many connections to these and other similar organizations, it is distinctive as the only International Academy of elected members in the broad area of astronautics and space.



Address: 6 rue Galilée, 75016 Paris
Mailing address: P.O. Box 1268-16
 – 75766 Paris Cedex 16 – France
Phone: 33 (0)1 47 23 82 15
Email: sgeneral@iaamail.org
Website: www.iaaspace.org



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7. International Institute of Space Law (IISL)

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

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

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



Email: info@iislweb.org

Website: <https://iislweb.space>

Facebook: <https://www.facebook.com/spacelaw>

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8. Space Generation Advisory Council (SGAC)

The Space Generation Advisory Council (SGAC), in Support of the United Nations Programme on Space Applications, was established at UNISPACE III in 1999. As part of the Vienna Declaration, it was recommended “to create a council to support the United Nations Committee on the Peaceful Uses of Outer Space by raising awareness and exchanging fresh ideas from youth.” The vision was to harness the creativity and vigor of young people to advance humanity through the peaceful use of space.

In 2024, SGAC is celebrating its 25th anniversary, marking a quarter-century of fostering international collaboration and innovation among young space professionals. SGAC has grown to become the largest network for students and young professionals interested in space, representing over 30,000 members aged 18 to 35 from more than 165 countries. This representation extends to the United Nations, space agencies, industry, and academia.

This year, SGAC continues to be an invaluable platform for channeling the passion and talent of its members. As a global organisation, SGAC hosted 3 global events, 17 regional and local events, and numerous online activities, including webinars, workshops, and research projects, keeping our community connected.

Furthermore, SGAC is proud to report that more than 160 scholarships were awarded to our global membership for key space events. Among the events hosted in 2024, SGAC organised the Space Generation Congress alongside the International Astronautical Congress in Milan, in coordination with IAF activities. Our active participation in IAF committees and our commitment to maintaining and expanding

our excellent relationship with the IAF is of fundamental importance to our operations.

In line with our strategic goals, we will expand our presence in developing regions, increasing our participation and activities. To support these objectives, SGAC has employed two new permanent staff members: a Continuous Improvement Officer and a Business Development Officer.

With new experience from the past year and a larger, stronger team, SGAC is optimistic and encouraged for what 2025 holds, with even better engagement and connection with our members and partners. As we plan our activities for the new year, we wish to recognise, acknowledge and celebrate the hard work and outstanding efforts of all SGAC members, reaffirming our mission as the leading international space youth organization.

Further information regarding SGAC can be found at www.spacegeneration.org



Space Generation Advisory Council (SGAC)

c/o European Space Policy Institute
Schwarzenbergplatz 16
TOP1 1010 Vienna, Austria

E: info@spacegeneration.org

W: www.spacegeneration.org

Instagram: [@spacegeneration](https://www.instagram.com/spacegeneration)

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Paulina VALLE

Continuous Improvement Officer,
Space Generation Advisory Council (SGAC)

9. Message from the IAF Vice President for Technical Activities

The International Programme Committee (IPC) is pleased to invite you to submit an abstract for consideration for the 76th International Astronautical Congress to be held in Sydney, Australia from 29 September to 3 October 2024. The Congress is organized by the International Astronautical Federation (IAF), hosted by the Space Industry Association of Australia (SIAA), co-hosted by NSW Government and the Australian Space Agency, and will be supported by the International Academy of Astronautics (IAA), the International Institute of Space Law (IISL) and the Space Generation Advisory Council (SGAC) who contribute to the IAC through their events and symposia.

Under the motto *“Responsible Space: Resilient Earth”*, the intention of the IAC 2025 is to broaden the influence and relevance of space to adjacent industries, including emergency services, health, utilities, telecommunications, resources, manufacturing, finance, construction, agriculture, and Smart Cities. It will delve into why space is critical for both businesses and our everyday lives.

This “Call for Abstracts” is a precursor to a subsequent submission of a final paper, which may be presented at the 76th IAC. Authors are invited to submit an abstract regarding an original, unpublished paper that has not been submitted in any other forum. Abstracts must fit into one of the following IAC categories: A. Science and Exploration; B. Applications and Operations; C. Technology; D. Infrastructure; E. Space and Society. Abstracts must be written in English and the length shall not exceed 400 words. Tables or drawings are not allowed in the abstract. Submitted abstracts can be considered for oral presentations (as 'Short Talks' in the Symposia) and for interactive presentations (IP). Submit your abstract through the online IAF portal at <https://iafastro.directory/iac/account/login/> by 28 February 2025.

Submitted abstracts will be evaluated by the Session Chairs based on technical quality and relevance to the session topics. Abstracts will be considered for an oral or interactive presentation. All selected papers will be treated as equally important in the presentation sessions and Congress Proceedings, differing only in the format of the presentation sessions (in other words, Oral Presentation papers will NOT be considered more important than Interactive Presentation papers). Their evaluation will be submitted to the International Programme Committee, which will make the final decision during the IAF Spring Meetings to be held in March 2025 in Paris, France.

Please note that any relevance to the Congress main theme will be considered as an advantage. Accepted abstracts will be displayed on the Congress website and published in the IAC Congress Proceedings. We look forward to receiving your abstracts for IAC 2025 and please check the IAF website regularly to get the latest updates on the Technical Programme!



Tanja MASSON-ZWAAN
Vice President, Technical Activities
International Astronautical Federation (IAF)

10. IAC 2025 Technical Sessions



Category



SCIENCE AND EXPLORATION

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

- A1 IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM
- A2 IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM
- A3 IAF SPACE EXPLORATION SYMPOSIUM
- A4 54TH IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – THE NEXT STEPS
- A5 28TH IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM
- A6 23RD IAA SYMPOSIUM ON SPACE DEBRIS
- A7 IAF SYMPOSIUM ON ONGOING AND NEAR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS

Category coordinated by Pierre W. Bousquet, *Centre National d'Etudes Spatiales (CNES), France*

A1

IAF/IAA 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

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

Oleg Orlov
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS) — RUSSIAN FEDERATION

Support

Elena Fomina
State Scientific Center of Russian Federation, Institute of Biomedical Problems, Russian Academy of Sciences — RUSSIAN FEDERATION

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 (UCSF)
— UNITED STATES

Gro M. Sandal
University of Bergen — NORWAY

A1.2

Human Physiology in Space

This session focuses on physiological effects of short- and long-duration spaceflight, and how this affects general health. Research into mitigation (countermeasures) of space effects are also included.

Co-Chairs

Elena Fomina
State Scientific Center of Russian Federation, Institute of Biomedical Problems, Russian Academy of Sciences — RUSSIAN FEDERATION

Jens Jordan
Institute of Aerospace Medicine (DLR) — GERMANY

Rapporteur

Alain Mailliet
MEDES - IMPS — FRANCE

Rapporteur

Angelique Van Ombergen
European Space Agency (ESA) — THE NETHERLANDS

A1.3

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.

Co-Chairs

Satoshi Iwase
Aichi Medical University — JAPAN

Oleg Orlov
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS) — RUSSIAN FEDERATION

Rapporteur

Hasan Birol Cotuk
— TÜRKIYE

Rapporteur

Katrin Stang
DLR (German Aerospace Center) — GERMANY

A1.4

Medicine in Space and Extreme Environments

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

Co-Chairs

Oleg Orlov
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS) — RUSSIAN FEDERATION

Hanns-Christian Gunga
Charité Universitätsmedizin Berlin — GERMANY

Rapporteur

Jeffrey R. Davis
Exploring 4 Solutions — UNITED STATES

Rapporteur

Alexander Choukér
University of Munich — GERMANY

A1.5

Radiation Fields, Effects and Risks in Human Space Missions

The major topics of this session are the characterization of the radiation environment by theoretical modeling and experimental data, radiation effects on physical and biological systems, countermeasures to radiation and radiation risk assessment.

	<p>Co-Chairs</p> <p>Lawrence Pinsky <i>University of Houston — UNITED STATES</i></p> <p>Guenther Reitz <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Rapporteur</p> <p>Premkumar Saganti <i>Prairie View A&M University — UNITED STATES</i></p>
A1.6	<p>Advancements in Astrobiology and Space Exploration</p> <p>This session offers an insightful exploration of the latest advancements in astrobiology and space exploration. From ambitious human missions to the Moon and Mars to cutting-edge robotic exploration of Mars subsurface and ocean worlds like Europa, and Enceladus, this session covers all aspects of astrobiology. Therefore, this scientific gathering seeks to foster collaboration and knowledge exchange on extremophiles research, exobiology, biosignature detection, planetary protection, space exploration technology, and the quest to find evidence of habitability and life beyond our home planet.</p> <p>Co-Chairs</p> <p>Fathi Karouia <i>NASA Ames Research Center, Blue Marble Space Institute Of Science; BioServe Space Technologies, University of Colorado Boulder — UNITED STATES</i></p> <p>Stephan Ulamec <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p>
A1.7	<p>Life Support, Habitats and EVA Systems</p> <p>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</p> <p>Ulrich Kuebler <i>Airbus DS GmbH — GERMANY</i></p> <p>Khalid Badri <i>Mohammed Bin Rashid Space Centre (MBRSC) — UNITED ARAB EMIRATES</i></p> <p>Rapporteur</p> <p>Gisela Detrell <i>Technical University of Munich — GERMANY</i></p> <p>Rapporteur</p> <p>Hong Liu <i>School of Biological Science and Medical Engineering, Beihang University; Institute of Environmental Biology and Life Support Technology, Beihang University — CHINA</i></p>
A1.8	<p>Biology in Space</p> <p>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</p> <p>Didier Chaput <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i></p> <p>Fengyuan Zhuang <i>Beihang University — CHINA</i></p> <p>Rapporteur</p> <p>Jancy McPhee <i>The Aerospace Corporation — UNITED STATES</i></p>
A1.IP	<p>Interactive Presentations - IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM</p> <p>This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Space Life Sciences addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific eight minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips, etc. An award will also be presented to the author of the best Interactive Presentation in the A Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.</p> <p>Co-Chairs</p> <p>Didier Chaput <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i></p> <p>Jancy McPhee <i>The Aerospace Corporation — UNITED STATES</i></p>
A2	<p>IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM</p> <p>The objective of the Microgravity Science and Processes Symposium, organized by the International Astronautical Federation (IAF), 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>Vice-Coordinator</p> <p>Remi Canton <i>Centre National d'Etudes Spatiales (Cnes) — FRANCE</i></p> <p>Vice-Coordinator</p> <p>Angelika Diefenbach <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p>
A2.1	<p>Gravity and Fundamental Physics</p> <p>This session is devoted to the search for 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</p> <p>Thomas Driebe <i>DLR (German Aerospace Center) — GERMANY</i></p> <p>Vladimir Pletser <i>Blue Abyss — UNITED KINGDOM</i></p>
A2.2	<p>Fluid and Materials Sciences</p> <p>The main focus of the session is on perspective research fields in fluid and materials sciences, multi-phase and chemically reacting flows including theoretical modeling, numerical simulations, and results of pathfinder laboratory and space experiments.</p> <p>Co-Chairs</p> <p>Nickolay N. Smirnov <i>Lomonosov Moscow State University — RUSSIAN FEDERATION</i></p> <p>Satoshi Matsumoto <i>Japan Aerospace Exploration Agency (JAXA) — JAPAN</i></p> <p>Rapporteur</p> <p>Qi Kang <i>National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences — CHINA</i></p>
A2.3	<p>Microgravity Experiments from Sub-Orbital to Orbital Platforms</p> <p>This session presents recent results of microgravity experiments from all disciplines using different microgravity platforms, including drop towers, parabolic aircrafts, sounding rockets and capsules.</p> <p>Co-Chairs</p> <p>Raffaele Savino <i>University of Naples "Federico II" — ITALY</i></p> <p>Rainer Willnecker <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Rapporteur</p> <p>Vladimir Pletser <i>Blue Abyss — UNITED KINGDOM</i></p>
A2.4	<p>Science Results from Ground Based Research</p> <p>This session is focused on the results of ground based preparatory experiments from all disciplines in physical sciences.</p> <p>Co-Chairs</p> <p>Valentina Shevtsova <i>University of Mondragon — SPAIN</i></p> <p>Antonio Viviani <i>Università degli Studi della Campania "Luigi Vanvitelli" — ITALY</i></p> <p>Rapporteur</p> <p>Nickolay N. Smirnov <i>Lomonosov Moscow State University — RUSSIAN FEDERATION</i></p>

A2.5

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).

Co-Chairs

Qiu-Sheng Liu

*Institute of Mechanics, Chinese Academy of Sciences
— CHINA*

Remi Canton

Centre National d'Etudes Spatiales (CNES) — FRANCE

A2.6

Microgravity Sciences on board of Space stations

This session focusses on the presentation of scientific and operational results obtained from microgravity sciences research conducted on large orbital platforms, in particular the ISS, the Chinese Space Station (CSS) and upcoming commercial space stations. Papers on planned or newly developed research topics and experiment scenarios are also invited. The session is not limited to the usage of stations in low Earth orbits (LEO), but comprises the preparation scenarios for further long-term flight opportunities beyond low Earth orbits such as the Deep Space Gateway station.

Co-Chairs

Angelika Diefenbach

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

Yang Yang

*Technology and Engineering Center for Space Utilization,
Chinese Academy of Sciences — CHINA*

Rapporteur

Thomas Driebe

DLR (German Aerospace Center) — GERMANY

A2.7

Life and Physical Sciences under reduced Gravity

This session focuses on the presentation of scientific and operational results obtained from life and physical sciences research conducted on large orbital platforms, in particular the ISS, the Chinese Space Station (CSS) and upcoming commercial space stations. Papers on planned or newly developed research topics and experiment scenarios are also invited. The session is not limited to the usage of stations in low Earth orbits (LEO), but comprises the preparation scenarios for further long-term flight opportunities beyond low Earth orbits such as the Deep Space Gateway station.

Co-Chairs

Angelika Diefenbach

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

Remi Canton

Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteur

Peter Graef

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

A2.8

In-Space Manufacturing and Production Applications

In-space manufacturing represents an emerging capability that can revolutionize space exploration and utilization. Producing parts, tools, and even spacecraft in space eliminates the constraints and costs of launching every item from Earth. An IAC session would provide an important forum to share progress, innovations, and lessons learned. Speakers could highlight techniques like additive manufacturing with novel materials for spacecraft production and repair. Experts could also discuss biomanufacturing applications like tissue engineering and biomedicine production leveraging microgravity. Operators could share insights on managing material processing and fabrication off Earth. The symposium would connect leaders across disciplines tackling these technical challenges and catalyze innovations. As humanity expands into space, in-space manufacturing provides sustainability and cost benefits by enabling self-sufficiency. Terrestrially, it opens new avenues for manufacturing products impossible to produce in normal gravity. Commercial space companies are poised to benefit from reduced launch costs. As public and private entities target manufacturing in space, IAC participation would accelerate advances in this transformative field and maximize downstream applications on Earth.

Co-Chairs

Fathi Karouia

*NASA Ames Research Center, Blue Marble Space
Institute Of Science; BioServe Space Technologies,
University of Colorado Boulder — UNITED STATES*

David Estrada

Boise State University (BSU) — UNITED STATES

Rapporteur

Albert Houcine Touati

Université Clermont Auvergne (UCA) — FRANCE

A2.1P

Interactive Presentations - IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM

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

Co-Chair

Angelika Diefenbach

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

Coordinator

Remi Canton

Centre National d'Etudes Spatiales (CNES) — FRANCE

A3

IAF SPACE EXPLORATION SYMPOSIUM

This symposium, organized by the International Astronautical Federation (IAF), covers the current and future robotic missions and material plans for initiatives in the exploration of the Solar System.

Coordinators

Vincenzo Giorgio

Thales Alenia Space Italia — ITALY

Pierre W. Bousquet

Centre National d'Etudes Spatiales (CNES) — FRANCE

Keyur Patel

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

A3.1

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.

Co-Chairs

Kathy Laurini

Osare Space Consulting Group — UNITED STATES

Keyur Patel

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

Rapporteurs

Norbert Frischauf

TU Graz — AUSTRIA

Masaki Fujimoto

Japan Aerospace Exploration Agency (JAXA) — JAPAN

A3.2A

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.

Co-Chairs

Bernard Foing

ILEWG "EuroMoonMars" — THE NETHERLANDS

David Korsmeyer

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

Rapporteurs

Pierre-Alexis Joumel

Airbus Defence and Space — GERMANY

Nadeem Ghafoor

Avalon Space — CANADA

A3.2B

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.

Co-Chairs

Bernard Foing
ILEWG "EuroMoonMars" — THE NETHERLANDS

David Korsmeyer
National Aeronautics and Space Administration (NASA),
Ames Research Center — UNITED STATES

Rapporteurs

Pierre-Alexis Joumel
Airbus Defence and Space — GERMANY

Nadeem Ghafoor
Avalon Space — CANADA

A3.2C

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.

Co-Chairs

Bernard Foing
ILEWG "EuroMoonMars" — THE NETHERLANDS

David Korsmeyer
National Aeronautics and Space Administration (NASA),
Ames Research Center — UNITED STATES

Rapporteurs

Sylvie Espinasse
European Space Agency (ESA) — THE NETHERLANDS

Nadeem Ghafoor
Avalon Space — CANADA

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.

Co-Chairs

Vincenzo Giorgio
Thales Alenia Space Italia — ITALY

Pierre W. Bousquet
Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteurs

Amalia Ercoli Finzi
Politecnico di Milano — Italy

Cheryl L.B. Reed
Northrop Grumman Corporation — United States

A3.3B

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 science, instruments and technologies for Mars missions including expected experiments. Papers on any aspects of the search for evidence or extinct Martian life, and forward and backward contamination are particularly welcome.

Co-Chairs

Vincenzo Giorgio
Thales Alenia Space Italia — ITALY

Pierre W. Bousquet
Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteurs

Amalia Ercoli Finzi
Politecnico di Milano — ITALY

Cheryl Reed
Northrop Grumman Innovation Systems — UNITED STATES

A3.4A

Small Bodies Missions and Technologies (Part 1)

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

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

Cheryl Reed
Northrop Grumman Innovation Systems — UNITED STATES

Rapporteurs

Norbert Frischauf
TU Graz — AUSTRIA

Marc D. Rayman
NASA Jet Propulsion Laboratory — UNITED STATES

A3.4B

Small Bodies Missions and Technologies (Part 2)

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

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

Cheryl Reed
Northrop Grumman Innovation Systems — UNITED STATES

Rapporteurs

Marc D. Rayman
NASA Jet Propulsion Laboratory — UNITED STATES

Norbert Frischauf
TU Graz — AUSTRIA

A3.5

Solar System Exploration including Ocean Worlds

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. Special emphasis on papers addressing missions to so-called Ocean Worlds (Enceladus, Europa, Titan) is sought. Papers covering both new mission concepts as well as the associated specific technologies are invited.

Co-Chairs

Mariella Graziano
GMV Aerospace & Defence SAU — SPAIN

Junichiro Kawaguchi
Australian National University (ANU) — AUSTRALIA

Rapporteurs

Charles E. Cockrell Jr
National Aeronautics and Space Administration (NASA)
— UNITED STATES

Gabriel Pont
Centre National d'Etudes Spatiales (CNES) — FRANCE

A3.IP

Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM

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

Co-Chairs

Christian Sallaberger

Canadensys Aerospace Corporation — CANADA

Bernard Foing

ILEWG "EuroMoonMars" — THE NETHERLANDS

A4

54TH IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – THE NEXT STEPS

This symposium, organized by the International Academy of Astronautics (IAA), deals with the scientific, technical, and interdisciplinary aspects of the Search for Extra-Terrestrial Intelligence (SETI) on an international scale. SETI researchers are typically looking for anomalies in astronomical data, potentially associated with other technical civilisations in the Milky Way and beyond (so-called "techno-signatures"). The search includes all parts of the electromagnetic spectrum and utilises cutting-edge technologies deployed on some of the largest telescopes in the world. The interdisciplinary aspects of the topic involve the social and societal consequences of detecting a signal, engaging with a very wide variety of human cultural pursuits - including art, language, education, science, anthropology, sociology, psychology, legal, political and institutional issues, interactions with the media, public outreach and risk communication.

Coordinators

Mike Garrett

University of Manchester — UNITED KINGDOM

Carol Oliver

University of New South Wales — AUSTRALIA

A4.1

SETI 1: SETI Science and Technology

All scientific and technical aspects associated with the search for extraterrestrial intelligence, including current and future developments and search strategies.

Co-Chairs

Chenoa Tremblay

SETI Institute — UNITED STATES

Danny Price

Square Kilometre Array Observatory (SKAO) — AUSTRALIA

A4.2

SETI 2: SETI and Society

All interdisciplinary aspects of SETI, in particular the social and societal consequences of detecting a signal, engaging with a very wide variety of human cultural pursuits - including art, language, education, science, anthropology, sociology, psychology, legal, political and institutional issues, interactions with the media, public outreach and risk communication.

Co-Chair

Kate Genevieve

University of Sussex — UNITED KINGDOM

Rebecca Charbonneau

National Radio Astronomy Observatory — UNITED STATES

A4.IP

Interactive Presentations - 54TH IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps

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

Co-Chairs

Carol Oliver

University of New South Wales — AUSTRALIA

Mike Garrett

University of Manchester — UNITED KINGDOM

A5

28TH IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM

This symposium, organized 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

Canadensys Aerospace Corporation — CANADA

Maria Antonietta Perino

Thales Alenia Space Italia — ITALY

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

Avalon Space — CANADA

Greg Chavers

NASA MSFC — UNITED STATES

Rapporteurs

Marc Haese

DLR, German Aerospace Center — GERMANY

Henrik Petersson

Swedish Space Corporation (SSC) — SWEDEN

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

Thales Alenia Space Italia — ITALY

Kathy Laurini

Osare Space Consulting Group — UNITED STATES

Rapporteur

Norbert Frischaut

TU Graz — AUSTRIA

A5.3

B3.6

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

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

Pierre-Alexis Joumel

Airbus Defence and Space — GERMANY

Mark Hempzell

The British Interplanetary Society — UNITED KINGDOM

	Rapporteur	
	Juergen Schlutz <i>European Space Agency (ESA) — GERMANY</i>	Scott Ritter <i>International Space University (ISU) — FRANCE</i>
A5.4	Deep Space Habitats and Resources This session will focus on the habitability aspects for Moon and Mars outposts and bases and to sustain human deep space exploration missions and the needed resources, exploring technical solutions like greenhouses, plant-growth in space, harvesting water from the Moon and Mars regolith.	
	Co-Chairs	
	Anna Barbara Imhof <i>Liquifer Systems Group (LSG) — AUSTRIA</i>	Maria Antonietta Perino <i>Thales Alenia Space Italia — ITALY</i>
	Rapporteurs	
	Sandra Haeuplik-Meusburger <i>TU Wien — AUSTRIA</i>	Olga Bannova <i>University of Houston — UNITED STATES</i>
A5.IP	Interactive Presentations - 28TH IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Human Exploration of the Solar System addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the A Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.	
	Co-Chairs	
	Christian Sallaberger <i>Canadensys Aerospace Corporation — CANADA</i>	Maria Antonietta Perino <i>Thales Alenia Space Italia — ITALY</i>
A6	23RD IAA SYMPOSIUM ON SPACE DEBRIS The Symposium will address the complete spectrum of issues associated to space debris, including orbital sustainability and operations in debris dominated environment. It will cover every aspect of Space Environment Management (SEM) including Mitigation and Remediation measures, Space Surveillance and Tracking (SST), Space Situational Awareness (SSA), Space Traffic Management (STM), including all aspects of measurements, modelling, risk assessment in space and on the ground, re-entry, hypervelocity impacts and protection, mitigation and standards, post-mission disposal, remediation, debris removal, Space Surveillance, collision avoidance as well as non-technical topics associated to space debris dominated environment.	
	Coordinators	
	Christophe Bonnal <i>European Conference for Aero-Space Sciences (EUCASS) — FRANCE</i>	Mark A. Skinner <i>The Aerospace Corporation — UNITED STATES</i>
		Pierre Omaly <i>CNES — FRANCE</i>
A6.1	Space Debris Detection, Tracking and Characterization - SST This session will address every aspect of SST (Space Surveillance and Tracking), advanced ground and space-based measurement techniques, relating processing methods, and results of space debris characterization.	
	Co-Chairs	
	Mark A. Skinner <i>The Aerospace Corporation — UNITED STATES</i>	Fabrizio Piergentili <i>Sapienza University of Rome — ITALY</i>
		Rapporteur
		Thomas Schildknecht <i>SwissSpace Association — SWITZERLAND</i>
A6.2	Modelling and Risk Analysis This session will address the characterization 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 collision avoidance.	
	Co-Chairs	
	Carmen Pardini <i>ISTI-CNR — ITALY</i>	Dan Oltrogge <i>COMSPOC Corporation — UNITED STATES</i>
	Rapporteurs	
	Marlon Sorge <i>The Aerospace Corporation — UNITED STATES</i>	Noelia Sanchez Ortiz <i>Arribes Enlghtenment — SPAIN</i>
A6.3	Impact-Induced Mission Effects and Risk Assessments This session addresses disruptions of spacecraft operations induced by hypervelocity impacts including spacecraft anomalies, perturbation of operations, component failures up to mission loss, and spacecraft fragmentations. It includes risk assessments for impact vulnerability studies and corresponding system tools. Further topics are spacecraft impact protection and shielding studies, laboratory impact experiments, numerical simulations, and on-board diagnostics to characterize impacts such as impact sensors, accelerometers, etc.	
	Co-Chairs	
	Zizheng Gong <i>Beijing Institute of Spacecraft Environment Engineering, China Academy of Space Technology (CAST) — CHINA</i>	Ysolde Prevèreaud <i>ONERA - The French Aerospace Lab — FRANCE</i>
		Rapporteur
		Yukihito Kitazawa <i>Japan Aerospace Exploration Agency (JAXA)— JAPAN</i>
A6.4	Mitigation - Tools, Techniques and Challenges - SEM This session will focus on the Mitigation part of the SEM (Space Environment Monitoring), implementation of debris prevention and reduction measures; vehicle passive protection at system level including end of life strategies and tools to verify the efficiency of the implemented measures. The session will also address practical experiences in the planning and verification of measures and issues and lessons learnt in the actual execution of mitigation actions.	
	Co-Chairs	
	Stijn Lemmens <i>European Space Agency (ESA) — GERMANY</i>	Satomi Kawamoto <i>Japan Aerospace Exploration Agency (JAXA) — JAPAN</i>
		Rapporteur
		Pierre Omaly <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i>
A6.5	Post Mission Disposal and Space Debris Removal 1 - SEM This session will focus on the Remediation part of the SEM, dealing with ADR (Active Debris Removal), JCA (Just in time Collision Avoidance), LDTM (Large Debris Traffic Management) among solutions. It will address post-mission disposal and active removal techniques "ground and space based", review potential solutions and identify implementation difficulties.	
	Co-Chairs	
	Nicolas Bérend <i>ONERA - The French Aerospace Lab — FRANCE</i>	Roberto Opromolla <i>University of Naples "Federico II" — ITALY</i>
		Rapporteur
		Balbir Singh <i>Manipal Institute of Technology, Manipal Academy of Higher Education — INDIA</i>

A6.6

Post Mission Disposal and Space Debris Removal 2 - SEM

This session will focus on the Remediation part of the SEM, dealing with ADR (Active Debris Removal), JCA (Just in time Collision Avoidance), LDTM (Large Debris Traffic Management) among solutions. It will address post-mission disposal and active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

Co-Chairs

Dmitriy Grishko
Bauman Moscow State Technical University —
RUSSIAN FEDERATION

Jason Forshaw
Astroscale Ltd — UNITED KINGDOM

Rapporteurs

Marko Jankovic
Airbus Defence and Space — GERMANY

J.-C. Liou
National Aeronautics and Space Administration (NASA) —
UNITED STATES

A6.7

Operations in Space Debris Environment, Situational Awareness - SSA

This session will address the multiple aspects associated to STM (Space Traffic Management) and SSA (Space Situational Awareness) including safe operations in space dealing with Space Debris, operational observations, orbit determination, catalogue build-up and maintenance, data aggregation from different sources, relevant data exchanges standards and conjunction analyses.

Co-Chairs

A. K. Anil Kumar
Indian Space Research Organization (ISRO) — INDIA

Andrew Monham
EUMETSAT — GERMANY

Rapporteurs

Melissa Zemoura
Centre National d'Etudes Spatiales (CNES) — FRENCH
GUIANA

Rachit Bhatia
West Virginia University — UNITED STATES

Laurent Francillout
Centre National d'Etudes Spatiales (CNES) — FRANCE

A6.8

E9.1

Policy, Legal, Institutional, Economic and Security Aspects of Debris Mitigation, Debris Remediation and STM

This session will address all non-technical aspects of debris mitigation, debris remediation and STM. Papers may focus on aspects of responsibility, liability and registration, on the role of bodies such as UNCOPUOS or IADC, as well as on insurance, financial incentives and funding. In addition, security-related aspects and the role of international cooperation in addressing these issues may be considered.

Co-Chairs

David Spencer
The Aerospace Corporation — UNITED STATES

Serge Plattard
University College London (UCL) — UNITED KINGDOM

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

Andrea Capurso

LUISS Guido Carli University — ITALY

Rapporteur

Victoria Samson
Secure World Foundation — UNITED STATES

Rapporteur

Emma Kerr
Deimos Space UK Ltd — UNITED KINGDOM

A6.9

Orbit Determination and Propagation - SST

This session will address every aspect of orbit determination coming from the SST (Space Surveillance and Tracking), related to assessment of raw and derived data accuracy, optical measurements processing and modelling and risk analysis of space debris.

Co-Chairs

Darren McKnight
LeoLabs — UNITED STATES

Paolo Marzioli
Sapienza University of Rome — ITALY

Rapporteurs

Juan Carlos Dolado Perez
Centre National d'Etudes Spatiales (CNES) — FRANCE

Jan Siminski
European Space Agency (ESA) — GERMANY

A6.10

E9.4

Space Carrying Capacity Assessment and Allocation

Space in Earth's orbit has a finite capacity and, due to the boosting of space activities, the space orbital system is slowly overloading. Assessing and managing orbital carrying capacity requires an international and interdisciplinary approach that embrace space engineering, policy, and economy. This session covers the theoretical approaches, computational tools, and techniques to measure space environment thresholds and overall carrying capacity of space. It will discuss proxies for monitoring boundaries for the maximum capacity, such as space debris metrics. The application of these metrics to space debris evolution scenarios and their role in the definition of debris mitigation guidelines will be discussed. This session will also address the legal and policy implications, including relevance to regulation and licensing, the needed steps to enforce the implementation of capacity thresholds evaluation, and correlation with space debris mitigation measures. Finally, economic incentives or payments systems for ensuring sustainable space activities will be discussed. This is a frontier topic in the space debris field: modelling and simulations of the debris environment are applied to the definition of indicators for the management of the space traffic and links with space law and policy. This topic is one example of Space Science Diplomacy.

Co-Chairs

Camilla Colombo
Politecnico di Milano — ITALY

Didier Alary
International Academy of Astronautics (IAA) — FRANCE

Rapporteur

Peter Martinez
Secure World Foundation — UNITED STATES

Alessandro Rossi
IFAC-CNR — ITALY

A6.IP

Interactive Presentations - 23RD IAA SYMPOSIUM ON SPACE DEBRIS

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

Co-Chairs

Marko Jankovic
Airbus Defence and Space — GERMANY

Paolo Marzioli
Sapienza University of Rome — ITALY

Roberto Opromolla
University of Naples "Federico II" — ITALY

Rapporteur

Melissa Zemoura
Centre National d'Etudes Spatiales (CNES) — FRENCH
GUIANA

Emma Kerr
Defence Science and Technology Laboratory (DSTL) —
UNITED KINGDOM

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

A7 IAF SYMPOSIUM ON ONGOING AND NEAR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS

The symposium, organized by the International Astronautical Federation (IAF), invites leaders from the science, space industry, and space-agencies community to share information, insights, and planning for ongoing and near future space missions in exoplanets, astronomy, space physics, fundamental physics, and outer-solar-system planetary science. The Symposium will comprise both invited talks and contributed papers in these five areas of scientific endeavour. For each, the Symposium solicits discussion of phenomena coming within our reach over the next decades; their enabling measurement and system technologies, including significant progress made by industry and research laboratories; mission concepts to implement such investigations, and corporate and space agency strategies to prioritize and invest in bringing them into reality.

Coordinators**Andrew Court**

TNO — THE NETHERLANDS

Alessandra Di Cecco

Agenzia Spaziale Italiana (ASI) — ITALY

A7.1 Space Astronomy Missions, Strategies and Plans

The session comprises invited talks by international space-agency division directors about their long-term views, priorities, and plans to implement developments and missions for the four fields (exoplanets, space astronomy, space physics and fundamental physics). The mission scope ranges from flagship-class, large-class, medium-class, and small-class to smallsat platforms. The programme scope includes status updates on current programmes, near-term investment priorities, and long-range directions, including the relationship to community and guiding research panels.

Co-Chairs**Eric Wille**

ESA — THE NETHERLANDS

Alessandra Di Cecco

Agenzia Spaziale Italiana (ASI) — ITALY

Rapporteur**Andrew Court**

TNO — THE NETHERLANDS

A7.2 Science Goals and Drivers for Future Exoplanet, Space Astronomy and Space Physics

The session has invited and contributed talks about scientific motivations, goals, opportunities, and needs in the four fields (exoplanets, space astronomy, space physics, and fundamental physics). New directions for measurements that are being opened by emergent results and newly understood phenomena will be explored, and science roadmaps to pursue them will be discussed.

Co-Chair**Pietro Ubertini**

INAF — ITALY

Maria Cristina Falvella

Italian Space Agency (ASI) — ITALY

Rapporteur**Alessandra Di Cecco**

Agenzia Spaziale Italiana (ASI) — ITALY

A7.3 Technology Needs for Future Missions, Systems, and Instruments

The session includes invited and contributed talks about the technology challenges and plans required to enable breakthrough science objectives in: exoplanet detection and characterization; astronomy throughout the electromagnetic spectrum and using gravitational waves; space physics including fractional gravity regimes and heliophysics; and fundamental physics including relativity. Topical focus includes measurement techniques, data types, performance requirements, instrument designs, mission concepts and systems, and associated technology developments.

Co-Chairs**Eric Wille**

ESA — THE NETHERLANDS

Andrew Court

TNO — THE NETHERLANDS

Rapporteur**Maria Cristina Falvella**

Italian Space Agency (ASI) — ITALY

A7.IP Interactive Presentations - IAF SYMPOSIUM ON FUTURE SPACE ASTRONOMY AND SPACE PHYSICS

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

Co-Chairs**Andrew Court**

TNO — THE NETHERLANDS

Alessandra Di Cecco

Agenzia Spaziale Italiana (ASI) — ITALY

Category

B

APPLICATIONS AND OPERATIONS

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

- B1 IAF EARTH OBSERVATION SYMPOSIUM**
- B2 IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM**
- B3 IAF HUMAN SPACEFLIGHT SYMPOSIUM**
- B4 32ND IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS**
- B5 IAF SYMPOSIUM ON INTEGRATED APPLICATIONS**
- B6 IAF SPACE OPERATIONS SYMPOSIUM**

Category coordinated by Igor V. Sorokin, *S.P. Korolev Rocket and Space Corporation Energia, RUSSIAN FEDERATION*

B1 IAF EARTH OBSERVATION SYMPOSIUM

The Earth Observation Symposium, organized by the International Astronautical Federation (IAF), covers all aspects of Earth observations from space, including observations related to the Earth's environment, services to meet societal needs, and economic benefit. Aspects include programs, constellations, missions, and systems; microwave and optical sensors; land, oceanographic, atmospheric, geological, geophysical, societal, security, economic, and business domains; the associated science, ground data-processing, applications, and services; through all life cycle phases from research and technology through, planning, conceptualization, development, commissioning, operations, retirement and historical retrospective. Participation is encouraged from all sectors including institutional (including Government, Agencies, multi-lateral, non-Governmental, Academic) and Commercial.

Coordinators**Luís Ferreira**

Airbus Defence and Space — GERMANY

Annamaria Nassisi

Thales Alenia Space Italia — ITALY

Shimrit Maman

Ben-Gurion University of the Negev — ISRAEL

B1.1 International Ventures in Earth Observations

Focus is on innovation and lessons learned in the planning, governance, business models, management and how organize and operate to achieve successful program outcomes for space-based Earth Observations missions (including single and constellation missions, one time and sustained observations, programs, and projects), systems (including instruments, spacecraft, communications, processing, archive, distribution, and calibration / validation systems), and applications (user driven value-added products and services for societal and business benefit, and science and technology advancement) that are aimed at international markets, application, or leverage international cooperation to achieve their objectives. All sources of missions are sought including governmental / agency programs, public / private partnerships, commercial, academic / non-governmental / non-commercial. Papers are encouraged which provide plans, status, and experience (including challenges and risks) in organizing, creating, and managing Earth Observations international ventures to better meet societal needs including addressing climate change mitigation, earth system health, underdeveloped and emerging space nations capacity building, entrepreneurial and commercial development, governmental policy, regulation and planning, disaster mitigation and response, news and media, and security. All forms of business structure, cooperation, collaboration, partnership are of interest. Papers with technical focus should be submitted to B1.2.

	<p>Co-Chairs</p> <p>Charles Wooldridge <i>National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES</i></p> <p>Mukund Kadursrinivas Rao <i>Independent consultant — INDIA</i></p> <p>Rapporteurs</p> <p>Kyriaki Minoglou <i>European Space Agency (ESA) — THE NETHERLANDS</i></p> <p>José Gavira Izquierdo <i>European Space Agency (ESA) — THE NETHERLANDS</i></p>
B1.2	<p>Earth Observation Systems</p> <p>Focus is on innovative and new concept system solutions for Earth observations and how well they perform to meet user / mission objectives. Functional and technical description are encouraged. Papers covering all phases of the life cycle are requested including for systems envisioned, planned, recently launched, ongoing, and historical for single spacecraft missions and constellations, and for all categories of purposes including for scientific research, experimental demonstration, and operational / commercial Earth observation. All sources of missions are sought including governmental / agency programs, public / private partnerships, commercial, academic / non-governmental / non-commercial. Desired papers convey design features, technical performance, status of technical execution (concept study, concept design, preliminary design, detailed design, development, operations, retirement, historical), and technical challenges of the associated program, and highlighting unique / unprecedented features and the technical value they provide. Papers with a management / organization / programmatic / business model / cooperation focus should be submitted to B1.1.</p> <p>Co-Chairs</p> <p>Annamaria Nassisi <i>Thales Alenia Space Italia — ITALY</i></p> <p>Timo Stuffer <i>OHB System AG — GERMANY</i></p> <p>Rapporteurs</p> <p>Cristian Bank <i>EUMETSAT — GERMANY</i></p> <p>Erick Lansard <i>Satellite Research Center, Nanyang Technological University (NTU) — SINGAPORE, REPUBLIC OF</i></p>
B1.3	<p>Earth Observation Sensors and Technology</p> <p>First focus is on Earth Observation sensors and instruments including future concepts being proposed, developed, tested, or calibrated, and those in operations for all aspects of Earth observation. Driven by user and scientific requirements, particular emphasis is on instrument systems that make innovative measurements and deliver improved performance for science, operational or commercial applications. Second focus is on technologies for instruments, spacecraft and missions which enable innovation and advancement in sensor observations performance and capability. Capability advancement could be in coverage, resolution, onboard features such as processing, autonomy, adjustability/ adaptability, user commanding, or other technology that provides or is intended to provide improved utility to targeted and other users.</p> <p>Co-Chairs</p> <p>Andrew Court <i>TNO — THE NETHERLANDS</i></p> <p>Kate Becker <i>National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES</i></p> <p>Rapporteur</p> <p>Camilo Andres Reyes <i>Space Generation Advisory Council (SGAC) — COLOMBIA</i></p>
B1.4	<p>Earth Observation Data Systems and Technology</p> <p>The focus is on the development and operations of Earth Observation-related data processing systems. The emphasis of the session is on the challenges of emerging information and web-based technology (e.g. Big Data, Cloud-based operations, internet of things, crowd sourcing) for acquisition, communication, processing, dissemination and archiving of data. The session also covers innovative methods for making data analysis ready, the extraction of information from these resulting large data sets (e.g. Machine learning and artificial intelligence) and methods for making the information available timely to decision makers. This session also includes the evolving data processing infrastructure like federated Cloud systems and digital twin.</p> <p>Co-Chairs</p> <p>Ana-Mia Louw <i>Simera Sense — SOUTH AFRICA</i></p> <p>James Graf <i>Jet Propulsion Laboratory — UNITED STATES</i></p> <p>Rapporteurs</p> <p>Frank Webb <i>Jet Propulsion Laboratory - California Institute of Technology — UNITED STATES</i></p> <p>Agnieszka Lukaszczyk <i>Planet Labs Inc. — The Netherlands</i></p>
B1.5	<p>Earth Observation Societal and Economic Applications, Challenges and Benefits</p> <p>The focus of the session is on generating information and delivering applications and services using Earth Observations data for meeting sustainable development challenges, addressing socio-economic benefits, and delivering commercial services. Presentation of analyses, methods, algorithms, processors, case studies and results from developing and operating applications and services (e.g., including consideration of investment cost, economic return, and societal benefits, especially leveraging innovative approaches), are encouraged. Optimized application satellite constellations, that emphasize the socio-economic aspects of these collective systems rather than focusing on individual techniques or single satellites are also encouraged.</p> <p>Co-Chairs</p> <p>Na Yao <i>Qian Xuesen Laboratory of Space Technology, China Academy of Space Technology (CAST) — CHINA</i></p> <p>Luis Ferreira <i>Airbus Defence and Space — GERMANY</i></p> <p>Rapporteurs</p> <p>Masami Onoda <i>Japan Aerospace Exploration Agency (JAXA) — UNITED STATES</i></p> <p>Michael Kern <i>ESA — FRANCE</i></p>
B1.6	<p>Nowhere to Hide – The impacts on society of Ubiquitous Earth Coverage</p> <p>The advent of large constellations of earth observing satellites provides frequent detailed coverage of human actions and infrastructure at high spatial and temporal resolution, uncovering a wide range of human and natural activity not as readily measured and observed in the past. It has opened new avenues for news coverage, regulatory compliance, market analysis, assessment of infrastructure health, mitigation / recovery from disasters, and influence on security. This session focuses on the dramatic new influences of ubiquitous earth coverage for human / societal interest applications such as news, security, business and marketing, policy, regulation, and privacy. Papers are encouraged addressing means, applications and impacts of this new era of ubiquitous coverage of human actions and infrastructure from space.</p> <p>Co-Chairs</p> <p>Krystal Azelton <i>Secure World Foundation — UNITED STATES</i></p> <p>Mariel Borowitz <i>Georgia Institute of Technology — UNITED STATES</i></p> <p>Chen Xiaoli <i>Beijing Institute of Space Mechanics & Electricity, China Academy of Space Technology (CAST) — CHINA</i></p>
B1.7	<p>Earth Observations to address Earth's Environment and Climate Challenges</p> <p>The IPCC reports on climate change articulate the major global environmental challenges that require vast and sustained measurement and information systems to monitor key climate parameters and inform decision makers and enable potential mitigations. Global governmental agencies, commercial and public/private partnerships are investing in creating systems and applications for environmental monitoring and prediction, and climate monitoring and change mitigation. This session focuses on the latest major findings in climate research and the systems being used to address the climate challenges, Earth Observations science, weather, oceanography, and land monitoring. Presentation of algorithms, processing chains and services especially leveraging innovative approaches, are encouraged. Optimized application satellite constellations, which do not focus on individual techniques or single satellites and describe the environmental / climate aspects of these collective systems, are also encouraged.</p>

Co-Chairs

Ole Morten Olsen
Norwegian Space Agency (NOSA) — NORWAY

Shimrit Maman
Ben-Gurion University of the Negev — ISRAEL

Rapporteur

Patrick Castillan
Centre National d'Etudes Spatiales (CNES) — FRANCE

Pilar Zamora
Colombian Space Agency — COLOMBIA

B1.IP

Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM

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

Co-Chairs

Oana van der Togt
Netherlands Aerospace Centre (NLR) — THE NETHERLANDS

Harry A. Cikanek
National Oceanic and Atmospheric Administration (NOAA) — UNITED STATES

Bernard Foing
ILEWG "EuroMoonMars" — THE NETHERLANDS

Parag Vaze
National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES

Masami Onoda
Japan Aerospace Exploration Agency (JAXA) — UNITED STATES

B2

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM

This symposium, organized by the International Astronautical Federation (IAF), examines developments in space-based systems, services, applications, and technologies as they relate to communication and navigation. Communication topics include fixed, broadcast, high-throughput, mobile, optical, and quantum communications. Navigation topics include position, velocity, and time determination and tracking for both relative and inertial reference frames. The symposium addresses geostationary, non-geostationary, and extra-terrestrial systems and constellations. The topics of IoT and M2M as they relate to communication and navigation are also applicable to this symposium.

Coordinators

Laszlo Bacsardi
Hungarian Astronautical Society (MANT) — HUNGARY

Morio Toyoshima
National Institute of Information and Communications Technology (NICT) — JAPAN

B2.1

Space-based PNT (Position, Navigation, Timing) Architectures, Applications, and Services

This session is focused on advances in space-based navigation systems, including the existing global systems (Beidou, Galileo, GLONASS, GPS) and regional systems (EGNOS, IRNSS, QZSS, WAAS), as well as proposed and emerging new space-based systems. The session also addresses advances in the services and applications of those systems for position, velocity, and time determination and tracking, and integrity assurance on Earth, Moon, and potentially other bodies of the solar system.

Co-Chairs

Giovanni B. Palmerini
Sapienza University of Rome — ITALY

Raj Thilak Rajan
Delft University of Technology (TU Delft) — THE NETHERLANDS

Rapporteur

Rania Toukebri
Space Generation Advisory Council (SGAC) — GERMANY

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

B2.2

Space-based PNT (Position, Navigation, Timing) Sensors and Systems

This session is focused on advances in technology applicable to space-based navigation systems. Technologies include hardware or software necessary for the entire navigation system (spacecraft, monitor and control system, end-user equipment) for GNSS and alternative navigation satellite architectures (such as LEO constellations), ground and space-based navigation user equipment, sensor fusion algorithms, frequency and time transfer standards, crosslink ranging, precise orbit & satellite clock error determination, etc. Technologies should be applicable to position, velocity, and time determination and tracking, and integrity assurance on Earth, Moon, and other off-Earth platforms.

Co-Chairs

Sanat K Biswas
IIIT Delhi — INDIA

Peter Buist
European Union Agency for the Space Programme (EUSPA) — THE NETHERLANDS

Rapporteur

Chris Rizzo
University of New South Wales — AUSTRALIA

B2.3

Advance Higher Throughput Communications for GEO and LEO satellites

This session is focused on advanced higher throughput communications and networks for LEO constellations, GEO, MEO and Molnya to improve performances (increased capacity, low latency and reduced cost) including all aspects of space communications, services, architecture and infrastructure: fixed, mobile and broadcast services; High-Throughput Satellite (HTS); Very-High Throughput Satellites (VHTS); Ultra-High Throughput Satellites (UHTS); Software Defined Satellite (SDS); 5G integration into satellite networks; multiple access; Ku- and Ka-band, Q/V/W/E bands and higher frequencies; VSAT/ESIM and broadcasting/radio/television and internet services, including video to users; and Artificial Intelligence (AI)/Machine Learning (ML) related technologies.

Co-Chairs

Norbert Frischauf
TU Graz — AUSTRIA

Dunay Badirkhanov
Azercosmos, Space Agency of Republic of Azerbaijan — AZERBAIJAN

Co-Chairs

Debra Emmons
The Aerospace Corporation — UNITED STATES

Otto Koudelka
Graz University of Technology (TU Graz) — AUSTRIA

B2.4

Space-based Optical and Quantum Communications

This session is focused on optical and quantum communications in space including all aspects of space-based optical and quantum communications: in-orbit, on-ground demonstrations and results; present and future scenarios; next generation systems and applications; terrestrial-based systems; small satellites; ranging technology with optical communications; imaging technology for optical communications; optical devices; optoelectronic subsystems and components; laboratory demonstration hardware; atmospheric propagation and modeling, transmission effects; compensation techniques; site-diversity techniques; modulation formats; trade-offs between optical and microwave (RF) systems; Quantum Key Distribution (QKD); advances in quantum communications; quantum internet; and atomic clocks.

Co-Chairs

Laszlo Bacsardi
Hungarian Astronautical Society (MANT) — HUNGARY

Kevin Shortt
Airbus Defence & Space — GERMANY

Rapporteur

Nader Alagha
ESA — THE NETHERLANDS

B2.5

Extra-Terrestrial and Interplanetary Communications, and Regulations

This session focuses on near-Earth, deep-space and extra-terrestrial communications with particular emphasis on unique concepts, techniques and technologies including all aspects of space communications, services, architecture and infrastructure: ARTEMIS related missions; Earth orbiting, lunar, and planetary missions; flight and ground demonstrations and results; present and future scenarios; next generation systems and applications; science missions; terrestrial-based systems; small satellites; near-Earth and planet observation satellites. It also includes spectrum interferences, spectrum allocations and regulations issues, and impacts of Space Debris and optical pollution to satellite communications for new systems/services, systems modeling; and review/survey papers.

Co-Chairs

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

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

Rapporteur

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

B2.6

Cubesat, Internet of Things, and Mobile Direct Communications

This session is focused on small satellite, IoT and mobile communication services that can communicate directly with 3GPP mobile phone terminals including all aspects of space communications, services, architecture and infrastructure: Narrow Band (NB)-IoT, 3GPP IoT terminals; LoRa IoT terminals; Low Power Wide Area (LPWA); Non-Terrestrial Network (NTN); cube-, pico-, nano-, micro-satellites; High Altitude Platform Station (HAPS); aircraft control; in-orbit, on-ground demonstrations and results; present and future scenarios; next generation systems and applications; terrestrial-based systems; small satellites; Earth observation satellites; devices; subsystems and components; laboratory demonstration hardware; site-diversity techniques; modulation formats. Both terrestrial and satellite networks will be available at the same terminal, and coverage is expected to expand significantly.

Co-Chair

Debra Emmons
The Aerospace Corporation — UNITED STATES

Giuseppe D'Amore
Agenzia Spaziale Italiana (ASI) — ITALY

Co-Chair

Amane Miura
National Institute of Information and Communications
Technology (NICT) — JAPAN

Enrique Pacheco Cabrera
Incomspace — MEXICO

B2.7

Advances in Space-based Network and Communication Technologies

This session is focused on all aspects of advanced spacecraft and Earth station communications technologies for space-based communications, as applied to both existing and future systems. It addresses technologies ranging from those used in nano satellites to those applicable to large, high throughput satellites as well as to extraterrestrial space communications. It covers – among others – communications subsystem design, modulation and coding, propagation, power amplifiers, digital payload technologies including onboard processing and adaptive transmit technologies, inter-satellite link technology, antennas including phased array, plasma and microstrip patch antenna array design, and all other technology relevant to space communications.

Co-Chairs

Enrique Pacheco Cabrera
Incomspace — MEXICO

Eva Fernandez Rodriguez
Netherlands Organisation for Applied Scientific Research
(TNO) — SPAIN

Rapporteur

Elemer Bertenyi
Canadian Aeronautics and Space Institute — CANADA

B2.8 GTS.3

Space Communications and Navigation Global Technical Session

This is a hybrid (virtual and in person) session that targets a global audience where developments in a wide range of satellite communication and space-based PNT (position, navigation, timing) topics are presented and discussed. Communication topics include fixed, mobile, broadcasting, and data relay technologies and services. Space-based PNT topics include sensors, systems, architectures, applications, and services. Topics ranging from Earth orbit to interplanetary space can be addressed. Authors are welcome to either present their work in person at the conference or remotely via the IAF's online platform. This session offers authors the unique opportunity to directly engage an audience beyond just the on-site attendees and is co-sponsored by the Space Communications and Navigation Committee and the Workforce Development/Young Professionals Programme Committee.

Co-Chairs

Joshua Critchley-Marrows
The University of Sydney — AUSTRALIA

Eric Wille
ESA — THE NETHERLANDS

Rapporteurs

Behnoosh Meskoob
École de technologie supérieure — CANADA

Manish Saxena
Indian Space Research Organization (ISRO) — INDIA

B2.1P

Interactive Presentations - IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM

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

Co-Chairs

Laszlo Bacsardi
Hungarian Astronautical Society (MANT) —
HUNGARY

Morio Toyoshima
National Institute of Information and Communications
Technology (NICT) — JAPAN

Behnoosh Meskoob
École de technologie supérieure — CANADA

Rapporteurs

Vera Pinto Gomes
European Commission — BELGIUM

Manish Saxena
Indian Space Research Organization (ISRO) — INDIA

B3

IAF HUMAN SPACEFLIGHT SYMPOSIUM

The symposium, organized by the International Astronautical Federation (IAF), invites papers on all aspects of on-going and planned human spaceflight including the design, development, operations, utilization and future plans of space missions involving humans. The scope covers past, present and planned space missions and programmes in LEO and beyond, both governmental and private. The Human Spaceflight Symposium will also feature discussions on preparations for the launch of new human spaceflight capabilities and collaborative efforts of human and robotic systems and technologies.

Coordinators

Kevin D. Foley
The Boeing Company — UNITED STATES

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

Peter Batenburg
Netherlands Space Society (NVR) — THE NETHERLANDS

B3.1

Governmental Human Spaceflight Programmes (Overview)

The session provides the forum for updates and annual "Overview" presentations on present and evolving governmental Human Spaceflight programmes. Each year, the session will focus on specific themes dealing with human spaceflight exploration. These will be selected by the session chairs based on the received abstracts. The session will accept manuscripts from any organization (agencies, industries, research centers, academia, etc.) dealing with international, Governmental human space programmes initiatives. The range of topic to be addressed in this session include mission to low Earth orbit (LEO) and those beyond Earth orbit (BEO) and include orbital systems, crew and cargo transportation systems, as well as surface systems and operations on the Moon. The format of the session (e.g. panel, pitching presentations, keynote speech) will be a result of such a selection.

	<p>Co-Chairs</p> <p>Robyn Gatens <i>National Aeronautics and Space Administration (NASA)</i> — UNITED STATES</p> <p>Juergen Schlutz <i>European Space Agency (ESA)</i> — GERMANY</p> <p>Rapporteur Antonio Fortunato <i>European Space Agency (ESA)</i> — GERMANY</p>	
B3.2	<p>Commercial Human Spaceflight Programmes</p> <p>This session provides a forum for papers describing commercial human orbital and sub-orbital endeavours including orbital space stations, commercial transportation systems, services, operation and uses, as well as human-tended space station platforms. This session also accepts papers on commercial human spaceflight activities in cis-lunar space and lunar surface operations. Topics include the status of development, testing, operations and utilization; the architecture and performance of various systems; orbital infrastructure development; commercial operations and utilization projects, market and economic development activity, and other pertinent areas of commercial human spaceflight. Examples of activity include but are not limited to commercial utilization and other commercial activity on the International Space Station, international capability for commercial transportation, activities planned for future human spaceflight platforms either in low Earth orbit (LEO) or beyond Earth orbit (BEO) and other applications are appropriate for this session.</p> <p>Co-Chairs</p> <p>Sergey K. Shaevich <i>Khrunichev State Research & Production Space Center</i> — RUSSIAN FEDERATION</p> <p>Kevin D. Foley <i>The Boeing Company</i> — UNITED STATES</p> <p>Michael E. Lopex Alegria <i>MLA Space, LLC</i> — UNITED STATES</p>	
B3.3	<p>Advancements in Human Space Habitation for Orbital, Transit, and Surface Environments</p> <p>This session features papers that highlight the latest advancements in human space habitation systems, covering orbital, transit, and planetary surface applications. Technical papers will present innovative technological advancements and architectural strategies that are crucial for ensuring the safety, sustainability, and well-being of crews during extended missions beyond Earth. Topics include achievements, technologies, design concepts, and future prospects for crewed and crew-tended space habitats, emphasizing all aspects of their utilization. Additionally, discussions will cover terrestrial-based test and analog facilities pivotal in advancing the development of future space habitation outposts.</p> <p>Co-Chairs</p> <p>Eleanor Morgan <i>Lockheed Martin Space Systems</i> — UNITED STATES</p> <p>Kavya K. Manyapu <i>NASA</i> — UNITED STATES</p> <p>Thomas A.E. Andersen <i>Danish Aerospace Company A/S</i> — DENMARK</p>	
B3.4 B6.4	<p>Flight & Ground Operations aspects of Human Spaceflight - Joint Session of the IAF Human Spaceflight and IAF Space Operations Symposia</p> <p>This session addresses systems, advanced concepts, key challenges and their solutions related to flight and ground operations within governmental and commercial human spaceflight. Topics include among others; cutting-edge operational tools, solutions, efficient cost reduction measures, improved operational ground facilities or infrastructure, enhanced logistics concepts as well as new approaches for mission planning, ground transportation, and sustainment.</p> <p>Co-Chairs</p> <p>Dieter Sabath <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)</i> — GERMANY</p> <p>Annamaria Piras <i>Thales Alenia Space Italia</i> — ITALY</p> <p>Rapporteur Jérôme Campan <i>European Space Agency (ESA)</i> — GERMANY</p>	
B3.5	<p>Astronaut Training, Accommodation, and Operations in Space</p> <p>This session begins with an Astronaut Roundtable where an international group of astronauts from the various programmes will discuss their experiences in a roundtable format. There will be an extended Question and Answer period of interaction with the audience. This session concentrates on all aspects of spaceflight that are unique to the presence of 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.</p> <p>Co-Chairs</p> <p>Igor V. Sorokin <i>S.P. Korolev Rocket and Space Corporation Energia</i> — RUSSIAN FEDERATION</p> <p>Alan T. DeLuna <i>American Astronautical Society (AAS)</i> — UNITED STATES</p> <p>Rapporteur Andrea Boyd <i>European Space Agency (ESA)</i> — GERMANY</p>	
B3.6 A5.3	<p>Human and Robotic Partnerships in Exploration - Joint session of the IAF Human Spaceflight and IAF Exploration Symposia</p> <p>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.</p> <p>Co-Chairs</p> <p>Mark Hemsell <i>The British Interplanetary Society</i> — UNITED KINGDOM</p> <p>Rapporteurs</p> <p>Jan Marius Bach <i>DLR (German Aerospace Center)</i> — GERMANY</p> <p>Scott Ritter <i>International Space University (ISU)</i> — FRANCE</p>	
B3.7	<p>Advanced Systems, Technologies, and Innovations for Human Spaceflight</p> <p>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 potential future subsystems, technologies, innovations, logistics, processes, procedures, etc. Papers are also encouraged that address key factors in enabling innovation and new system insertion in human space flight, including reliability, availability, first time use, learning by doing, early testing and integration results, and prototyping. Topics which enable or significantly improve future human space mission objectives are of interest including for 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.</p> <p>Co-Chairs</p> <p>Mauro Augelli <i>UK Space Agency</i> — UNITED KINGDOM</p> <p>Sébastien Barde <i>Centre National d'Etudes Spatiales (CNES)</i> — FRANCE</p> <p>Rapporteur Gi-Hyuk Choi <i>Korean Aerospace Research Institute</i> — KOREA, REPUBLIC OF</p>	
B3.8	<p>Human Space & Exploration</p> <p>This session addresses current and future missions, applications and preparatory plans for human lunar and planetary exploration activities. The session covers human exploration of the Moon including its surface and cislunar space as well as Mars missions. Papers that delve into the programmatic and technical aspects of these activities are encouraged. Both national and international perspectives are invited as are emerging areas of commercial human exploration activities.</p> <p>Co-Chairs</p> <p>Dan King <i>MDA Corporation</i> — CANADA</p> <p>Joost van Tooren <i>ArianeGroup SAS</i> — FRANCE</p> <p>Rapporteur Joao Lousada <i>GMV Aerospace & Defence SAU</i> — GERMANY</p>	
B3.9 GTS.2	<p>Human Spaceflight Global Technical Session</p> <p>The Human Space Endeavours Global Technical Session is targeting individuals and organizations with the objective of sharing best practices, future projects, research and issues for the future of Human Space Endeavours. This is a Global session co-sponsored by the Human Space Endeavours Committee and the Workforce Development/Young Professionals Programme Committee.</p>	

	<p>Co-Chairs</p> <p>Guillaume Girard <i>Zero2infinity — SPAIN</i></p> <p>Andrea Jaime <i>Isar Aerospace Technologies GmbH — GERMANY</i></p> <p>Rapporteur</p> <p>Joao Lousada <i>GMV Aerospace & Defence SAU — GERMANY</i></p>
B3.IP	<p>Interactive Presentations - IAF HUMAN SPACEFLIGHT SYMPOSIUM</p> <p>This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Human Spaceflight addressed in the classic Sessions. The presentation will be displayed on digital screens in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the B Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.</p> <p>Co-Chairs</p> <p>Peter Batenburg <i>Netherlands Space Society (NVR) — THE NETHERLANDS</i></p> <p>Matej Poliacsek <i>Space Generation Advisory Council (SGAC) — SLOVAK REPUBLIC</i></p>
B4	<p>32ND IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS</p> <p>The International Academy of Astronautics (IAA) Symposium on Small Satellite Missions is focused on recent advances in small satellite class missions weighing much less than 1000kg, addressing needs in government, commerce, or academia. Papers should focus on how microsatellites, nanosatellites, CubeSats and small and “megaconstellations” amongst others enable valuable results for the mission end-user. Papers should benefit the wider smallsat community, and demonstrate a degree of ingenuity and innovation in small satellite utilization, design, manufacture and/or engineering. Papers can report on important lessons-learned, describe notable missions in the planning stages, or include topics that demonstrate the value of small satellites and their constellations, their applications. Sessions cover the role that small satellites can play in developing space nations, science, exploration, “NewSpace”, communications and Earth Observation. Sessions also cover cost-effective operations, affordable and reliable access to space through launch, and emerging and promising smallsat technologies and techniques.</p> <p>Coordinators</p> <p>Alex da Silva Curiel <i>Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM</i></p> <p>Jian Guo <i>Delft University of Technology (TU Delft) — THE NETHERLANDS</i></p> <p>Support</p> <p>Rhoda Shaller Hornstein <i>— UNITED STATES</i></p>
B4.1	<p>26TH Workshop on Small Satellite Programmes at the Service of Developing Countries</p> <p>This workshop is organized jointly by the United Nations Office for Outer Space Affairs (UNOOSA) and the International Academy of Astronautics (IAA). It shall review the needs 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 Africa, Middle-East, and Central Asia 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.</p> <p>Co-Chairs</p> <p>Sias Mostert <i>Space Commercial Services Holdings (Pty) Ltd — SOUTH AFRICA</i></p> <p>Nathalie Ricard <i>United Nations Office for Outer Space Affairs — AUSTRIA</i></p> <p>Taiwo Raphael Tejumola <i>International Space University — FRANCE</i></p> <p>Rapporteurs</p> <p>Danielle Wood <i>Massachusetts Institute of Technology (MIT) — UNITED STATES</i></p> <p>Pierre Molette <i>— FRANCE</i></p>
B4.2	<p>Small Space Science Missions</p> <p>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.</p> <p>Co-Chairs</p> <p>Larry Paxton <i>The Johns Hopkins University Applied Physics Laboratory — UNITED STATES</i></p> <p>Norbert M.K. Lemke <i>OHB System AG - Oberpfaffenhofen — GERMANY</i></p> <p>Rapporteurs</p> <p>Roberta Mugellesi-Dow <i>European Space Agency (ESA) — UNITED KINGDOM</i></p> <p>Oana van der Togt <i>Netherlands Aerospace Centre (NLR) — THE NETHERLANDS</i></p>
B4.3	<p>Small Satellite Operations</p> <p>This session covers the planning for, and execution of, cost-effective approaches for Small Satellite Operations, with emphasis on new missions, including constellations of small satellites, with new models of operation to reduce mission lifecycle costs and to minimize 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.</p> <p>Co-Chairs</p> <p>Andreas Hornig <i>AerospaceResearch.net — GERMANY</i></p> <p>Nijin Jose Thykkathu <i>Science and Technology Facilities Council — UNITED KINGDOM</i></p> <p>Stephan Roemer <i>OHB — GERMANY</i></p> <p>Rapporteur</p> <p>Lynette Tan <i>Singapore Space and Technology LTD (SSTL) — SINGAPORE, REPUBLIC OF</i></p>
B4.4	<p>Small Earth Observation Missions</p> <p>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 ranges 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.</p> <p>Co-Chairs</p> <p>Carsten Tobehn <i>European Space Agency (ESA) — THE NETHERLANDS</i></p> <p>Larry Paxton <i>The Johns Hopkins University Applied Physics Laboratory — UNITED STATES</i></p> <p>Eugene D Kim <i>Satrec Initiative — KOREA, REPUBLIC OF</i></p>

	<p>Rapporteurs</p> <p>Werner R. Balogh <i>European Space Agency (ESA) — FRANCE</i></p> <p>Marco Gomez Jenkins <i>— UNITED KINGDOM</i></p>
B4.5	<p>Access to Space for Small Satellite Missions</p> <p>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 the utilization of dedicated launches; development of ride-share systems, auxiliary payload systems, and separation and dispenser systems; and responsive integration approaches that will enable efficient small satellite access to space. Includes lessons learned from users on technical and programmatic approaches. For a dedicated discussion of small satellite propulsion systems, please refer to session B4.5A-C4.8. For a discussion of small launchers concepts and operations, please refer to session D2.7.</p> <p>Co-Chairs</p> <p>Yves Gerard <i>Airbus Defence & Space — FRANCE</i></p> <p>Philip Davies <i>Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM</i></p>
B4.5A	<p>Rapporteurs</p> <p>Jeffery Emdee <i>The Aerospace Corporation — UNITED STATES</i></p> <p>Carlos Niederstrasser <i>Northrop Grumman Corporation — UNITED STATES</i></p>
C4.8	<p>Joint Session between IAA and IAF for Small Satellite Propulsion Systems</p> <p>This session will pay particular attention to propulsion systems and associated technologies as an enabler to efficient small satellite access to space and orbit change. Papers are invited discussing the particular challenges of design, manufacture, testing, operations and technological developments of small satellite propulsion systems, and the challenges of obtaining high performance within a small volume and mass. The scope includes chemical and electric propulsion systems for major orbit changes, fine orbit control and maintenance, and end-of-life disposal. This session will be accepting submissions for oral presentations only. For papers with an emphasis on the small satellite and its system design, refer to other B4 sessions. For a focus on other propulsion systems and technologies, refer to other C4 sessions.</p> <p>Co-Chairs</p> <p>Jeff Emdee <i>The Aerospace Corporation — UNITED STATES</i></p> <p>Arnau Pons Lorente <i>Space Generation Advisory Council (SGAC) — UNITED STATES</i></p>
	<p>Rapporteurs</p> <p>Elena Toson <i>Space Generation Advisory Council (SGAC) — ITALY</i></p> <p>Angelo Cervone <i>Delft University of Technology (TU Delft) — THE NETHERLANDS</i></p>
B4.6A	<p>Generic Technologies for Small Satellites (1)</p> <p>This session, together with session B4.6B, covers emerging and promising generic technologies for small satellites, including platform and payload technologies. Real-life examples are particularly encouraged, both recently launched and shortly to be launched (next 3 years)..</p> <p>Co-Chairs</p> <p>Philip Davies <i>Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM</i></p> <p>Joost Elstak <i>ICEYE — THE NETHERLANDS</i></p>
	<p>Rapporteurs</p> <p>Jian Guo <i>Delft University of Technology (TU Delft) — THE NETHERLANDS</i></p> <p>Thomas Terzibaschian <i>DLR, German Aerospace Center — GERMANY</i></p>
B4.6B	<p>Generic Technologies for Small Satellites (2)</p> <p>This session, together with session B4.6A, covers emerging and promising generic technologies for small satellites, including platform and payload technologies. Real-life examples are particularly encouraged, both recently launched and shortly to be launched (next 3 years).</p> <p>Chairman</p> <p>Andy Vick <i>RAL Space — UNITED KINGDOM</i></p> <p>Co-Chair</p> <p>Zeger de Groot <i>Innovative Solutions in Space BV — THE NETHERLANDS</i></p>
	<p>Rapporteurs</p> <p>Martin von der Ohe <i>— GERMANY</i></p> <p>Paolo Marzioli <i>Sapienza University of Rome — ITALY</i></p>
B4.7	<p>Constellations and Distributed Systems</p> <p>Small satellites offer important advantages in creating new opportunities for implementing spatially-distributed space-based systems (e.g. Constellations). In this session we focus on new, emerging, or enabling technologies that can be used or are being used to create networked data collection systems via small satellites. Specifically, Session B4.7 focuses on Constellations (e.g. Constellation missions for Earth Observation, IoT/M2M and LEO Communications), distributed architectures (e.g. Distributed SAR systems) and sensor systems and how these low-cost and rapidly delivered technologies offer the potential to fulfill complex user needs, working in coordination with other small or large space infrastructures (e.g. mega-constellations), as well as with airborne or terrestrial assets. Papers should show how cross-platform compatibility (both hardware and software aspects) can be used to enable these systems, any standards that are proposed or adopted, design techniques that enable this cross-platform compatibility, etc. We are particularly interested in technologies that enable small spacecraft to play an important role in upcoming applications, such as (but not limited to) civil security, telecommunications in remote areas, navigation support (e.g., along the new foreseen routes in the Arctic), natural disaster management (e.g., damage assessment and first responders support), and planetary exploration. In this regard, the development and usage of Commercial-off-the-shelf (COTS) technologies are also of specific interest to the session. Distributed systems and their impact in terms of new opportunities for the emerging Commercial Space Industry and new commercial space missions with small platforms is also of specific interest to the session. The integrated applications of these sensor systems are covered in Symposium Session B5.2, and the broader view of tools and technologies to enable integrated applications are covered in B5.1. In B4.7 authors are also invited to analyze technological enhancements and new developments needed to guarantee small satellite integration with existing and scheduled assets from both the bus and payload perspectives. Also analysis of inter-operability within integrated systems can be addressed, like payload data management, spacecraft operation, and formation flying.</p> <p>Co-Chairs</p> <p>Rainer Sandau <i>International Academy of Astronautics (IAA) — GERMANY</i></p> <p>Michele Grassi <i>University of Naples "Federico II" — ITALY</i></p>
	<p>Rapporteurs</p> <p>Jaime Esper <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p> <p>Maria Daniela Graziano <i>University of Naples "Federico II" — ITALY</i></p>

B4.8

Small Spacecraft for Deep-Space Exploration

This session focuses on innovative small spacecraft designs, systems, missions and technologies for the exploration and commercialization of space beyond Earth orbit. Target destinations for these miniaturized space probes include the Earth's Moon, Mars, comets and asteroids, as well as other destinations that are targets for in-situ resource utilization (ISRU). 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 including the use of commercial off the shelf (COTS) technologies, miniaturized subsystems including propulsion, avionics, guidance navigation & control, power supply, communication, thermal management, and sensors and instruments. The main focus of this session is on new and emerging systems, missions, driving technologies and applications that are both government-funded as well as driven by commercial ventures.

Co-Chairs

Leon Alkalai

Mandala Space Ventures — UNITED STATES

Rene Laufer

Luleå University of Technology — SWEDEN

Rapporteurs

Lihua Zhang

DFH Satellite Co. Ltd. — CHINA

Jaime Esper

National Aeronautics and Space Administration (NASA) — UNITED STATES

B4.9 GTS.5

Small Satellite Missions Global Technical Session

The Small Satellite Missions Global Technical Session (GTS) is a collaboration between the International Academy of Astronautics (IAA) Small Satellite Missions Symposium and the International Astronautical Federation (IAF) Workforce Development/Young Professionals Programme Committee. This session is unique in that it allows for sharing of information on a global scale with presenters and audience both at the IAC venue and online at their home/work/university locations. Abstracts are solicited regarding operational missions or mature proposals for small satellite systems and related topics. These must have clear relevance on an international scale or at a business level, and must also provide young professionals a taste of what the space sector has to offer. Where possible, abstracts should have a wide interest in the community and should include transferable knowledge or lessons learned. Abstracts highlighting ingenuity or innovation are preferred. Examples include space missions utilizing small satellites that address specific new societal, scientific or commercial challenges, or novel technologies that have the potential to revolutionize space missions and/or enable their access to space. Papers are to describe the specific need, the small satellite approach that addresses this need, the benefits of this approach and the use of space technology, and demonstrate that other non-space approaches provide inferior solutions. Papers from, or directed at the young professional community are preferred. This session will be accepting submissions for oral presentations only.

Co-Chairs

Matthias Hetscher

DLR (German Aerospace Center) — GERMANY

Norbert M.K. Lemke

OHB System AG - Oberpfaffenhofen — GERMANY

Likhit Waranan

Geo-Informatics and Space Technology Development Agency (Public Organization) — THAILAND

Rapporteurs

Alex da Silva Curiel

Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM

Victoria Barabash

Luleå University of Technology — SWEDEN

B4.1P

Interactive Presentations: 32ND IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS

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

Co-Chairs

Danil Ivanov

Keldysh Institute of Applied Mathematics, RAS — RUSSIAN FEDERATION

Balbir Singh

Manipal Institute of Technology, Manipal Academy of Higher Education — INDIA

Andreas Hornig

AerospaceResearch.net — GERMANY

Rapporteur

Klaus Schilling

Zentrum für Telematik — GERMANY

Jian Guo

Delft University of Technology (TU Delft) — THE NETHERLANDS

B5

IAF SYMPOSIUM ON INTEGRATED APPLICATIONS

Space systems are more and more involved in the delivery of global services to end-users. Integrated Applications are built on the exploitation of space and terrestrial technologies for the benefit of the global population. This symposium will address various aspects of space-based downstream services with a special emphasis to the sustainable development of our planet in line with the objectives defined by the UN Sustainable Development Goals. Integrated applications combine data from existing space assets, such as Satellite Communications, Earth Observation, Satellite Navigation with airborne and ground-based systems, in addition to other technologies, such as big data, drone, analytics, IOT, 5G and others to deliver sustainable solutions and services responding to users' needs. The goal of the symposium is to discuss the different types of systems, tools and technologies, such as the kind of space and non-space data to be collected, how are data collected and integrated, that can enable the development of end-to-end solutions.

Coordinators

Jeanne Holm

City of Los Angeles — UNITED STATES

Roberta Mugellesi-Dow

European Space Agency (ESA) — UNITED KINGDOM

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 by addressing the various issues associated with applications development, the kind of data to be collected, how are data collected and how the data are integrated and distributed to address key user needs. Integrated Applications are built on the exploitation of space and terrestrial technologies for the benefit of the global population. Emerging technologies, such as Machine Learning, Artificial Intelligence, Digital Twin, Internet of Things, and other advanced technologies are rapidly revolutionizing and reshaping infrastructure and global-local economies. Leveraging these new transformative developments and understanding their disruptive potential with respect to technology, shifting demographics and global connectivity is essential for space technologies. Possible topics include: ground-truthing of data collected from space platforms; innovative, low-cost solutions for data distribution and access that focus on the space segment; new ways of integrating space and non-space data; data fusion and visualization tools; enabling technologies in support of new developments, models in support of applications, managing integrated applications programmes and public outreach efforts to connect the public to these applications.

Co-Chairs

Jeanne Holm

City of Los Angeles — UNITED STATES

Roberta Mugellesi-Dow

European Space Agency (ESA) — UNITED KINGDOM

Rapporteur

Marion Allayioti

European Space Agency (ESA) — UNITED KINGDOM

B5.2

Integrated Applications End-to-End Solutions

The session will be a forum for end-to-end solutions, case studies, proof-of-concept applications and current projects that aim to provide innovative, and sustainable solutions that combine terrestrial and space-based data sources with models and other technologies to address specific user requirements. These examples can cover a variety of sectors, like disaster/crisis monitoring and management, energy, food security, smart cities, transport, health, maritime, education, tourism, etc. The user needs, the organizations of the user communities, the service value chain, the business case and the societal impact of the solutions are among the many aspects that can be considered. Examples of projects with established partnerships between space and non-space stakeholders are appreciated. The different ways of assessing the impact of specific integrated applications in addressing the users and stakeholders needs and requirements could also be discussed.

Co-Chairs

Boris Penne

OHB System AG — GERMANY

Roberta Mugellesi-Dow

European Space Agency (ESA) — UNITED KINGDOM

Rapporteur

Marion Allayioti

European Space Agency (ESA) — UNITED KINGDOM

B5.3

Integrated Commercial Satellite Applications for Sustainability and Climate

Spaceflight represents one of humanity's greatest tools to solve some of our most pressing global challenges related to sustainability and climate. Our shared experience with addressing the Ozone depletion, deforestation, and other challenges improved through space-derived solutions demonstrate the power of orbiting platforms to collect data, provide unique observational perspectives, and advance our understanding of many existential problems. Each of the seventeen (17) UN Sustainable development goals have key dimensions in which satellite applications – coupled with innovation to be found throughout the world – can help us make strides in improving the sustainability of life on Earth and combat climate change. This session solicits papers pertinent to integrated satellite applications that directly address any of the seventeen UN Sustainable Development goals, work successfully to help mitigate or reverse effects of climate change, or improve other dimensions of sustainability in areas such as agriculture, water quality, air quality, space domain awareness and orbital debris, transportation, maritime, and natural resource management.

Co-Chairs

John M. Horack
The Ohio State University College of Engineering — UNITED STATES

Bruce Chesley
Teaching Science and Technology, Inc (TSTI) — UNITED STATES

Rapporteur

Marcello Romano
Politecnico di Torino — ITALY

B5.1P

Interactive Presentations - IAF SYMPOSIUM ON INTEGRATED APPLICATIONS

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

Coordinator

Roberta Mugellesi-Dow
European Space Agency (ESA) — UNITED KINGDOM

Jeanne Holm
City of Los Angeles — UNITED STATES

B6

IAF SPACE OPERATIONS SYMPOSIUM

The Space Operations Symposium, organised by the International Astronautical Federation (IAF), encompasses all aspects of spaceflight operations across the entire life cycle of space and ground segments. The sessions address space operations including human spaceflight and robotic space missions, from low-Earth and geosynchronous orbit, to lunar, planetary, science and exploration missions covering institutional space missions, commercial space systems, small spacecraft and constellations. This symposium addresses both, flight and ground systems, and includes mission planning, training, and real time operations.

Coordinators

Andreas Rudolph
European Space Agency (ESA) — GERMANY

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

B6.1

Ground Operations - Systems and Solutions

This session addresses all aspects of ground systems and solutions for all mission types, for both preparation and execution phases.

Co-Chairs

Sean Burns
EUMETSAT — GERMANY

Claude Audouy
Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteurs

Regina Mosenkis
Airbus Defence & Space — GERMANY

Keyur Patel
National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES

B6.2

Innovative Space Operations Concepts and Advanced Systems

This session addresses innovative space operations and addresses advanced concepts, systems, approaches, processes and tools for operating existing and new types of missions, improving mission output in quality and quantity, and reducing cost.

Co-Chairs

Mario Cardano
Thales Alenia Space France — ITALY

Andreas Ohndorf
DLR (German Aerospace Center) — GERMANY

Rapporteurs

Jackelyne Silva-Martinez
NASA — UNITED STATES

Yuichiro Nogawa
Japan Manned Space Systems Corporation (JAMSS) — JAPAN

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 concepts, execution and lessons learned. This includes both flight and surface operations.

Co-Chairs

Andreas Rudolph
European Space Agency (ESA) — GERMANY

Zeina Mounzer
Telespazio VEGA Deutschland GmbH — GERMANY

Rapporteurs

Borre Pedersen
Kongsberg Satellite Services AS — NORWAY

Matthew Duggan
— UNITED STATES

B6.4

B3.4

Flight & Ground Operations of HSF Systems - A Joint Session of the IAF Human Spaceflight and IAF Space Operations Symposia

This session addresses systems, advanced concepts, key challenges and their solutions related to flight and ground operations within governmental and commercial human spaceflight. Topics include among others; cutting-edge operational tools, solutions, efficient cost reduction measures, improved operational ground facilities or infrastructure, enhanced logistics concepts as well as new approaches for mission planning, ground transportation, and sustainment.

Co-Chairs

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

Annamaria Piras
Thales Alenia Space Italia — ITALY

Rapporteurs

Jérôme Campan
European Space Agency (ESA) — GERMANY

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

B6.5

Large Constellations & Fleet Operations

Access to space has been simplified and opened the door to a wider range of applications. Organisations are opting for distributed architectures of satellite constellations instead of single-satellite missions. The complexity of the overall system has shifted and necessitated a focus on efficient management and operation of a multitude of heterogeneous smaller elements. This session addresses the operations of large constellations, covering all related elements and phases; the operations concepts and solutions, the required ground segment architecture, the scale-up, deployment, and exploitation, the space traffic management approaches, end-of-life management, as well as the advantages, challenges, the outlook and foreseen developments.

Co-Chairs

Simon Plum

European Space Agency (ESA-ESOC) — GERMANY

Thomas Uhlig

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

Rapporteurs

Shawn Linam

Qwaltec, Inc. — UNITED STATES

Mario Cardano

Thales Alenia Space Italia — ITALY

B6.IP

Interactive Presentations - IAF SPACE OPERATIONS SYMPOSIUM

This session offers a unique opportunity for authors to deliver key messages in an interactive presentation on any of the subjects of Space Operations addressed in the main technical sessions of this symposium. The interactive presentation is a new format that allows the authors to create presentations which can include videos and animations that are shown on screens in a dedicated area throughout the congress week. Authors of the interactive presentations are also given a 5 min slot to present during the Interactive Session. The five very best interactive presentations of the IAC are selected and announced during the Interactive Presentation Award Ceremony.

Co-Chairs

Andreas Rudolph

European Space Agency (ESA) — GERMANY

Otfried G. Liepack

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

Category

TECHNOLOGY

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

C1 IAF ASTRODYNAMICS SYMPOSIUM

C2 IAF MATERIALS AND STRUCTURES SYMPOSIUM

C3 IAF SPACE POWER SYMPOSIUM

C4 IAF SPACE PROPULSION SYMPOSIUM

Category coordinated by John C. Mankins, ARTEMIS Innovation Management Solutions, LLC, UNITED STATES

C1

IAF ASTRODYNAMICS SYMPOSIUM

This symposium addresses advances in orbital mechanics, attitude dynamics, guidance, navigation and control of space systems

Coordinators

Daniel Scheeres

*Colorado Center for Astrodynamics Research,
University of Colorado — UNITED STATES*

Vincent Martinot

Thales Alenia Space France — FRANCE

C1.1

Attitude Dynamics (1)

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

Marcello Romano

Politecnico di Torino — ITALY

Zhanfeng Meng

China Academy of Space Technology (CAST) — CHINA

Rapporteur

Robert G. Melton

Pennsylvania State University — UNITED STATES

C1.2

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

Krishna Dev Kumar

Toronto Metropolitan University — CANADA

Mikhail Ovchinnikov

*Keldysh Institute of Applied Mathematics, RAS — RUSSIAN
FEDERATION*

Rapporteur

Bang Hyochong

*Korea Advanced Institute of Science and Technology (KAIST)
— KOREA, REPUBLIC OF*

C1.3

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, including formation flying, rendezvous and docking.

Co-Chairs

Guo Linli

*Institute of Manned Space System Engineering, China
Academy of Space Technology (CAST) — CHINA*

Shinichiro Sakai

ISAS/JAXA — JAPAN

Rapporteur

Steve Ulrich

Carleton University — CANADA

C1.4

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, including formation flying, rendezvous and docking.

Co-Chairs

Mai Bando

Kyushu University — JAPAN

Eberhard Gill

Delft University of Technology — THE NETHERLANDS

Rapporteur

Hanspeter Schaub

*Colorado Center for Astrodynamics Research, University of
Colorado — UNITED STATES*

C1.5

Guidance, Navigation & 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, including formation flying, rendezvous and docking.

Co-Chairs

Jean de Lafontaine

NGC Aerospace Ltd. — CANADA

Yung Fu Tsai

Taiwan Space Agency (TASA) — TAIWAN, CHINA

Rapporteur

Bernard Lübke-Ossenbeck

OHB System AG — GERMANY

C1.6

Mission Design, Operations & Optimization (1)

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

Co-Chairs

Erick Lansard
Satellite Research Center, Nanyang Technological
University (NTU) — REPUBLIC OF SINGAPORE

Mauro Pontani
Sapienza University of Rome — ITALY

Rapporteur

Stephanie Lizy-Destrez
Spaceflight Institute — FRANCE

C1.7

Mission Design, Operations & Optimization (2)

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

Co-Chairs

Diane Davis
National Aeronautics and Space Administration
(NASA), Johnson Space Center — UNITED STATES

Richard Epenoy
Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteur

Liang Tang
Beijing Institute of Control Engineering, CAST — CHINA

C1.8

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

Yuichi Tsuda
Japan Aerospace Exploration Agency (JAXA) — JAPAN

Anna Guerman
Centre for Mechanical and Aerospace Science and
Technologies (C-MAST) — PORTUGAL

Rapporteur

Kathleen Howell
Purdue University — UNITED STATES

C1.9

Orbital Dynamics (2)

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

Othon Winter
UNESP - São Paulo State University — BRAZIL

Josep J. Masdemont
Universitat Politècnica de Catalunya (UPC) — SPAIN

Rapporteur

David C. Folta
National Aeronautics and Space Administration (NASA),
Goddard Space Flight Center — UNITED STATES

C1.IP

Interactive Presentations - IAF ASTRODYNAMICS SYMPOSIUM

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Co-Chairs

Vladimir Razoumy
Cosmoexport Aerospace Research Agency — RUSSIAN
FEDERATION
Jinglang Feng
Nanjing University — CHINA

Florian Renk
European Space Agency (ESA) — GERMANY

Manoranjan Sinha
Indian Institute of Technology Kharagpur — INDIA

C2

IAF MATERIALS AND STRUCTURES SYMPOSIUM

The IAF Materials and Structures Committee addresses materials and structures technologies applicable to space transportation, space exploration and in orbit operation. Three sessions are allocated for the design, verification of qualification of launcher, spacecraft, large orbital structures and in-orbit operating vehicles and robotic systems. It concerns their structures, propellant tanks, propulsive subsystem mechanical components, fluidic and thermal control systems. Six sessions deal with specific technical topics related to the aforementioned different types of applications. Mastering the space structures control, dynamics and micro-dynamics is an important technical field of expertise ensuring the proper functioning of space transportation systems and in-orbit structures and robotic systems. The structures require for high reliability and performance a thorough selection, characterization and qualification of materials, considering the space environmental conditions covering a temperature range from cryogenic conditions up to extreme high temperatures during re-entry in the atmosphere. Protection systems are mandatory especially for in-orbit operating structures, vehicles, space stations and robotic systems. The application of additive manufacturing technologies allow to design and produce multifunctional structures. New smart materials, adaptive structures and nanotechnologies pave the way for new advanced designs of e.g. Sensors and actuators. Reduction of production cost are nowadays playing a very important role. A specific session has been set-up which is addressing the manufacturing and industrialization for Launch Vehicle and Space Vehicle Structures and components.

Coordinator

Jochen Albus
ArianeGroup — GERMANY

Alwin Eisenmann
IABG Industrieanlagen - Betriebsgesellschaft mbH —
GERMANY

C2.1

Space Structures I Design, Development and Verification (Launch Vehicles and Space Vehicles, including their Mechanical/Thermal/Fluidic Systems)

The topics addressed in this session cover the aspects of the design, development and verification of space launch system structures (e.g. pressurized propellant tanks, non-pressurized structures of space vehicles, control surfaces) and their components (e.g. fluidic equipment and propulsive lines, thermal control systems). The aspects of design, development, verification, and qualification concern: • Thermo-Mechanical loads and environment • New structural concepts (e.g. multi-functional structures, design concepts for reusability) • Structure design and verification (stiffness, strength, static and dynamic stability, damage tolerance, reusability) • design, verification and qualification of fluidic and thermal control systems • Structure optimization • Materials • Static and dynamic ground testing • Exploitation of flight measurements and in-orbit testing • Lessons learned related to space vehicle structures and components development, verification and qualification.

Co-Chairs

Alwin Eisenmann
IABG Industrieanlagen - Betriebsgesellschaft mbH —
GERMANY

Jochen Albus
ArianeGroup — GERMANY

Rapporteurs

Zijun Hu
China Academy of Launch Vehicle Technology (CALT)
— CHINA

Coraline Dalibot
Rutherford Appleton Laboratory — UNITED KINGDOM

C2.2

Space Structures II Development and Verification (Orbital deployable and dimensionally stable structures, including mechanical and robotic systems and subsystems)

The topics to be addressed within this session concern all aspects of deployable and dimensionally stable structures e.g. reflectors, telescopes, antennas etc. It includes structural design, analysis and verification, shape control and thermal distortion as well as evaluation of analysis versus test results, of both on-ground and in-orbit testing. Furthermore, related mechanical, thermal and robotic systems and subsystems/mechanisms will be covered.

	<p>Co-Chairs</p> <p>Paolo Gasbarri <i>University of Rome "La Sapienza" — ITALY</i></p> <p>Pavel Trivailo <i>RMIT University (Royal Melbourne Institute of Technology) — AUSTRALIA</i></p> <p>Rapporteur</p> <p>Jiawen Qiu <i>— CHINA</i></p>
C2.3	<p>Space Structures III Design, Development and Verification (Orbital infrastructure for in orbit service & manufacturing, Robotic and Mechatronic systems, including their Mechanical/Thermal/ Fluidic Systems)</p> <p>The topics to be addressed include all aspects of orbital infrastructures design, development and verification, including their mechanical/robotic/thermal/fluidic systems and subsystems, such as manned and unmanned spacecraft, space stations, 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 development with respect to engineering analysis, manufacturing, and test verification. Furthermore, design and testing of robotic and mechatronics systems for exploration, in-orbit servicing and manufacturing of space structures will be addressed. It is also planned to discuss the issues of experimental and computational simulation of functioning and full-scale tests of space infrastructures and their systems/subsystems. Attention will be paid to the problem of verification and validation of mathematical models for the design and experimental development of these objects at various phases of their life cycle.</p> <p>Co-Chairs</p> <p>Andreas Rittweger <i>DLR (German Aerospace Center) — GERMANY</i></p> <p>Oleg Alifanov <i>MAI — RUSSIAN FEDERATION</i></p> <p>Rapporteur</p> <p>Ijar M. Da Fonseca <i>ITA-DCTA — BRAZIL</i></p>
C2.4	<p>Space Structures Control, Dynamics and Microdynamics</p> <p>The topics to be addressed include dynamics analysis and testing, modal identification, landing and impact dynamics, pyro-shock, test facilities, vibration suppression techniques, damping, micro-dynamics, in-orbit dynamic environment, wave structural propagation, excitation sources and in-orbit dynamic testing. Attention will be paid to dynamics modelling and control of robotic and mechatronic systems (e.g. manipulators for the servicing and/or assembly of space structures, pointing mechanisms, etc).</p> <p>Co-Chairs</p> <p>Federica Angeletti <i>University of Rome "La Sapienza" — ITALY</i></p> <p>Élcio Jeronimo de Oliveira <i>Associazione Italiana di Aeronautica e Astronautica (AIDAA) — BRAZIL</i></p> <p>Rapporteur</p> <p>Harijono Djojodihardjo <i>Bandung Institut of Tecnology — INDONESIA</i></p>
C2.5	<p>Space Structures and Materials for Extreme Environment (High-temperature and cryogenic-temperature applications including thermal insulation concepts)</p> <p>The topics to be addressed include structures and materials for extreme environments, including both cryogenic applications and high temperature applications in space related domains. The session covers the full spectrum of material, design, manufacturing and testing. Operation of structures and mechanisms in cryogenic environment is quite challenging. This concerns the components design as well as the materials they are made of or lubricants needed for proper functioning. Tanks for storage of cryogenic propellants for launch vehicle application or long term storage of cryogenic liquids require an appropriate material selection and characterization, especially when organic composite materials are considered. Cryogenic insulation for propellant tanks and lines, especially for reusable launch vehicles exposed to aerothermal loads might require a combination with high temperature thermal protection systems. (Foam with metallic protection, vacuum insulated sandwich, stand-off thermal protection...). For the elevated temperature regime, this session includes carbon-carbon and ceramic matrix composites, ultra-high temperature ceramic matrix composites, ablative materials, ceramic tiles and insulations, together with innovative structural concepts making use of the above, for propulsion systems, launchers, hypersonic vehicles, re-entry vehicles, aero capture, power generation.</p> <p>Co-Chairs</p> <p>David E. Glass <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p> <p>Thierry Pichon <i>ArianeGroup — FRANCE</i></p> <p>Rapporteurs</p> <p>Zijun Hu <i>China Academy of Launch Vehicle Technology (CALT) — CHINA</i></p> <p>James Tucker <i>— UNITED STATES</i></p>
C2.6	<p>Space Environmental Effects and Spacecraft Protection</p> <p>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.</p> <p>Co-Chairs</p> <p>Antonio Del Vecchio <i>CIRA Italian Aerospace Research Centre — ITALY</i></p> <p>Anatolii Lohvynenko <i>Yuzhnoye State Design Office — UKRAINE</i></p> <p>Rapporteur</p> <p>Kyeum-rae Cho <i>Pusan National University — KOREA, REPUBLIC OF</i></p>
C2.7	<p>Manufacturing and industrialization for Launch Vehicle and Space Vehicle Structures and components (High volume production, industrialization, automatization and digitalization)</p> <p>This session will focus on manufacturing, inspection and testing technologies to enable efficient high volume production for launch vehicle and spacecraft structures as well as components. This includes industrialization aspects of series production as e.g. high cadences automatization design, design-to-manufacturing concepts and lean production principles. Other topics covered are the use of digitalization in particular of artificial intelligence, AR, VR, machine learning, digital twins and real-time manufacturing data evaluation to support spacecraft production.</p> <p>Co-Chairs</p> <p>Oliver Kunz <i>Beyond Gravity — SWITZERLAND</i></p> <p>Aicke Patzelt <i>MT Aerospace AG — GERMANY</i></p> <p>Rapporteur</p> <p>Elizabeth Barrios <i>National Aeronautics and Space Administration (NASA) — UNITED STATES</i></p>
C2.8	<p>Advancements in Materials Applications, Additive Manufacturing, and Rapid Prototyping Manufacturing and Rapid Prototyping</p> <p>The topics to be addressed include advancements in materials applications, novel technical concepts in the rapid prototyping of space systems, and materials and processes for in space manufacturing and construction. Continuous improvements in materials and structural concepts are always needed to achieve extremely demanding goals in performance, reliability, and affordability of space components, especially in terms of greater accuracy/dimensional stability, longer life, greater survivability to both natural and threat environments, and producibility capability for high volume production. Different additive manufacturing (AM) processes are currently used for different materials in the fabrication of metal, ceramic, and plastic parts. New and different processes are being developed for utilization of lunar regolith materials for manufacturing and construction. As a very new technique, AM is strongly emerging due to the capability of optimization of structural parts for space applications as it concerns weight reduction, improvement of mechanical properties and reduction of development and lead times as well as cost reduction. The ability to utilize in situ resources for manufacturing and construction is very attractive for logistics reduction for deep space exploration.</p> <p>Co-Chairs</p> <p>Pierre Rochus <i>CSL (Centre Spatial de Liège) — BELGIUM</i></p> <p>Raymond Clinton <i>NASA Marshall Space Flight Center — UNITED STATES</i></p> <p>Rapporteur</p> <p>Bangcheng Ai <i>China Aerospace Science and Industry Corporation — CHINA</i></p> <p>Mario Marchetti <i>Sapienza University of Rome — ITALY</i></p>

C2.9

Smart Materials and Adaptive Structures & Specialized Technologies, Including Nanotechnology

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. Specialized 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 miniaturization 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 specialized technologies, in particular of nanomaterial related techniques and their application in devices offering unprecedented performances for space applications.

Co-Chairs

Behnam Ashrafi

National Research Council — CANADA

Aashish Agrawal

Space Applications Centre (ISRO) — INDIA

Rapporteur

Kanjiro Makihara

Tohoku University — JAPAN

C2.IP

Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM

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

Co-Chairs

Jochen Albus

ArianeGroup — GERMANY

Alwin Eisenmann

IABG Industrieanlagen - Betriebsgesellschaft mbH — GERMANY

C3

IAF SPACE POWER SYMPOSIUM

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

Coordinator

John C. Mankins

ARTEMIS Innovation Management Solutions, LLC — UNITED STATES

Koji Tanaka

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

C3.1

Solar Power Satellite

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

Co-Chairs

John C. Mankins

ARTEMIS Innovation Management Solutions, LLC — UNITED STATES

Ming Li

China Academy of Space Technology (CAST) — CHINA

Rapporteurs

Leopold Summerer

European Space Agency (ESA) — THE NETHERLANDS

Koji Tanaka

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

C3.2

Wireless Power Transmission Technologies and Application

This session focuses on all aspects of wireless power transmission systems. It covers wireless power transmission technologies, including laser, microwave-based as well as novel wireless power transmission technologies from the short ranges (e.g. within spacecraft or between two surface installations) up to 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-Chair

Ming Li

China Academy of Space Technology (CAST) — CHINA

Rapporteurs

Massimiliano Vasile

University of Strathclyde — UNITED KINGDOM

Haroon B. Oqab

Space Canada Corporation — CANADA

Rapporteurs

Paul Jaffe

Naval Research Laboratory — UNITED STATES

Nobuyuki Kaya

Kobe University — JAPAN

C3.3

Advanced Space Power Technologies

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

Co-Chairs

Gary Barnhard

Xtraordinary Innovative Space Partnerships, Inc. — UNITED STATES

Lisa May

Lockheed Martin (Space Systems Company) — UNITED STATES

Rapporteurs

Lee Mason

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

Koji Tanaka

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

C3.4

Space Power System for Ambitious Missions

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

Co-Chairs

Massimiliano Vasile
University of Strathclyde — UNITED KINGDOM

Lisa May
Lockheed Martin (Space Systems Company) — UNITED STATES

Rapporteurs

Xinbin Hou
CAST — CHINA

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

C3.5 C4.10

Joint Session on Nuclear Power and Propulsion Systems, and Propellantless Propulsion

This session, organized jointly between the Space Power and the Space Propulsion Symposia, addresses all aspects related to nuclear power and propulsion systems for space applications. The session also addresses all types of propellantless propulsion including (but not limited to) solar sails, magnetic sails, laser propulsion, tethers, etc.

Co-Chairs

Leopold Summerer
European Space Agency (ESA) — THE NETHERLANDS

Lisa May
Lockheed Martin (Space Systems Company) — UNITED STATES

Christian Bach
Technische Universität Dresden (DTU) — GERMANY

Rapporteurs

Markus Jaeger
Airbus Defence & Space, Space Systems — GERMANY

Saroj Kumar
Propulsion Research Center, University of Alabama in Huntsville — UNITED STATES

C3.IP

Interactive Presentations - IAF SPACE POWER SYMPOSIUM

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Coordinators

Ming Li
China Academy of Space Technology (CAST) — CHINA

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

Haroon Oqab
Kepler Space University — UNITED STATES

C4

IAF SPACE PROPULSION SYMPOSIUM

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

Coordinators

Angelo Cervone
Delft University of Technology (TU Delft) — THE NETHERLANDS

Adam Okninski
Łukasiewicz Research Network – Institute of Aviation (ILOT) — POLAND

Ozan Kara
Technology Innovation Institute (TII) — UNITED ARAB EMIRATES

Saroj Kumar
Propulsion Research Center, University of Alabama in Huntsville — UNITED STATES

Andrei Shumeiko
Bauman Moscow State Technical University — RUSSIAN FEDERATION

C4.1

Liquid Propulsion (1)

The session Liquid Propulsion (1) is dedicated to Liquid Rocket Engines (mono-propellant or bi-propellant), with particular emphasis on full engine systems. The session welcomes manuscripts on all research and development areas, with a significant technical content: design, testing (including diagnostics and test facilities), analysis and calculations, modelling, applications, science and fundamentals.

Co-Chairs

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

Ulrich Gotzig
ArianeGroup — GERMANY

Rapporteurs

Annafederica Urbano
ISAE - Institut Supérieur de l'Aéronautique et de l'Espace — FRANCE

Vanniyaperumal Narayanan
Indian Space Research Organization (ISRO) — INDIA

C4.2

Liquid Propulsion (2)

The session Liquid Propulsion (2) is dedicated to Liquid Rocket Engines (mono-propellant or bi-propellant), with particular emphasis on sub-systems and specific components (including propellants). The session welcomes manuscripts on all research and development areas, with a significant technical content: design, testing (including diagnostics and test facilities), analysis and calculations, modelling, applications, science and fundamentals.

Co-Chairs

Angelo Cervone
Delft University of Technology (TU Delft) — THE NETHERLANDS

Annafederica Urbano
ISAE - Institut Supérieur de l'Aéronautique et de l'Espace — FRANCE

Rapporteurs

Christian Bach
Technische Universität Dresden (DTU) — GERMANY

Ulrich Gotzig
ArianeGroup — GERMANY

C4.3

Solid and Hybrid Propulsion (1)

The session Solid and Hybrid Propulsion (1) is dedicated to Solid and Hybrid Rocket motors, with particular emphasis on full systems. The session welcomes manuscripts on all research and development areas: design, testing (including diagnostics and test facilities), analysis and calculations, modelling, applications, science and fundamentals.

Co-Chairs

Yen-Sen Chen

American Institute of Aeronautics and Astronautics
(AIAA) — UNITED STATES

Christian Bach

Technische Universität Dresden (DTU) — GERMANY

Rapporteurs

Adam Okninski

Łukasiewicz Research Network – Institute of Aviation
(ILOT) — POLAND

Yuji Saito

Tohoku University — JAPAN

C4.4

Solid and Hybrid Propulsion (2)

The session Solid and Hybrid Propulsion (2) is dedicated to Solid and Hybrid Rocket motors, with particular emphasis on sub-systems and specific components (including propellants). The session welcomes manuscripts on all research and development areas: design, testing (including diagnostics and test facilities), analysis and calculations, modelling, applications, science and fundamentals.

Co-Chairs

Didier Boury

ArianeGroup SAS — FRANCE

Yuji Saito

Tohoku University — JAPAN

Rapporteurs

Jean-Claude Traineau

Office National d'Etudes et de Recherches
Aérospatiales (ONERA) — FRANCE

Arif Karabeyoglu

Koc University — TÜRKIYE

C4.5

Electric Propulsion (1)

The sessions Electric Propulsion (1) and Electric Propulsion (2) are dedicated to all aspects of Electric Propulsion, including full systems, sub-systems and specific components. The sessions welcome manuscripts on all research and development areas: design, testing (including diagnostics and test facilities), analysis and calculations, modelling, applications, science and fundamentals.

Co-Chairs

Jean-Claude Traineau

Office National d'Etudes et de Recherches Aérospatiales
(ONERA) — FRANCE

Andrei Shumeiko

Bauman Moscow State Technical University — RUSSIAN
FEDERATION

Rapporteurs

Marco Di Clemente

Italian Space Agency (ASI) — ITALY

Vincent Guyon

SAFRAN — FRANCE

C4.6

Electric Propulsion (2)

The sessions Electric Propulsion (1) and Electric Propulsion (2) are dedicated to all aspects of Electric Propulsion, including full systems, sub-systems and specific components. The sessions welcome manuscripts on all research and development areas: design, testing (including diagnostics and test facilities), analysis and calculations, modelling, applications, science and fundamentals.

Co-Chairs

Marco Di Clemente

Italian Space Agency (ASI) — ITALY

Nicoletta Wagner

European Space Agency (ESA) — FRANCE

Rapporteurs

Angelo Cervone

Delft University of Technology (TU Delft) — THE
NETHERLANDS

Heji Huang

Institute of Mechanics, Chinese Academy of Sciences —
CHINA

C4.7

Hypersonic Air-breathing and Combined Cycle Propulsion, and Hypersonic Vehicle

This session covers hypersonic air-breathing and combined cycle propulsion with space applications. The typical types of engine considered in this session include: turbojet, ramjet, Scramjet, detonation engine, Turbine Based Combined Cycle (TBCC), Rocket Based Combined Cycle (RBCC), Hypersonic Pre-cooled Propulsion, Air Turbo Rocket (ATR) and other types of hypersonic combined cycle propulsion, together with the associated vehicle.

Co-Chairs

Heji Huang

Institute of Mechanics, Chinese Academy of Sciences
— CHINA

Jean-Claude Traineau

Office National d'Etudes et de Recherches Aérospatiales
(ONERA) — FRANCE

Rapporteurs

Didier Boury

ArianeGroup SAS — FRANCE

Riheng Zheng

Beihang University — CHINA

C4.8 B4.5A

Joint Session between IAA and IAF for Small Satellite Propulsion Systems

This session will pay particular attention to propulsion systems and associated technologies as an enabler to efficient small satellite access to space and orbit change. Papers are invited discussing the particular challenges of design, manufacture, testing, operations and technological developments of small satellite propulsion systems, and the challenges of obtaining high performance within a small volume and mass. The scope includes chemical and electrical propulsion systems for major orbit changes, fine orbit control and maintenance, and end-of-life disposal. For papers with an emphasis on the small satellite and its system design, refer to other B4 sessions. For a focus on other propulsion systems and technologies, refer to other C4 sessions.

Co-Chairs

Arnau Pons Lorente

Space Generation Advisory Council (SGAC) — UNITED
STATES

Jeff Emdee

The Aerospace Corporation — UNITED STATES

Rapporteurs

Elena Toson

T4i — ITALY

Angelo Cervone

Delft University of Technology (TU Delft) — THE
NETHERLANDS

C4.9

Disruptive Propulsion Concepts for Enabling New Missions

This session will explore advanced and disruptive propulsion technologies, systems, ideas (including integration of different propulsion concepts) showing potential to enable new mission concepts, or to enhance the capabilities of current mission concepts.

Co-Chairs

Elena Toson

T4i — ITALY

Christian Bach

Technische Universität Dresden (DTU) — GERMANY

C4.10
C3.5

Rapporteurs

Saroj Kumar
Propulsion Research Center, University of Alabama in Huntsville — UNITED STATES

Arnau Pons Lorente
Space Generation Advisory Council (SGAC) — UNITED STATES

Joint Session on Nuclear Power and Propulsion Systems, and Propellantless Propulsion

This session, organized jointly between the Space Power and the Space Propulsion Symposia, addresses all aspects related to nuclear power and propulsion systems for space applications. The session also addresses all types of propellantless propulsion including (but not limited to) solar sails, magnetic sails, laser propulsion, tethers, etc.

Co-Chairs

Leopold Summerer
ESA - European Space Agency — THE NETHERLANDS

Saroj Kumar
University of Alabama in Huntsville — UNITED STATES

Lisa May
Lockheed Martin (Space Systems Company) — UNITED STATES

Rapporteurs

Markus Jaeger
Airbus Defence & Space, Space Systems — GERMANY

Yen-Sen Chen
American Institute of Aeronautics and Astronautics (AIAA) — UNITED STATES

C4.1P

Interactive Presentations - IAF SPACE PROPULSION SYMPOSIUM

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

Coordinators

Angelo Cervone
Delft University of Technology (TU Delft) — THE NETHERLANDS

Andrei Shumeiko
Bauman Moscow State Technical University — RUSSIAN FEDERATION

Riheng Zheng
Beihang University — CHINA

Category

D

INFRASTRUCTURE

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

- D1 IAF SPACE SYSTEMS SYMPOSIUM
- D2 IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM
- D3 23RD IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT
- D4 23RD IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE
- D5 58TH IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES
- D6 IAF SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES

Category coordinated by Roberta Mugellesi-Dow, *European Space Agency (ESA), UNITED KINGDOM*

D1

IAF SPACE SYSTEMS SYMPOSIUM

The Space Systems Symposium, organized by the International Astronautical Federation (IAF), addresses the present and future development of space systems, architectures, and technologies, with sessions on Innovative Systems toward Future Architectures, Technologies that Enable Space Systems, Emergent Space Systems, Cooperative Systems, Systems Engineering Modeling and Analysis, Systems Engineering Approaches, Processes and Methods, and Lessons Learned in Space Systems.

Coordinators

Reinhold Bertrand
European Space Agency (ESA) — GERMANY

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

Tibor S. Balint
Jet Propulsion Laboratory — UNITED STATES

D1.1

Innovative Systems toward Future Architectures

This session explores innovative system concepts, technical capabilities that enable future architectures, new applications, new business models and evolution of the global ecosystem. It also analyses how new challenges such as reduction of environmental impact (space debris, CO2 footprint reduction) can induce new space system architectures, applications, eventually proposing solutions to reduce global warming and debris mitigation. As examples: Could Space based Solar Power contribute to reduction of CO2 emission and make an economically and technically feasible option to meet the energy needs? Will in-space transportation and logistics develop in association with reusable launchers? Which new applications could be enabled i.e., Active Debris Removal (ADR), In-orbit Service and Manufacturing (IOSM) or recycling? How would these changes affect the ecosystems? This session objective is to connect innovators and researchers in building a vision of transformation of space systems architecture. In this perspective, the dreams of yesterday are the hope of today and the reality of tomorrow.

Co-Chairs

Xavier Roser
Thales Alenia Space France — FRANCE

Peter Dieleman
Netherlands Aerospace Centre (NLR) — THE NETHERLANDS

Rapporteurs

Mamatha Maheshwarappa
UK Space Agency — UNITED KINGDOM

Hui Du
Institute of Spacecraft System Engineering, China Academy of Space Technology (CAST) — CHINA

D1.2

Technologies that Enable Space Systems

This session focuses on innovative and technological developments that are often high risk, but which have the potential to significantly enhance the performance of existing and new space systems. Leading-edge technologies that enable space applications come in many diverse forms, from system level innovations down to the subsystem or component level. Examples include instrumentation, sensors, biotechnology, components, micro- and nano-technology, advanced new structures and software techniques. Additionally, architectural solutions incorporating technologies such as artificial intelligence, machine learning, virtual/augmented reality, autonomy and automation are also of interest. The scope of the session includes architectures for single satellite systems or multiple satellite systems, such as constellations, formations, swarms, distributed systems, and system-of-systems (including hybridization with terrestrial systems). Ground-versus-space allocation of functionality and aspects of autonomy, both on-board and on-ground, may be addressed.

Co-Chairs

Matteo Emanuelli
Airbus Defence and Space — GERMANY

Steven Arnold
The Johns Hopkins University Applied Physics Laboratory — UNITED STATES

Rapporteur

Audrey Berquand
European Space Agency (ESA) — THE NETHERLANDS

D1.3

Emergent Space Systems

This session focuses on the novel aspects of currently emerging systems, with a special emphasis put on new system design paradigms related to Human-Centered Design (HCD) and Very Low Earth Orbit (VLEO) systems. In this context, we seek ideas on how and where HCD, Human System Integration (HSI), User Experience/User Interface (UX/UI) design, Augmented and Virtual Reality (AR/VR) systems, as well as design processes may broaden technical fields and provide demonstrable benefit throughout the full lifecycle, from formulation through implementation to operations. Our session addresses today's challenges by leveraging novel approaches for current and emerging space systems, but also for system of systems, where the space element represents key contributions to overall system topology.

Co-Chairs

Tibor Balint
Jet Propulsion Laboratory — UNITED STATES

Reinhold Bertrand
European Space Agency (ESA) — GERMANY

Rapporteur

Igor V. Belokonov
*Samara National Research University (Samara University)
— RUSSIAN FEDERATION*

D1.4.

Cooperative Systems

Emphasis of this session is on innovative cooperative and self-organizing approaches to address increasing complexities in space systems coordinating several actors. Examples concern the following fields: formations in multi-satellite systems, in-space servicing, robotics in planetary explorations or in satellite production. Contributions related to algorithms, software simulations, testbeds and in-orbit experiences for cooperative systems are highly encouraged.

Co-Chairs

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

Klaus Schilling
Zentrum für Telematik — GERMANY

Rapporteurs

Eberhard Gill
Delft University of Technology — THE NETHERLANDS

Avid Roman-Gonzalez
UNIVERSIDAD NACIONAL DE MOQUEGUA — PERU

D1.5

Systems Engineering Modeling and Analysis

This session focuses on digital applications for improved systems engineering modeling and analysis across the product life-cycle. The session will gather a community of those on "the front lines" of implementing system modeling. Papers are sought in three topical areas: 1. Tactical results, use cases or examples, which validate mission, systems or sub-system application and subsequent return on investment for traditional versus future SE approaches. 2. Strategic results, organizational progress toward a fully integrated enterprise digital solution, including how SE modeling fits into that solution space. 3. Innovative approaches, more forward looking or lower TRL tooling advances which offer large improvement opportunities and their potential application (AI/ML for example). Lessons learned on challenges and opportunities within the three topic areas are of special interest and highly desired.

Co-Chairs

Jon Holladay
*National Aeronautics and Space Administration (NASA)
— UNITED STATES*

Thierry Floriant
Centre National d'Etudes Spatiales (CNES) — FRANCE

Rapporteur

Sapna Rao
Lockheed Martin (Space Systems Company) — UNITED STATES

D1.6

Systems Engineering Approaches, Processes and Methods

This session focuses on state-of-the-art systems engineering methodologies to deliver space systems of high quality that meet stakeholder needs at a manageable risk, reducing the development time and life cycle cost. Of special interest are papers on multi-disciplinary approaches, processes, methods, tools, and training used for improving development and life cycle productivity and risk management, and increasing safety, availability, reliability, resilience, dependability, testability, ease of operation, serviceability and quality of life cycle cost estimates. Papers are sought in four topical areas: 1) space systems architecting, which includes campaign analysis and design, mission analysis and design, and systems of systems (SoS); 2) trade off studies, optimization, and simulation tools and decision analysis; 3) AIV&V (assembly, integration, verification and validation); and 4) space systems management, which includes stakeholder management, technical planning, control and assessment of space system design, earned value management, technical risk management, requirements management, configuration management, and information management.

Co-Chairs

Geilson Loureiro
National Institute for Space Research - INPE — BRAZIL

Timothy Cichan
Lockheed Martin Corporation — UNITED STATES

Rapporteur

Norbert Frischauf
TU Graz — AUSTRIA

D1.7

Lessons Learned in Space Systems

Lessons learned are essential to significantly improve space projects implementation practices and, in turn, increase their success-rate. Collecting and sharing information regarding analysis of past and recent successes/failures is deemed the key element to support that and, in addition, it is also highly valuable since it can foster setting up of a collaborative paradigm where people from different Systems Engineering & Management cultures, in different projects, and at different maturity stages, share knowledge among teams, organizations and people, to contribute to the above common practice. For the above practice to be effective, this retrospective viewpoint shall come from a variety of sources. In this regard, the scope of the D1.7 session covers the full spectrum of a space project life-cycle activities such as: project management and systems engineering; systems and missions design; systems MAIVT (manufacturing, assembly, integration, verification, and testing); mission execution, systems exploitation, and post-mission evaluation. Additional added-value can also come from discussion and examination on side-aspects (yet important) as: diversity of standards/practices including lessons learned yielded from their adoption interpretation and application; as well as project-data management approaches (design results, engineering models, documentation, mission results, etc.) to preserve and make them available to future missions.

Co-Chairs

Yoshihisa Arikawa
Japan Aerospace Exploration Agency (JAXA) — JAPAN

Giuseppe Guidotti
Deimos Space SLU — SPAIN

Rapporteurs

Dapeng Wang
China HEAD Aerospace Technology Co. — CHINA

Hamed Gamal
Myraric — GERMANY

D1.IP

Interactive Presentations - IAF SPACE SYSTEMS SYMPOSIUM

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

Co-Chairs

Reinhold Bertrand
European Space Agency (ESA) — GERMANY

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

D2

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM

Topics of this symposium, organized by the International Astronautical Federation (IAF), are to address worldwide space transportation solutions and innovations as well as relevant technologies needed and ground support infrastructure. The symposium addresses existing vehicles, vehicles in development and future space transportation solutions. The goal is to foster understanding and cooperation amongst the world's space-faring organizations. The corresponding activities are devoted to different types of space transportation missions, systems (launch vehicle system and/or the propulsion stages, expendable or reusable, manned or unmanned) and to their safety and support operations.

	<p>Coordinators</p> <p>Yuguang Yang China Aerospace Science & Industry Corporation (CASIC) — CHINA</p> <p>Markus Jaeger The Exploration Company GmbH — GERMANY</p> <p>Randolph Kendall The Aerospace Corporation — UNITED STATES</p>
D2.1	<p>Launch Vehicles in Service or in Development</p> <p>Review of up to date status of launch vehicles currently in use in the world or under short term development with a special focus on the Space Transportation activities in Australia and New Zealand: This session also plans to highlight the Space Transportation activities in Australia and New Zealand. This can include: - Launch related propulsion/ stage development, - Orbital launch systems in development and operational, - Orbital launch sites as well as - In space Transportation systems.</p> <p>Co-Chairs</p> <p>Aaron Weaver National Aeronautics and Space Administration (NASA) — UNITED STATES</p> <p>Martin Sippel Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</p> <p>Rapporteur</p> <p>Giuseppe Rufolo CIRA Italian Aerospace Research Centre — ITALY</p> <p>Anurup Marath Indian Space Research Organization (ISRO) — INDIA</p>
D2.2	<p>Launch Services, Missions, Operations and Facilities</p> <p>Review of the current and planned launch services and support, including economics of space transportation systems, financing, cost, insurance, licensing. Advancements in ground infrastructure, ground operations, production methods, mission planning and mission control for both expendable and reusable launch services.</p> <p>Co-Chairs</p> <p>Iwao Igarashi Mitsubishi Heavy Industries, Ltd. — JAPAN</p> <p>Florian Ruhhammer MT Aerospace AG — GERMANY</p> <p>Rapporteurs</p> <p>Vincent Taponier Centre National d'Etudes Spatiales (CNES) — FRANCE</p> <p>Jeremy Pinier National Aeronautics and Space Administration (NASA), Langley Research Center — UNITED STATES</p>
D2.3	<p>Upper Stages, Space Transfer, Entry and Landing Systems</p> <p>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.</p> <p>Co-Chairs</p> <p>Oliver Kunz Beyond Gravity — SWITZERLAND</p> <p>Bryan Smith NASA Glenn Research Center — UNITED STATES</p> <p>Rapporteurs</p> <p>Nicole Viola Politecnico di Torino — ITALY</p> <p>Julio Monreal European Space Agency (ESA) — FRANCE</p>
D2.4	<p>Future Space Transportation Systems</p> <p>Discussion of future overall transportation system designs and operational concepts for both expendable and reusable systems for Earth-to orbit transportation and exploration missions considering also emerging space ventures and deep space transportation.</p> <p>Co-Chairs</p> <p>José Gavira Izquierdo European Space Agency (ESA) — THE NETHERLANDS</p> <p>Kenneth Bruce Morris Sierra Space — UNITED STATES</p> <p>Rapporteurs</p> <p>Daniel McCammon MDA SPACE INC. — CANADA</p> <p>Nicolas Bérend ONERA - The French Aerospace Lab — FRANCE</p>
D2.5	<p>Technologies for Future Space Transportation Systems</p> <p>Discussion of technologies enabling new reusable or expendable launch vehicles and in-space transportation systems. Emphasis is on early TRL hardware development and verification prior to flight, including ground testing and/or innovative technology prototype demonstrations not yet involving flight.</p> <p>Co-Chairs</p> <p>Xiaowei Wang China Academy of Launch Vehicle Technology (CALT) — CHINA</p> <p>Franck Koebel ArianeGroup — FRANCE</p> <p>Rapporteurs</p> <p>Shana Diez SpaceX — UNITED STATES</p> <p>Christophe Bonnal European Conference for Aero-Space Sciences (EUCASS) — FRANCE</p>
D2.6	<p>Future Space Transportation Systems Verification and In-Flight Experimentation</p> <p>Discussion of atmospheric and in-space flight testing and qualification of system, sub-system, and advanced technologies for future launch vehicles and in-space transportation systems. Emphasis is on higher TRL in-flight experimentation, demonstration, and qualification, including test plans and innovative technology prototype demonstrations involving or leading to flight as well as new and unique test platforms and capabilities.</p> <p>Co-Chairs</p> <p>Tetsuo Hiraiwa Japan Aerospace Exploration Agency (JAXA) — JAPAN</p> <p>David E. Glass National Aeronautics and Space Administration (NASA) — UNITED STATES</p> <p>Rapporteurs</p> <p>Christie Maddock University of Strathclyde — UNITED KINGDOM</p> <p>Mauro Augelli UK Space Agency — UNITED KINGDOM</p>

D2.7

Suborbital Rockets and Small Launchers: Concepts and Operations including Student Rocketry

Discussion of existing, planned and future Launchers for small payloads ranging from 1500 kg to as low as 1 kg into Low Earth Orbit. Includes innovative solutions such as airborne systems, evolutions from sub-orbital concepts, combinations of existing / emerging elements and new elements, reusable, partially reusable and expendable concepts, and flexible, highly responsive concepts considering also student rocketry technical achievements for the development of their sounding rockets: development of subsystems, safety issue, uses of novel technologies.

Co-Chairs

Harry A. Cikanek

National Oceanic and Atmospheric Administration
(NOAA) — UNITED STATES

Patrick Rennie

Reaction Engines Ltd. — UNITED KINGDOM

Rapporteur

Ulf Palmnäs

Swedish Space Corporation (SSC) — SWEDEN

Joachim Despatures

Ecole Polytechnique Fédérale de Lausanne (EPFL) — SWITZERLAND

D2.8

In-Space Transportation Solutions and Space Logistics

This session is focused on in-space transportation capabilities and mission architectures, existing or under study. Related enabling and support missions, such as robotic servicing and supply, as well as technology roadmaps shall be discussed. The session will also implement large scale exploration missions.

Co-Chairs

Markus Jaeger

Airbus Defence & Space, Space Systems — GERMANY

Josef Wiedemann

MT Aerospace AG — GERMANY

Rapporteur

Gennaro Russo

Campania Aerospace District, DAC — ITALY

Élcio Jeronimo de Oliveira

Associazione Italiana di Aeronautica e Astronautica
(AIDAA) — BRAZIL

Rapporteur

Gennaro Russo

Campania Aerospace District, DAC — ITALY

D2.9

D6.2

Sustainable Approaches and Impact of Space Transportation Solutions on Earth + Space Environment and on General Safety

This session is dedicated to the study of the impact of space transportation solutions on the earth and space environment and on the relevant safety aspects. This session can address methodologies for life cycle analysis, environmental impact mitigation and assessment, sustainability, and eco-design for space transportation. It will also address new and emerging technologies for space transportation systems to mitigate the impact on the earth and space environments, yet guaranteeing Space and Ground Safety.

Co-Chairs

Aline Decadi

European Space Agency (ESA) — FRANCE

Charles E. Cockrell Jr.

National Aeronautics and Space Administration (NASA) — UNITED STATES

Rapporteur

Francesco Santoro

Altec S.p.A. — ITALY

Aline Decadi

European Space Agency (ESA) — FRANCE

D2.IP

Interactive Presentations - IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM

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

Co-Chairs

Sunny Narayanan

Florida State University — UNITED STATES

Jens Lassmann

ArianeGroup — GERMANY

Rapporteur

Markus Jaeger

Airbus Defence & Space, Space Systems — GERMANY

D3

23RD IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT

This symposium, organised by the International Academy of Astronautics (IAA), will involve papers and discussion that traverse a wide range of highly valuable future space capabilities (FSC) – in other words “building blocks” for future space exploration, development and discovery – that could enable dramatic advances in global space goals and objectives. The international discussion of future directions for space exploration and utilisation is fully underway, including activities involving all major space-faring nations. Decisions are now being made that will set the course for space activities for many years to come. New approaches are needed that establish strategies, architectures, concepts 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

John C. Mankins

ARTEMIS Innovation Management Solutions, LLC — UNITED STATES

Maria Antonietta Perino

Thales Alenia Space Italia — ITALY

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

John C. Mankins

ARTEMIS Innovation Management Solutions, LLC — UNITED STATES

Maria Antonietta Perino

Thales Alenia Space Italia — ITALY

Rapporteur

Nasr Al-Sahhaf

— Saudi Arabia

D3.2A

Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems

The emergence of novel systems and infrastructures will be needed to enable ambitious scenarios for sustainable future space exploration and utilization. New, reusable space infrastructures must emerge in various areas include the following: (1) infrastructures that enable affordable and reliable access to space for both exploration systems and logistics; (2) infrastructures for affordable and reliable transportation in space, including access to/from lunar and planetary surfaces for crews, robotic and supporting systems and logistics; (3) infrastructures that allow sustained, affordable and highly effective operations on the Moon, Mars and other destinations; and, (4) supporting in space infrastructures that provide key services (such as communications, navigation, etc.). Considering its focus on design and operation solutions for future crewed missions, in 2025 this session will be jointly curated with the recently-formed IAF Space Habitats Committee, whose aims include fostering research and partnerships in the design, the construction, the scalability, the commercialization, the disassembling and the sustainability of space habitats and associated infrastructures, emphasizing Moon and Mars surface structures and orbital stations. Papers are solicited in all areas related to the scope of this session, from a variety of disciplinary approaches.

Co-Chairs

Frank Preud'homme
QinetiQ Space nv — BELGIUM

Gary Barnhard
Xtraordinary Innovative Space Partnerships, Inc. — UNITED STATES

Julie Patarin-Jossec
Spartan Space — FRANCE

Rapporteurs

Paivi Jukola
Aalto University — FINLAND

D3.2B

Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Technologies

The emergence of new technologies will be essential to realizing the various systems and infrastructures that will be needed to enable ambitious scenarios for sustainable future space exploration, utilization and eventual settlement. Technologies for new, reusable space infrastructures are needed, including 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 robotic and human 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

Raymond G. Clinton
NASA Marshall Space Flight Center — UNITED STATES

Rapporteur

Gary Barnhard
Xtraordinary Innovative Space Partnerships, Inc. — UNITED STATES

D3.3

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 is 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 Modeling 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

Maria Antonietta Perino
Thales Alenia Space Italia — ITALY

Rapporteur

Paivi Jukola
Aalto University — FINLAND

D3.IP

Interactive Presentations Interactive Presentations - 23RD IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT

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

Co-Chairs

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

Maria Antonietta Perino
Thales Alenia Space Italia — ITALY

D4

23RD IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE

This 23rd symposium is organized by the International Academy of Astronautics (IAA). 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 the Moon Village can contribute to the resolution of World Societal Changes as well as increasing the countries engaged in lunar activities.

Coordinators

Giuseppe Reibaldi
Moon Village Association (MVA) — AUSTRIA

Gongling Sun
International Space University — FRANCE

D4.1

Innovative Concepts and Technologies

1) In order to realize future, programs of space exploration and resource utilization, a focused suite of transformational new system concepts and enabling technologies must be developed during the coming decades. 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. 2) Ideally, the concepts should be presented in three categories: 1. Concepts which represent a significant advance, but require laboratory advancement, and 2. Concepts which have been demonstrated to some level in the laboratory, but require demonstration to validate their utility, and 3. Concepts which identify cross-cutting advances which, when combined can be successfully developed to support transformational new system concept. Papers are solicited in these and related areas

Co-Chairs

Alessandro Bartoloni
National Institute of Nuclear Physics - INFN — ITALY

Timothy Cichan
Lockheed Martin Corporation — UNITED STATES

Rapporteur

XiaoWei Wang
China Academy of Launch Vehicle Technology (CALT) — CHINA

D4.2

Contribution of Moon Village to Solving Global Societal Issues

Moon Village is a concept that brings together efforts, world-wide, from the private sector, governments, academics and others to explore and use the Moon in a sustainable manner. Moon Village is a community of projects carried out by stakeholders from different fields (for example, technical, scientific, cultural, economic) working together. The implementation of the Moon Village has already started with missions and activities in line with its spirit, it is a major step forward for the peaceful development of humankind. Moon Village can offer a new start to humanity on the Moon and on the Earth by contributing to solve global societal issues. The session will discuss the contributions of the Moon Village to the solution of global challenges (e.g., energy, population, sustainable development, many others). How the Moon Village will support the understanding of the global societal issues and bring benefits to society on a global scale will also be discussed. The session will include also the identification of the related technologies that need to be developed. The definition of a roadmap complementary to the UN Agenda 2030 will be also discussed.

	<p>Co-Chairs</p> <p>Giuseppe Reibaldi <i>Moon Village Association (MVA) — AUSTRIA</i></p> <p>Xiaowei Wang <i>China Academy of Launch Vehicle Technology (CALT) — CHINA</i></p> <p>Rapporteur</p> <p>Paivi Jukola <i>Aalto University — FINLAND</i></p>
D4.3	<p>The Modern Day Space Elevator as a Permanent Transportation Infrastructure</p> <p>Space elevators position humanity to address Earth's challenges from a new vantage point. We are on the brink of transforming our relationship with space, offering an eco-friendly, cost-effective, and efficient logistics method to transport large cargoes into space. This gateway will provide unparalleled opportunities in space exploration, resource utilization, and satellite assembly. Starting in the late 2030s, space elevator infrastructures will deliver satellites and other payloads to GEO, the Moon and Mars at the rate of 30,000 tonnes, every year. This surpasses the total launched between 1957 and 2022. Indeed – a seismic shift! By harnessing electricity for lift, each space elevator promises daily deliveries of up to 14 tonnes to geostationary orbit (GEO), dramatically reducing the environmental impact as compared to rocket launches. Space elevator designs have an unmatched 70% pad mass to GEO efficiency, as compared to only 2% for rockets. They have the potential to unlock solutions to Earth's most pressing challenges such as harvesting solar power from space, climate monitoring, and global communication networks. As humanity stands on the cusp of this new era, these ribbons from ocean to space offer the promise of making space accessible to all, fostering global cooperation, positioning humanity to address Earth's challenges, and inspiring a sustainable future for our planet. The Keynote Speech for this technical session will be entitled the "Jerome Pearson Memorial Lecture."</p> <p>Co-Chairs</p> <p>Peter Swan <i>Teaching Science and Technology, Inc (TSTI) — UNITED STATES</i></p> <p>Yoji Ishikawa <i>Obayashi Corporation — JAPAN</i></p> <p>Rapporteur</p> <p>Daniel Griffin <i>Royal Institute of Technology (KTH) — SWEDEN</i></p>
D4.4	<p>Strategies for Rapid Implementation of Interstellar Missions: Precursors and Beyond</p> <p>Knowledge about space beyond our solar system and between the stars—that is interstellar space—is lacking data. Even as IBEX, NASA's Interstellar Background Explorer, studies the edge of our solar system, it still is confined to earth orbit. Arguably, some of the most compelling data to understand the universe we live in will come from sampling the actual environment beyond our solar system as Voyager 1 and Voyager 2 spacecraft are on the threshold of doing. In the 36 years since the Voyager probes' launches, significant advances in materials science, analytical chemistry, information technologies, imaging capabilities, communications and propulsion systems have been made. The recently released IAA study: "Key Technologies to Enable Near-Term Interstellar Scientific Precursor Missions" along with significant initiatives like the DARPA seed-funded 100 Year Starship and the Breakthrough Starshot project, signal the need, readiness and benefits to aggressively undertaking interstellar space missions. This session seeks to define specific strategies and key enabling steps to implement interstellar precursor missions within the next 10-15 years. Suggestions for defined projects, payloads, teams, spacecraft and mission profiles that leverage existing technological capacities, yet will yield probes that generate new information about deep space, rapidly exit the solar system and which can be launched before 2040 are sought.</p> <p>Co-Chairs</p> <p>Mae Jemison <i>100 Year Starship — UNITED STATES</i></p> <p>Giancarlo Genta <i>Politecnico di Torino — ITALY</i></p> <p>Rapporteur</p> <p>Les Johnson <i>National Aeronautics and Space Administration (NASA), Marshall Space Flight Center — UNITED STATES</i></p>
D4.5	<p>Space Resources, the Enabler of the Earth-Moon Ecosphere</p> <p>1) With NASA announcing the Artemis Program to return to the Moon by 2024, and increasing numbers of companies investing in extraterrestrial resource utilization, this session is dominated by technology assessments and legal analyses associated with space resources. 2) In particular, the National Aeronautics and Space Administration is seeking commercially developed payloads to exploit lunar resources for supplies, fuel and other consumables. There are many opportunities to participate. 3) One issue which nags U.S. investors is the lack of a legal regime for authorization and continuing oversight of commercial entities seeking to exploit space resources for profit. Fortunately, Luxembourg has defined such a legal regime for its country's payloads. 4) This session seeks innovative ideas and concepts in the legal and technological regime. This session also seeks willing investors to present concepts for financing concepts to exploit space resources.</p> <p>Co-Chairs</p> <p>Roger X. Lenard <i>LPS — UNITED STATES</i></p> <p>Mark Sundhal <i>Cleveland State University — UNITED STATES</i></p> <p>Rapporteur</p> <p>Peter Swan <i>Space Elevator Development Corporation — UNITED STATES</i></p>
D4.IP	<p>Interactive Presentations - 23RD IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE</p> <p>This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Visions and Strategies for the Future addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the D Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.</p> <p>Co-Chairs</p> <p>Helen Tung <i>NewSpace2060 — AUSTRALIA</i></p> <p>Gongling Sun <i>International Space University — FRANCE</i></p>
D5	<p>58TH IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES</p> <p>Increasingly complex challenges around quality, safety, and security reflect how a space system can be developed and operated to perform its functions at its best with the proper robustness. In that environment, where radiation is not the least stress and possible ill-intentioned actions may occur, decreasing the level of failures in space activities is a must. Knowledge management (the proper capturing, protecting, and sharing of knowledge) and application of lessons learned and experience are key factors. This International Academy of Astronautics Symposium will be a lively discussion and raise awareness of new and innovative approaches to: obtain and run reliable and safe space systems: design solutions, validation, and tests; software development, validation, and security; and methods, management approaches, and regulations to improve the quality, efficiency, and collaborative ability of space programs and operations. All aspects are considered: risk management, complexity and security of systems and operations, knowledge and information management, human factors, economical constraints, international cooperation, norms, and standards.</p> <p>Coordinators</p> <p>Jeanne Holm <i>City of Los Angeles — UNITED STATES</i></p> <p>Roberta Mugellesi-Dow <i>European Space Agency (ESA) — UNITED KINGDOM</i></p>
D5.1	<p>For a Successful Space Program: Quality and Safety!</p> <p>Space is a difficult challenge, and no complex program can be successful without a creative and thoughtful approach to quality and safety! Relying on luck cannot be the only way to proceed! Beginners or veterans, for training, for science or for industry, for small or large programs, share your projects, methods, observations, analyses of successes or failures... This session deals with methods, tests, standards for the analysis and mitigation of the many risks to maintain the desired quality and required safety. It offers an opportunity to discuss all aspects of the life cycle (including design, development and production philosophy, operations) and the associated risk management approach. It concerns all types of space missions: transportation systems, orbital systems, exploration vehicles, and is also a management, manpower and education issue.</p> <p>Co-Chairs</p> <p>Alexander S. Filatyev <i>Lomonosov Moscow State University — RUSSIAN FEDERATION</i></p> <p>Rapporteur</p> <p>Kaitlyn Holm <i>University of Pennsylvania — UNITED STATES</i></p>

D5.2

Emerging Trends of Knowledge Management in Organizations

Digital transformation and innovations, such as cloud computing, new collaboration tools, intelligent search technologies, AI, are changing how people access and share the knowledge. Therefore, knowledge management needs to evolve adapting to the new environment and users needs. Technology is undoubtedly a big part of the growing need for a more effective knowledge management. Although technology plays crucial roles, KM will fail if end users and stakeholders are not in the centre of the strategy, design, implementation, and operations. Key themes addressed during the session are trends, innovations, concerns as well as practical challenges encountered, and solutions and technologies adopted in the field of Knowledge Management in Organisations to sustain, energise and invigorate the ability to learn, innovate, and share knowledge. The session aims to include case studies that demonstrate how KM strategies have been applied and the lessons learned, the challenges faced by the organizations, and innovative solutions that facilitates knowledge sharing and collaboration as well as search mechanisms.

Co-Chairs

Roberta Mugellesi-Dow
European Space Agency (ESA) — UNITED KINGDOM

Jeanne Holm
City of Los Angeles — UNITED STATES

Rapporteur

Daniel Galaretta
Centre National d'Etudes Spatiales (CNES) — FRANCE

D5.3

Prediction, Testing, Measurement and Effects of Space Environment on Space Missions

The space environment can strongly impact the performance and reliability of space missions. It has several natural and induced components, including high-energy radiation, plasma, atomic oxygen, planetary dust, extreme temperature, vacuum, micro-gravity, micrometeoroid and debris, molecular and particulate contamination, etc. Environmental conditions yield constraints at design phase, and important risks in the course of the mission. The evaluation of the nominal and worst-case conditions to be met, mitigation and protection options, and of their impact on missions and flight systems are thus of prime importance. This session will encompass the following topics: Space Weather, Plasma, Spacecraft Charging, Radiation, Atomic Oxygen, Planetary Dust, Molecular and Particulate Contamination, Plume Induced Contamination Effects and Interactions, Combined Environments - flight measurements; - physical processes; - prediction of nominal or worst case condition; - ground testing; - flight experiments and lessons learned; - modelling and prediction; thermos-optical degradation effects.

Co-Chairs

Henry de Plinval
Office National d'Etudes et de Recherches
Aérospatiales (ONERA) — FRANCE

Teppei Okumura
Japan Aerospace Exploration Agency (JAXA) — JAPAN

Rapporteur

Carlos Soares
NASA Jet Propulsion Laboratory — UNITED STATES

D5.4

Cybersecurity in Space Systems, Risks and Countermeasures

In the past few years our society and economy have become largely dependent on information technology, computer networks, and IoT solutions. Managing cyber-related risks and protecting against cyberattacks is therefore a growing concern requiring the identification and deployment of relevant cybersecurity measures and solutions. This session covers several topics focused on cyber-security: tools & methods aiming at preventing & forecasting attacks, risk assessment and cyber intelligence, protecting systems, infrastructures and data, space-enabled solutions, making secure the use of satellite communications, earth observation and satellite navigation, addressing all the means to mitigate risks and raising awareness via specific training, information sharing and analysis, addressing new areas candidates for standardisation. New technologies and practices emerging in cybersecurity are also relevant such as the development of quantum cryptography and quantum key distribution, combining big data analytics, artificial intelligence and machine learning to analyse communications patterns and operations data. New trends include the development of cyber security test ranges and certification schemes specific to each domain of activities, to better identify threats and vulnerabilities and develop customised solutions.

Co-Chairs

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

Stefano Zatti
University of Rome "La Sapienza" — ITALY

Rapporteur

Nil Angli
European Space Agency (ESA) — UNITED KINGDOM

D5.IP

Interactive Presentations - 58TH IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES

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

Co-Chairs

Jeanne Holm
City of Los Angeles — UNITED STATES

Roberta Mugellesi-Dow
European Space Agency (ESA) — UNITED KINGDOM

D6

IAF SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES

Topics of this symposium, organized by the International Astronautical Federation (IAF), 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

Francesco Santoro
Altec S.p.A. — ITALY

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

Francesco Santoro
Altec S.p.A. — ITALY

Rapporteur

Gennaro Russo
Campania Aerospace District, DAC — ITALY

D6.2

D2.9

Sustainable Approaches and Impact of Space Transportation Solutions on Earth + Space Environment and on General Safety

This session is dedicated to the study of the impact of space transportation solutions on the earth and space environment and on the relevant safety aspects. This session can address methodologies for life cycle analysis, environmental impact mitigation and assessment, sustainability, and eco-design for space transportation. It will also address new and emerging technologies for space transportation systems to mitigate the impact on the earth and space environments, yet guaranteeing Space and Ground Safety.

Co-Chairs

Charles E. Cockrell Jr.
National Aeronautics and Space Administration (NASA)
— UNITED STATES

Emmanuelle David
Ecole Polytechnique Fédérale de Lausanne (EPFL) — SWITZERLAND

Rapporteur

Francesco Santoro
Altec S.p.A. — ITALY

Co-Chairs

Aline Decadi
European Space Agency (ESA) — FRANCE

Francesco Santoro
Altec S.p.A. — ITALY

Rapporteur

D6.3

Enabling Safe Commercial Spaceflight: Vehicles and Spaceports

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

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

Francesco Santoro
Altec S.p.A. — ITALY

Rapporteur

Gennaro Russo
Campania Aerospace District, DAC — ITALY

D6.IP

Interactive Presentations - IAF SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES

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

Category



SPACE AND SOCIETY

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

- E1 IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM
- E2 52ND STUDENT CONFERENCE
- E3 37TH IAA SYMPOSIUM ON SPACE POLICY, REGULATIONS AND ECONOMICS
- E4 58TH IAA HISTORY OF ASTRONAUTICS SYMPOSIUM
- E5 35TH IAA SYMPOSIUM ON SPACE AND SOCIETY
- E6 IAF BUSINESS INNOVATION SYMPOSIUM
- E7 IISL COLLOQUIUM ON THE LAW OF OUTER SPACE
- E8 IAA MULTILINGUAL ASTRONAUTICAL TERMINOLOGY SYMPOSIUM
- E9 IAF SYMPOSIUM ON SECURITY, STABILITY AND SUSTAINABILITY OF SPACE ACTIVITIES
- E10 IAF SYMPOSIUM ON PLANETARY DEFENSE AND NEAR-EARTH OBJECTS
- E11 IAF SYMPOSIUM ON EMERGING SPACE ECOSYSTEMS

Category coordinated by Pascale Ehrenfreund, *The George Washington University / COSPAR – AUSTRIA*

E1

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM

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

Coordinators

Remco Timmermans
International Space University (ISU) — UNITED
KINGDOM

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

E1.1

Lift Off: Primary and Secondary Education

This session will explore innovative programmes and curricula focusing on space education and outreach to students up to the age of 18. Emphasis will be placed on programmes that effectively engage primary and secondary school students in Science, Technology, Engineering, Arts and Mathematics (STEAM), help them develop key skills, and foster a long-term passion for space. This session will also consider programmes and activities that focus on the professional development of primary and secondary school teachers, or on educational methodologies of relevance to primary and secondary education. When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Kaori Sasaki
Japan Aerospace Exploration Agency (JAXA) — JAPAN

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

Rapporteurs

Kerrie Dougherty
— AUSTRALIA

Alina Vizireanu
Space Generation Advisory Council (SGAC) — UNITED
KINGDOM

E1.2

Space for All

This session will showcase and provide examples of solutions via education, culture and outreach activities as well as Belonging, Accessibility, Diversity, Equity, Justice and Inclusivity (BADEJI, EDI, DEIA) protocols in the workplace, organisations and space agendas. Learnings and recommendations from the perspectives of professionals, scholars, experts, educators, artists and cultural institutions including museums, space agencies and non-profit organisations will be included. From code of ethics to pluralistic commitments towards achieving equity and accessibility, all relevant methodologies and formats are welcomed. This session is a showcase of demonstrated practices and/or experiential learning, and work presented should already have been implemented before the presentation. When submitting abstracts for this session, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Nelly Ben Hayoun-Stéphanie
SETI Institute — UNITED KINGDOM

Asanda Sangoni
South African National Space Agency (SANSA) — SOUTH AFRICA

Rapporteur

Valerie Anne Casasanto
NASA Goddard/University of Maryland, Baltimore County (UMBC) — UNITED STATES

E1.3

On Track: Undergraduate Space Education

This session will explore innovative space education and outreach programmes for undergraduate students. This can include the development and delivery of innovative courses, project-based work, and work placements. Emphasis should be placed on how the programme is structured for maximum impact, how the impact is measured and how the lessons learned are being applied to other courses. This session will also consider programmes and activities that focus on the professional development of undergraduate educators, or on educational methodologies of relevance to undergraduate education. When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

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

Christopher Vasko
European Space Agency (ESA) — THE NETHERLANDS

Rapporteurs

Alev Sönmez
Fraunhofer FHR — GERMANY

Ozan Kara
Technology Innovation Institute (TII) — UNITED ARAB EMIRATES

E1.4

In Orbit: Postgraduate Space Education

This session will explore innovative space education and outreach programmes for postgraduate students. This can include the development and delivery of innovative courses, project-based work, and work placements. Emphasis should be placed on how the programme is structured for maximum impact, how the impact is measured and how the lessons learned are being applied to other courses. This session will also consider programmes and activities that focus on the professional development of postgraduate educators, or on educational methodologies of relevance to postgraduate education. When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Manuela Aguzzi
Space Applications Services — BELGIUM

Sandra Haeuplik-Meusburger
TU Wien — AUSTRIA

David Spencer
The Aerospace Corporation — UNITED STATES

Rapporteurs

Victor Baptista
Ideia Space — BRAZIL

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. The work presented in this session may include but is not limited to formal professional development and accreditation programmes and professional development activities by companies, nonprofits and other actors. When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Kathleen Coderre
Lockheed Martin (Space Systems Company) — UNITED STATES

Olga Zhdanovich
Modis — THE NETHERLANDS

E1.6

Calling Planet Earth: Large Engagement and Communications Initiatives

This session will highlight activities, programmes and strategies for communicating with and engaging the general public in space activities. Topics should involve outreach outside the formal education system with demonstrated or projected reach in the many thousands or millions. Presentations in the session focus on measurable outcomes and demonstrate the strategic nature and thinking in the design of the work. Presenters will be expected to show objective assessment of results or thoroughly describe the design of their evaluation plans. When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

E1.7

Co-Chairs

Remco Timmermans
International Space University (ISU) — UNITED KINGDOM

Alina Vizireanu
Space Generation Advisory Council (SGAC) — UNITED KINGDOM

Rapporteurs

Chloé Carrière
Ecole Polytechnique Fédérale de Lausanne (EPFL) — SWITZERLAND

Milica Milosev
Econnects — SERBIA

Sending out a Signal: Innovative Outreach and Communications Initiatives

This session will highlight non-traditional, inventive, innovative, and new types of outreach activities, programmes and strategies for engaging audiences general public in space activities, outside the formal education system, with demonstrated outcomes. This could involve new outreach strategies, tactics, or storytelling mechanisms, new audiences, or using new technologies. The session will focus on results and evaluation of the activity, if it has been completed, or a thorough description of the expected outcomes of the activity. Presenters will provide information about how participants/audience were drawn to the activity (e.g., how it was promoted or disseminated). When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Vera Mayorova
Bauman Moscow State Technical University — RUSSIAN FEDERATION

Olga Zhdanovich
Modis — THE NETHERLANDS

Rapporteurs

Carol Christian
STScI — UNITED STATES

Kaori Sasaki
JAXA — JAPAN

E1.8

Show Us Space: Demonstration of Hands On Education and Outreach

Presenters in this session will demonstrate effective hands-on activities and experiments to explore, teach and reinforce space-related concepts. Hands-on space education and outreach is a powerful way to introduce and teach space concepts and Science, Technology, Engineering, Arts and Math (STEAM) concepts, especially with diverse learners. During the session, presenters will not only present the ideas behind the activity, but also physically demonstrate it hands-on and engage the session audience at the IAC. Note: A physical in-person demonstration of the activity is mandatory for this session. If you would like to make a presentation only, please submit your abstract to a different session. Submissions that cannot be physically demonstrated on-site (for example CubeSats) will be rejected. When submitting abstracts for SEOC sessions, please: • Clearly identify the hands-on nature of the work presented, how the audience at the IAC will sample this work, and its space connection. • Include any special technical requirements you will need for your demonstration such as "live webcam connection to remote location", "four long tables for audience members to gather around to build a model", or "ability to be near a window to view the sky for the demonstration." • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Lyn Wigbels
American Astronautical Society (AAS) — UNITED STATES

Valerie Anne Casasanto
NASA Goddard/University of Maryland, Baltimore County (UMBC) — UNITED STATES

Rapporteurs

Remco Timmermans
International Space University (ISU) — UNITED KINGDOM

Marcos Eduardo Rojas Ramirez
Space Generation Advisory Council (SGAC) — FRANCE

E1.9

Space Culture: New Processes of Public Engagement in Space through Culture and Art

This session will focus on the education and outreach activities of institutions such as museums, space agencies, non-profit organisations and individual contributions, which link space with culture, humanities and critical thinking. This session will specifically look at papers elaborating on new and original processes used in public engagement through culture and art. Presenters will be required to explain how their projects informed critical reflection and what mechanics in public engagement through culture and art were used to allow it. When submitting abstracts for SEOC sessions, please: • Clearly identify the connection to the session's described scope and to space. • Briefly describe what you will present, including results and evaluation of your work, if it has been completed, or a thorough description of the expected outcomes of the work. • Include information about what makes your work unique, original or innovative and worth sharing with the international space community. • State your work's goal, the intended audience, the measurable objectives that were set, and if the work is in planning or has already occurred. • Provide context describing the research and/or analysis you conducted in choosing the purpose of the activity, the intended audience, and the design of the activity. • Include reference to quantitative or qualitative data gathered through evaluations, surveys or other means. • If any theories are developed, please include information about the practical applicability of the information. • Consider that your audience is international and focus on what others working in the field can learn from your work. Include lessons learned, recommendations or other takeaway messages. • Make sure that the abstract provides a coherent idea or narrative for someone unfamiliar with your work.

Co-Chairs

Nelly Ben Hayoun-Stépanian
SETI Institute — UNITED KINGDOM

Daniela De Paulis
— THE NETHERLANDS

Rapporteurs

Aoife van Linden Tol
Feral Events — UNITED KINGDOM

Kerrie Dougherty
— AUSTRALIA

E1.IP

Interactive Presentations - IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM

This session offers a unique opportunity to share your education and outreach activities through an interactive presentation on any of the subjects of the symposium. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations presented by the authors. Authors will be assigned a ten-minute slot to present the topic and interact with the attendees present. The Interactive Presentation may take advantage of digital capabilities, including Powerpoints, embedded hyperlinks, pictures, audio and video clips. An award will be presented to the author of the best Interactive Presentation in the E Category at a special ceremony. When submitting abstracts for this session, please: Provide context describing the research and/or analysis you conducted when choosing the purpose of the activity, targeting an audience, and designing the activity. Clearly state the goal of the activity, the intended audience, the measurable objectives that were set, and if the activity is in planning or has already occurred. Provide a short but clear description of the activity or the programme. Include information about anything that makes the activity unique, original or innovative. Provide information about how your participants/audience were drawn to the activity (e.g., how it was promoted or disseminated). Set up the analysis you'll provide in your presentation, which should include results and evaluation of the activity, if it has been completed, or a thorough description of the expected outcomes of the activity. You will be expected to assess results against your measurable objectives that indicate if your goal was met. Include your top-level lessons learned, best practices, recommendations for future activities, practical applicability of theoretical work, or other takeaway findings.

Co-Chairs

Scott Madry
International Space University (ISU) — UNITED STATES

Eberhard Gill
Delft University of Technology — THE NETHERLANDS

E2

53RD IAF STUDENT CONFERENCE

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

Coordinators

Franco Bernelli-Zazzera
Politecnico di Milano — ITALY

Marco Schmidt
University Wuerzburg — 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 53rd International Student Competition. This session is NOT for team projects. Team project papers should be submitted to session E2.3. To accommodate for the different national education schemes, the distinction between undergraduate and graduate students is based uniquely upon the number of years of university education, as follows: - undergraduate students: students who did their work within the 4th year at university level, for instance a Bachelor thesis. - graduate students: students who did their work from the 5th year at university level, for instance a Master thesis. If appropriate, faculty members that advised students during the preparation of their work can be listed as a co-author (never as a first author) and their status of advisors must be clearly indicated. Principle responsibilities for a submitted student conference paper fall with the student author/s and as such they must be listed first. The content of the paper should mainly reflect the contribution of the student. Faculty co-authors cannot present the paper or answer questions at the student conferences. The selection of the oral presentations is solely based on the submitted abstracts. We strongly recommend that you submit an abstract with an extensive description of your topic, including a detailed explanation of your contribution and the novelty of your work. French, German, US and UK students submitting abstracts for the sessions E2.1 and E2.2 will be forwarded to the corresponding national competition coordinators. The following contact persons are available for more information: For the French national competition: Emmanuel Zenou – emmanuel.zenou@isae-supaero.fr For the German national competition: Marco Schmidt – marco.schmidt@uni-wuerzburg.de For the US national competition - Michael Lagana - MichaelL@aiaa.org For the UK national competition: Fabrizio Bernardini - iac_comp@bis-space.com Paper accepted for the competition and the presentations will be evaluated along the following criteria: Technical Content, Originality, Practical Application, General Presentation, Knowledge of the Subject

Co-Chairs

Franco Bernelli-Zazzera
Politecnico di Milano — ITALY

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

Rapporteur

Jeong-Won Lee
Korea Aerospace Research Institute (KARI) — 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 53rd International Student Competition. This session is NOT for team projects. Team project papers should be submitted to session E2.3. To accommodate for the different national education schemes, the distinction between undergraduate and graduate students is based uniquely upon the number of years of university education, as follows: - undergraduate students: students who did their work within the 4th year at university level, for instance a Bachelor thesis. - graduate students: students who did their work from the 5th year at university level, for instance a Master thesis. If appropriate, faculty members that advised students during the preparation of their work can be listed as a co-author (never as a first author) and their status of advisors must be clearly indicated. Principle responsibilities for a submitted student conference paper fall with the student author/s and as such they must be listed first. The content of the paper should mainly reflect the contribution of the student. Faculty co-authors cannot present the paper or answer questions at the student conferences. The selection of the oral presentations is solely based on the submitted abstracts. We strongly recommend that you submit an abstract with an extensive description of your topic, including a detailed explanation of your contribution and the novelty of your work. French, German, US and UK students submitting abstracts for the sessions E2.1 and E2.2 will be forwarded to the corresponding national competition coordinators. The following contact persons are available for more information: For the French national competition: Emmanuel Zenou – emmanuel.zenou@isae-supaero.fr For the German national competition: Marco Schmidt – marco.schmidt@uni-wuerzburg.de For the US national competition - Michael Lagana - MichaelL@aiaa.org For the UK national competition: Fabrizio Bernardini - iac_comp@bis-space.com Paper accepted for the competition and the presentations will be evaluated along the following criteria: Technical Content, Originality, Practical Application, General Presentation, Knowledge of the Subject

Co-Chairs

Marco Schmidt
University Wuerzburg — GERMANY

Ioana-Roxana Perrier
Institute of Polytechnic Science and Aeronautics (IPSA) — FRANCE

Rapporteur

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

E2.3 GTS.4

Student Team Competition

Undergraduate and graduate level student teams (students no more than 28 years of age) 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. If appropriate, faculty members that advised students during the preparation of their work can be listed as a co-author (never as a first author) and their status of advisors must be clearly indicated. Principle responsibilities for a submitted student conference paper fall with the student authors and as such they must be listed first. The content of the paper should mainly reflect the contribution of the students. Faculty co-authors cannot present the paper or answer questions at the student conferences. The selection of the oral presentations is solely based on the submitted abstracts. We strongly recommend that you submit an abstract with an extensive description of your topic, including a detailed explanation of your contribution and the novelty of your work. Furthermore, a short description how your team worked together to achieve the project goal should be included. Paper accepted for the competition and the presentations will be evaluated along the following criteria: Technical Content, Originality, Practical Application, General Presentation, Knowledge of the Subject.

Co-Chairs

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

Franco Bernelli-Zazzera
Politecnico di Milano — ITALY

Rapporteur

Kathleen Coderre
Lockheed Martin (Space Systems Company) — UNITED STATES

E2.4

Educational Pico and Nano Satellites

Joint session with SUAC. The session covers all aspects related to educational small satellites.

Co-Chairs

Xiaozhou Yu
Dalian University of Technology (DUT) — CHINA

Franco Bernelli-Zazzera
Politecnico di Milano — ITALY

Anna Guerman
Centre for Mechanical and Aerospace Science and Technologies (C-MAST) — PORTUGAL

E2.IP. Interactive Presentations - 53RD IAF STUDENT CONFERENCE

E3 38TH IAA SYMPOSIUM ON SPACE POLICY, REGULATIONS AND ECONOMICS

This Symposium, organized by the International Academy of Astronautics (IAA), will provide overview of the current trends in space policy, regulations and economics, by covering national as well as multilateral space policies and plans. The symposium also integrates the IAA/IISL Scientific-Legal Roundtable.

Coordinators

Jacques Masson

European Space Agency (ESA) — THE NETHERLANDS

Pieter Van Beekhuizen

Stichting Space Professionals Foundation (SSPF) — THE NETHERLANDS

E3.1 International Cooperation In Using Space For Sustainable Development: The “Space2030” agenda

As the societal benefits of space technologies and applications are growing, the international community has increasingly shifted its attention to their contributions to the global agendas on sustainability and development, in particular the Sustainable Development Goals (SDGs). In this regard, the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) has decided to develop a “Space2030” agenda and its implementation plan. This session provides the opportunity to discuss the agenda as finalized at COPUOS 2021, its implementation, especially how international cooperation in space activities can contribute to these objectives.

Co-Chairs

Dumitru-Dorin Prunariu

Commission d’Astronautique de l’Academie Roumaine — ROMANIA

Niklas Hedman

COSPAR — AUSTRIA

Rapporteurs

Alexander Soucek

Austrian Space Forum — AUSTRIA

Peter Stubbe

DLR (German Aerospace Center) — GERMANY

E3.2 The Future of Space Exploration and Innovation

Space exploration missions and plans have been emerging around the world, targeting different destinations from LEO, to the Moon and Mars, and with an increasing participation of new public and private actors. The session will focus on the current plans of future exploration missions of various space exploration stakeholders and will provide a forum to reflect on the trends and present the latest developments in the field.

Co-Chairs

Marc Haese

DLR, German Aerospace Center — GERMANY

Nicolas Peter

International Space University (ISU) — FRANCE

Rapporteur

Devanshu Ganatra

International Institute of Space Law (IISL) — UNITED STATES

Anmol Dhawan

International Institute of Space Law (IISL) — THE NETHERLANDS

E3.3 Economic Resilience and the Space Economic/Industrial Sector

Objective: The Space Economy Committee invites researchers, industry professionals, policymakers, and scholars to submit paper abstracts that align with the economic dimensions of building economic resilience within the space sector, focusing on how the sector can adapt and thrive in the face of global economic uncertainties and disruptions. This session seeks to foster a deeper understanding of the strategies and mechanisms that ensure the continuity and growth of space activities, even under challenging conditions. **Context:** Resilience refers to the ability of the space economy and its associated activities, industries, and institutions to withstand, adapt to, and recover from disruptions, challenges, or shocks from unforeseen events.

Submissions should address the following areas:

- Definitions, measurement issues, and models/methods for analyzing the resilience of the space economy.
- Data-driven approaches to understanding and enhancing the resilience of the space economy.
- Case studies on how space missions or programs have adapted to or mitigated economic disruptions
- Emerging markets and opportunities that enhance the resilience of the space economy.
- Impact of new technologies (e.g., quantum computing, AI) on the resilience of the space economy.
- Forecasting future economic trends in the space sector and their potential impacts on global economic resilience.

Submission Guidelines:

- Abstracts should be concise, clearly outlining the research question, methodology, key findings, and relevance to the theme “Economic Resilience of the Space Sector.”
- The submission should highlight the novelty and contribution of the work to the existing body of knowledge on economic resilience in the space economy.
- Collaborations with organizations outside the traditional space community are encouraged to bring diverse perspectives and innovative approaches.

Co-Chairs

Pieter Van Beekhuizen

Stichting Space Professionals Foundation (SSPF) — THE NETHERLANDS

Henry Hertzfeld

Space Policy Institute, George Washington University — UNITED STATES

Rapporteurs

Luigi Scatteia

PricewaterhouseCoopers Advisory (PwC) — FRANCE

Bhavya Lal

National Aeronautics and Space Administration (NASA) — UNITED STATES

E3.4 Assuring a Safe, Secure and Sustainable Space Environment for Space Activities

The space environment today involves a growing number of states, government consortia, and private sector entities with different strategic objectives and levels of economic and technological development. It is the responsibility of these actors to promote a secure, stable, and resilient environment in order to ensure uninterrupted access to space and security of space operations in Earth’s orbits and beyond, especially as space systems now support day-to-day civilian and commercial life in many countries, enabling socioeconomic prosperity. A number of established spacefaring nations have developed national policies and strategies to address these concerns. At a multilateral level, a body of principles and rules governing space activities was established during the second half of the twentieth century. However, the rapid pace of the development, testing, and fielding of various launch technologies, as well as on-orbit systems for terrestrial support and exploration of the cis-lunar orbit and beyond, brings unprecedented challenges to all space operators. It is the purpose of this session to seek to address them.

Co-Chairs

Peter Stubbe

German Aerospace Center (DLR) — GERMANY

Jana Robinson

The Prague Security Studies Institute — CZECH REPUBLIC

Rapporteur

Gina Petrovici

German Aerospace Center (DLR) — GERMANY

E3.5 E7.6 39TH IAA/IISL Scientific Legal Roundtable: Lunar Operations and Orbital Management: Governance in Cislunar Space

(Invited papers only, please do not submit abstracts as these will be rejected) Recent lunar landings on both the near and far sides of the Moon along with orbital missions in cislunar space by governmental and commercial entities all point to an accelerating effort to explore and establish a long-term human presence on and near our celestial neighbor. The diversity of governmental and commercial entities engaged in the lunar effort indicates that the numerical dominance of commercial satellite systems in Earth orbit is about to be replicated in cislunar realms with growing concerns over what constitutes “best practices” to ensure sustainable lunar operations and regulatory regime. At the June 2024 UNOOSA Conference on Sustainable Lunar Activities, the parties to the U.S.-led Artemis Accords and the International Lunar Research Station agreement between Russia and China discussed how frequency and time management, safety zones, lunar orbit traffic management, and protection of historical and sensitive scientific sites require regulatory mechanisms developed for the specific needs and conditions of the lunar realm. The IAC 2025 IAA-IISL Roundtable will seek to continue that dialogue by engaging roundtable panelists and audience in a wide-ranging discussion of the scientific-technological and legal-regulatory issues arising from the growing number and intensity of governmental and commercial exploration missions to cislunar space.

	<p>Co-Chairs</p> <p>Larry Martinez <i>International Institute of Space Law (IISL) — UNITED STATES</i></p> <p>Rainer Sandau <i>International Academy of Astronautics (IAA) — GERMANY</i></p> <p>Rapporteurs</p> <p>Nicola Rohner-Willsch <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Ivan Fino <i>Space Generation Advisory Council (SGAC) — ITALY</i></p>
E3.6	<p>Financial Viability and Profitability of Space Business Models</p> <p>The financial viability of space business models is an important critical factor that determines the feasibility and success of all space missions and the profitability of private space activities, especially when substantial investments are involved. Evaluating the financial viability of a Business Model involves estimating the total costs associated with the life cycle of the mission, as well as the revenue stream associated to it, among many other factors. The purpose of this session is to discuss the various practices for assessing risk, financial viability and profitability of space business models to ensure that projects with the highest chances of success and financial return are pursued. These efforts can be public, private, or some combination of different types of entities. The importance of understanding and using acceptable and well understood methodologies and practices will be the emphasis of the panel discussion and papers presented at this session.</p> <p>Co-Chairs</p> <p>Christine Klein <i>European Space Agency (ESA) — FRANCE</i></p> <p>Henry Hertzfeld <i>Space Policy Institute, George Washington University — UNITED STATES</i></p> <p>Rapporteur</p> <p>Karina Miranda Sanchez <i>ESA — THE NETHERLANDS</i></p>
E3.IP	<p>Interactive Presentations - 38TH IAA SYMPOSIUM ON SPACE POLICY, REGULATIONS AND ECONOMICS</p> <p>Authors with an abstract accepted for an interactive presentation will be asked to prepare slides and display them for the duration of the congress on plasma screens. Authors will be assigned to interactive sessions in which they must be near plasma screens to engage in interactive discussions with other congress attendees.</p> <p>Co-Chairs</p> <p>Jacques Masson <i>European Space Agency (ESA) — THE NETHERLANDS</i></p> <p>Franziska Knur <i>German Aerospace Center (DLR) — GERMANY</i></p>
E4	<p>59TH IAA HISTORY OF ASTRONAUTICS SYMPOSIUM</p> <p>The symposium covers the entire spectrum of space history, at least 25 years old. History of space science, technology & development, rocketry, human spaceflight and personal memoirs are included. This year a special focus is laid upon historical developments in Australia and Oceania.</p> <p>Coordinators</p> <p>A. Ingemar Skoog <i>— GERMANY</i></p> <p>Kerrie Dougherty <i>— AUSTRALIA</i></p> <p>Otfried G. Liepack <i>National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES</i></p> <p>Sandra Haeuplik-Meusburger <i>TU Wien — AUSTRIA</i></p>
E4.1	<p>Memoirs & Organizational Histories</p> <p>Autobiographical & biographical memoirs of individuals who have made original contributions to the development & application of astronautics & rocketry. History of government, agencies, industrial, academic & professional societies & organisations long engaged in astronautical endeavors. This will include the entire spectrum of space history, at least 25 years old.</p> <p>Co-Chairs</p> <p>Kerrie Dougherty <i>— AUSTRALIA</i></p> <p>Niklas Reinke <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i></p> <p>Rapporteurs</p> <p>Klaus Schilling <i>Zentrum für Telematik — GERMANY</i></p> <p>Philippe Cosyn <i>Independent scholar — BELGIUM</i></p>
E4.2	<p>Organizational, Scientific and Technical Histories</p> <p>The symposium will cover the history of space science, exploration, innovation & technology. Furthermore reflection on the cultural and socio-political impact are parts of it. This will include the entire spectrum of space history, at least 25 years old.</p> <p>Co-Chairs</p> <p>Vera Pinto Gomes <i>European Commission — BELGIUM</i></p> <p>Randy Liebermann <i>— UNITED STATES</i></p> <p>Rapporteurs</p> <p>Hannes Mayer <i>Karl Franzens Universität Graz — AUSTRIA</i></p> <p>Sandra Haeuplik-Meusburger <i>TU Wien — AUSTRIA</i></p>
E4.3	<p>History of Australian and Asia-Pacific Contribution to Astronautics</p> <p>This Session will focus on the history of Australian and Oceania in space, including topics on space programs, technical contributions, political influences and effects, space science activities, space architecture, and social and cultural influences. Contributions must address events that occurred at least 25 years ago.</p> <p>Co-Chair</p> <p>Kerrie Dougherty <i>— AUSTRALIA</i></p> <p>Otfried G. Liepack <i>National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES</i></p> <p>Rapporteurs</p> <p>Philippe Cosyn <i>Independent scholar — BELGIUM</i></p> <p>Gurbir Singh <i>The British Interplanetary Society — UNITED KINGDOM</i></p>
E4.IP	<p>Interactive Presentations - 59TH IAA HISTORY OF ASTRONAUTICS SYMPOSIUM</p> <p>This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of the history of astronautics addressed in the classic Sessions. The IP session is not restricted to any specific topic related to space law and invites authors to contribute presentations on any interesting, relevant and current space law issues. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the E Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.</p> <p>Coordinator</p> <p>Otfried G. Liepack <i>National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory — UNITED STATES</i></p>

E5

36TH IAA SYMPOSIUM ON SPACE AND SOCIETY

This 36th symposium is organized by the International Academy of Astronautics (IAA). Presentations will review the impact and benefits of space activities on the quality of life on Earth and in space. A broad range of topics may be covered including arts and culture, space architecture, and society's expectations from space exploration and research, as well as technology and knowledge transfer.

Coordinators

Geoffrey Langedoc
Canadian Aeronautics & Space Institute (CASI) —
CANADA

Olga Bannova
University of Houston — UNITED STATES

E5.1

Space Architecture: Habitats, Habitability, and Bases

Space Architecture integrates all topics related to designing and building human environments for use in space. The session welcomes papers in three areas: 1) research, design, prototype testing, manufacture, and operation of habitats for space and analog terrestrial environments; 2) how habitats influence human health, psychology, and efficiency, and requirements based on the "human factor"; 3) fabrication and construction of habitable complexes on planetary surfaces or in orbit and 4) human systems integration design implications.

Co-Chairs

Olga Bannova
University of Houston — UNITED STATES

Anna Barbara Imhof
Liquifer Systems Group (LSG) — AUSTRIA

Rapporteur

Anne-Marlene Rüede
Ecole Polytechnique Fédérale de Lausanne (EPFL) —
SWITZERLAND

E5.2

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

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

Co-Chairs

Olga Bannova
University of Houston — UNITED STATES

Nona Cheeks
retired from NASA GSFC — UNITED STATES

Rapporteur

Kerry Leonard
National Aeronautics and Space Administration (NASA),
Goddard Space Flight Center — UNITED STATES

E5.3

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 important practice is branching into a several directions, ranging from performance, installation, video, or conceptual work situated in space or space analogous environments themselves, to commercial gallery contexts and the realm of participation and public engagement with science. This session addresses the practice of contemporary artists who have developed new ways to appropriate space for their work, the conceptual and practical foundations of their engagement, and the implications of this emerging aesthetic paradigm for both the fields of space and art. Submissions are welcome from artists and art historians, and from space industry and space agency representatives as well as from the cultural sector facilitating or programming related -projects crossing over the increasingly blurred boundaries of creative practice.

Co-Chairs

Richard Clar
Art Technologies — UNITED STATES

Sasha Alexander
Western Sydney University — AUSTRALIA

Rapporteur

Kerrie Dougherty
— AUSTRALIA

E5.4

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

Geoffrey Langedoc
Canadian Aeronautics & Space Institute (CASI) —
CANADA

Jillianne Pierce
Space Florida — UNITED STATES

E5.5

Sharing Space Achievements and Heritage: Space Museums And Societies

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

Co-Chairs

Scott Hutton
The British Interplanetary Society — UNITED
KINGDOM

Jean-Baptiste Desbois
SEMECCEL Cité de l'Espace — FRANCE

Ines Prieto
SEMECCEL Cité de l'Espace — FRANCE

E5.6

Simulating Space Habitation: Habitats, Design and Simulation Missions

and its associated facilities. This includes lessons learned as well as experimental and concrete design proposals for future habitats, either orbital or surface structures, from analog programs to XR solutions and other cutting-edge approaches. The session especially welcomes papers with an interdisciplinary wide-range focus relevant for future crewed missions. Themes may span across innovative technologies, architectural, interior and design approaches and elements, human factors, social-cultural dynamics of space missions, the legal and policy aspects of analog or future crewed missions, as well as the economics of such missions.

Co-Chairs

Anna Barbara Imhof
Liquifer Systems Group (LSG) — AUSTRIA

Julie Patarin-Jossec
Spartan Space — FRANCE

Rapporteur

Sandra Haeuplik-Meusburger
TU Wien — AUSTRIA

E5.IP

Interactive Presentations - 36TH IAA SYMPOSIUM ON SPACE AND SOCIETY

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

Co-Chairs	
Geoffrey Langedoc Canadian Aeronautics & Space Institute (CASI) — CANADA	Olga Bannova University of Houston — UNITED STATES
E6	<p>IAF BUSINESS INNOVATION SYMPOSIUM</p> <p>The Business Innovation Symposium, organized by the International Astronautical Federation (IAF), is designed to offer papers that observe, study, analyze, describe, and/or propose any topic related to space activities that have commercial objectives, whether from an academic and/or practitioner perspective.</p> <p>Coordinators</p> <p>Ken Davidian — UNITED STATES</p> <p>Nancy C. Wolfson American Institute of Aeronautics and Astronautics (AIAA) — UNITED STATES</p>
E6.1	<p>Space Entrepreneurship and Investment: The Practitioners' Perspectives</p> <p>This session contains a broad spectrum of entrepreneurship, innovation, finance and investment presentations from the practitioner's perspective. Suggested topics suitable for this session can be at any level of analysis, including (from macroscopic to microscopic) the space sector, industries (e.g., propulsion), industry segments (e.g., chemical propulsion), individual firms, a portion of or a group of individuals within a firm, or an individual. Example entrepreneurship and innovation topics suitable for this session include descriptions related to entrepreneurship and innovation such as new market sectors, new businesses, new business plans, new projects, recent experiences of start-up companies. Suitable finance or investment topics apply to large programmes, new firms, the analysis methodologies of markets, or new developments in the finance and investment communities (including angel investors, venture capital organizations, and investment banks).</p> <p>Co-Chair</p> <p>Joerg Kreisel JOERG KREISEL International Consultant (JKIC) — GERMANY</p> <p>Daria Stepanova — GERMANY</p>
E6.2.	<p>Public-Private Partnerships: Traditional and New Space Applications</p> <p>This innovative session convenes experts from different sectors within the space industry and leaders from both the private sector and government agencies to explore their roles and emerging best practices that encourage public and private partnerships (PPP). Therefore, we welcome submissions that explore recent advancements and facilitate the commercialization of space, innovative business models, markets, the diversification of space economy budgets, including sustainability principles, and the attraction of private investments across various fields within the industry that highlight the following topics: 1. Traditional space industry applications, such as satellite-based services encompassing Earth observation, navigation, and communications. 2. New space industry applications mainly focus on space resource extraction, utilization, and asteroid mining (ongoing and future missions, including the Psyche mission, challenges, opportunities from various perspectives, cutting-edge technologies, and any related research or activity that encourage the development of this field and new markets), along with space tourism, space industrialization, commercial space debris, and related activities. This session will open with an invited keynote speaker, followed by a panel of experts for a discussion and Q&A period, and will conclude with paper presentations.</p> <p>Co-Chairs</p> <p>Nancy C. Wolfson American Institute of Aeronautics and Astronautics (AIAA) — UNITED STATES</p> <p>Kenneth Bruce Morris Sierra Space — UNITED STATES</p> <p>Nicholas Florio SPACE GENERATION ADVISORY COUNCIL (SGAC) — UNITED STATES</p>
E6.3	<p>Innovation: The Academics' Perspectives</p> <p>This innovative session convenes experts from different sectors within the space industry and leaders from both the private sector and government agencies to explore their roles and emerging best practices that encourage public and private partnerships (PPP). Therefore, we welcome submissions that explore recent advancements and facilitate the commercialization of space, innovative business models, markets, the diversification of space economy budgets, including sustainability principles, and the attraction of private investments across various fields within the industry that highlight the following topics: 1. Traditional space industry applications, such as satellite-based services encompassing Earth observation, navigation, and communications. 2. New space industry applications mainly focus on space resource extraction, utilization, and asteroid mining (ongoing and future missions, including the Psyche mission, challenges, opportunities from various perspectives, cutting-edge technologies, and any related research or activity that encourage the development of this field and new markets), along with space tourism, space industrialization, commercial space debris, and related activities. This session will open with an invited keynote speaker, followed by a panel of experts for a discussion and Q&A period, and will conclude with paper presentations.</p> <p>Co-Chairs</p> <p>Ken Davidian — UNITED STATES</p> <p>Michele Cristina Silva Melo Brazilian Federal Government - General Attorney Office — BRAZIL</p>
E6.4 GTS.1	<p>Entrepreneurship Around the World</p> <p>Entrepreneurship presents unique opportunities and challenges from country to country around the world. Some of the experiences of entrepreneurs transcend national and cultural borders, but some others do not. This session welcomes papers and presentations which describe the barriers experienced by real entrepreneurs in their different countries and regions. A panel with industry experts from around the world will set the stage followed by a discussion which highlights the commonalities and unique characteristics of nation-specific entrepreneurial barriers as identified by the individual papers presented. This is a technical session co-sponsored by the IAF Space Entrepreneurship and Investment Committee (SEIC) and the IAF Workforce Development/Young Professionals Programme Committee, as part of the Global Technical Sessions – presenters can present in person at the IAC or from their home/work/university location.</p> <p>Co-Chairs</p> <p>Susana Fornies Rodriguez — FRANCE</p> <p>Samuel Peterson Embry-Riddle Aeronautical University Worldwide — UNITED STATES</p>
E6.IP	<p>Interactive Presentations - IAF BUSINESS INNOVATION SYMPOSIUM</p> <p>This session offers a unique opportunity to deliver your key messages in an interactive presentation on any of the subjects of Business Innovation addressed in the classic Sessions. The presentation will be displayed on a digital screen in a dedicated location and available for view by all Congress attendees for the entire Congress week. In addition, one afternoon is dedicated exclusively for the attendees to view the Interactive Presentations, and the author will be assigned a specific ten minute slot to personally present the topic and interact with the attendees present. The Interactive Presentation may take advantage of all electronic display capabilities, such as: PowerPoint charts, embedded hot links, pictures, audio and video clips etc. An award will also be presented to the author of the best Interactive Presentation in the E Category at a special ceremony. An Abstract that follows the standard format must be submitted by the deadline for standard IAC abstracts.</p> <p>Co-Chair</p> <p>Ken Davidian — UNITED STATES</p>
E7	<p>IISL COLLOQUIUM ON THE LAW OF OUTER SPACE</p> <p>The 2025 IISL Colloquium focuses on how the latest technological developments are impacting the development of the law of outer space, and on whether space law should embrace new fields of activities, such as cyber, within its scope. The Colloquium looks at current discussions about questions related to the ethics and understanding of what is meant by treaty law terms freedom of exploration and use. It examines how space situational awareness (SSA), space surveillance and tracking (SST) can be integrated as elements within a greater framework for effective space traffic management. It serves as a forum to discuss developments of national space law as a constitutive element of the overall framework of space law enforcing and detailing the principles and general norms of space law, in particular within the field of security. It looks at whether existing legal concepts, particularly responsibility and liability for autonomous systems driven by artificial intelligence, are sufficiently regulated, and whether there is a homogenous approach to licensing at national level. It also provides insights as to how disruptive NewSpace activities can and should be accommodated by space law.</p>

	Coordinators Lesley Jane Smith <i>Leuphana University of Lüneburg/Weber-Steinhaus & Smith — GERMANY</i> Catherine Doldirina <i>International Institute of Space Law (IISL) — ITALY</i> Tanja Masson-Zwaan <i>International Institute of Air and Space Law, Leiden University — THE NETHERLANDS</i>
E7.1	Young Scholars Session with Keynote Lecture This session is open for abstracts and papers from space lawyers under 35 years old. It welcomes contributions on any topic related to space law. It also features a regular, annual keynote presentation by a High level expert and diplomat in the field of international space law. Co-Chairs Lesley Jane Smith <i>Leuphana University of Lüneburg/Weber-Steinhaus & Smith — GERMANY</i> L
E7.2	Threat and Use of Force in the Context of Space Activities Despite the desire to contribute to the use of outer space for peaceful purposes proclaimed by the Preamble of the Outer Space Treaty, Earth orbits are only partly demilitarized and can be used for defense purposes. This session analyses legal aspects of the threat and use of force in the context of space activities involving rendezvous and proximity operations. It focuses on the growing tendency to build up counterspace capabilities and discusses the legal consequences of ASAT-tests in space, especially in view of the due regard principle of the Outer Space Treaty. The session also addresses the use of large constellations in armed conflicts.
E7.3	Sustainability and Outer Space Law In the wake of the suggestion to add outer space as an 18th Sustainable Development Goal (SDG) and in the context of the UN Summit of the Future 2024, this session considers practical aspects relating to the sustainability of space activities and their impact on the planning and implementation of space activities. This could include life cycle assessment of space missions, launch related environmental impact assessments, or other sustainability-related aspects of space activity planning and implementation. The session aims to provide a timely overview of how sustainability of space activities can be implemented at a practical level. Co-Chair Catherine Doldirina <i>International Institute of Space Law (IISL) — ITALY</i>
E7.4	Small Satellites, Public and Private Law Perspectives The exponential practice of using small satellites requires a fresh view on the present legal framework. The session discusses the implications of Article VI of the Outer Space Treaty on the authorization and supervision of small satellites on the basis of the domestic licensing procedures. It elaborates on the legal framework of launching services, including questions of insurance and other commercial aspects. It sheds light on the regulatory procedures of the ITU designed for small satellites, and their implementation in the domestic practice. Co-Chair Maria A Pozza <i>— New Zealand</i>
E7.5	Legal Impact of Scientific Investigation on the Protection of Intellectual Property Research in extra-terrestrial space, including in the areas of space resources and long term human habitation, is being increasingly carried out by private entities operating under international cooperation schemes. Given the importance of intellectual property for these activities, the concept of territoriality and jurisdiction in IP law allows the extension of jurisdiction under national (regional) law to those objects which the respective country has registered and launched into outer space; registered space objects are treated as quasi-territorial for the purposes of intellectual property. The IP framework is equally relevant to scientific and technological advancement. In the absence of explicit international rules, several international cooperations agreements have been concluded for such space projects. This session invites papers that aim to analyse these agreements, to study the interrelation between the protection of intellectual property and the principles of the common interest and non-appropriation of outer space as formulated by the Outer Space Treaty.
E7.6 E3.5	39TH IAA/IISL Scientific Legal Roundtable: Lunar Operations and Orbital Management: Governance in Cislunar Space (Invited papers only, please do not submit abstracts as these will be rejected) Recent lunar landings on both the near and far sides of the Moon along with orbital missions in cislunar space by governmental and commercial entities all point to an accelerating effort to explore and establish a long-term human presence on and near our celestial neighbor. The diversity of governmental and commercial entities engaged in the lunar effort indicates that the numerical dominance of commercial satellite systems in Earth orbit is about to be replicated in cislunar realms with growing concerns over what constitutes “best practices” to ensure sustainable lunar operations and regulatory regime. At the June 2024 UNOOSA Conference on Sustainable Lunar Activities, the parties to the U.S.-led Artemis Accords and the International Lunar Research Station agreement between Russia and China discussed how frequency and time management, safety zones, lunar orbit traffic management, and protection of historical and sensitive scientific sites require regulatory mechanisms developed for the specific needs and conditions of the lunar realm. The IAC 2025 IAA-IISL Roundtable will seek to continue that dialogue by engaging roundtable panelists and audience in a wide-ranging discussion of the scientific-technological and legal-regulatory issues arising from the growing number and intensity of governmental and commercial exploration missions to cislunar space. Co-Chairs Larry Martinez <i>International Institute of Space Law (IISL) — UNITED STATES</i> Rainer Sandau <i>International Academy of Astronautics (IAA) — GERMANY</i> Rapporteurs Nicola Rohner-Willsch <i>Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) — GERMANY</i> Ivan Fino <i>Space Generation Advisory Council (SGAC) — ITALY</i>
E7.7	Climate Change of the Earth Reflected in Space Law The climate change of the Earth requires measures which are based on a precise knowledge of the meteorological conditions and the situation on the spot. The methods of Earth observation are extensively applied for this purpose: a whole branch of commerce has developed in this area. To react properly to the consequences of the climate change, national, regional and international networks for disaster management were established. The session discusses the legal aspects of these downstream activities: it offers insider views into the legal set-up of meteorological observation and follows the development of the legal framework of remote sensing. Moreover, the legal set-up of the disaster management is analyzed, including the provision of urgent remote services. Co-Chairs Scarlet O'Donnell <i>Lund University — GERMANY</i>
E7.IP	Interactive Presentations - IISL COLLOQUIUM ON THE LAW OF OUTER SPACE The IP session is not restricted to any specific topic related to space law and invites authors to contribute presentations on any interesting, relevant and current space law issues. Co-Chair Gina Petrovici <i>German Space Agency — GERMANY</i> Isidora Casas <i>Space Generation Advisory Council (SGAC) — CHILE</i>
E8	IAA MULTILINGUAL ASTRONAUTICAL TERMINOLOGY SYMPOSIUM This symposium, organized by the International Academy of Astronautics (IAA), will review the progress made in multilingual space terminology and its impact on international cooperation in space. Terminology is a key issue for a better understanding among people using various languages and dialects. Consecutive or simultaneous translation does not remove the risk of ambiguity during technical meetings and accuracy in terminology is essential during all phases of cooperation. The session will address issues such as standardization of definitions in space science and technology. The specific character of emerging space countries will also be discussed.

	Coordinators Susan McKenna-Lawlor <i>Space Technology (Ireland) Ltd. — IRELAND</i> Tetsuo Yoshimitsu <i>Institute of Space and Astronautical Science (ISAS), Japan</i> <i>Aerospace Exploration Agency — JAPAN</i>
E8.1	Multilingual Astronautical Terminology <p>This session, organized by the International Academy of Astronautics (IAA), will review the progress made in multilingual space terminology and its impact on international cooperation in space. Terminology is a key issue for a better understanding among people using various languages and dialects. Consecutive or simultaneous translation does not remove the risk of ambiguity during technical meetings and accuracy in terminology is essential during all phases of cooperation. The session will address issues such as standardization of definitions in space science and technology. The specific character of emerging space countries will also be discussed.</p> Co-Chairs Susan McKenna-Lawlor <i>Space Technology (Ireland) Ltd. — IRELAND</i> Tetsuo Yoshimitsu <i>Institute of Space and Astronautical Science (ISAS), Japan</i> <i>Aerospace Exploration Agency — JAPAN</i> Rapporteur Fabrice Dennemont <i>International Academy of Astronautics (IAA) — FRANCE</i>
E9	IAF SYMPOSIUM ON SPACE SECURITY, STABILITY AND SUSTAINABILITY OF SPACE ACTIVITIES <p>This symposium, organized by the International Astronautical Federation (IAF), will address two major issues regarding safe and secure operations of space systems via two separate sessions: i) policy, legal, institutional and economic aspects of space debris detection, mitigation and removal, jointly with the IAA Symposium on Space Debris, and, ii) cyber security threats to space missions and countermeasures to address them, jointly with the IAA Symposium on Safety, Quality and Knowledge Management on Space Activities. Papers dealing with non-technical aspects of space debris mitigation and removal, as well as planetary defence against asteroid impact threats, and case studies focusing on countermeasures needs, including cryptography processes, operational security, supply chain and other aspects relevant to ensure a “cyber secure” mission will be well received in this Symposium.</p> Coordinators Serge Plattard <i>University College London (UCL) — UNITED KINGDOM</i> Stefano Zatti <i>University of Rome “La Sapienza” — ITALY</i>
E9.1 A6.8	Policy, Legal, Institutional, Economic and Security Aspects of Debris Mitigation, Debris Remediation and STM <p>This session will address all non-technical aspects of debris mitigation, debris remediation and STM. Papers may focus on aspects of responsibility, liability and registration, on the role of bodies such as UNCOPUOS or IADC, as well as on insurance, financial incentives and funding. In addition, security-related aspects and the role of international cooperation in addressing these issues may be considered.</p> Co-Chairs David Spencer <i>The Aerospace Corporation — UNITED STATES</i> Serge Plattard <i>University College London (UCL) — UNITED KINGDOM</i> Tanja Masson-Zwaan <i>International Institute of Air and Space Law, Leiden University — THE NETHERLANDS</i> Rapporteurs Andrea Capurso <i>LUIS Guido Carli University — ITALY</i> Emma Kerr <i>Deimos Space UK Ltd — UNITED KINGDOM</i> Victoria Samson <i>Secure World Foundation — UNITED STATES</i>
E9.2	Cyber-based Security Threats to Space Missions: Establishing the Legal, Institutional and Collaborative Framework to Counteract them <p>The increasingly pervasive network connectivity following the Internet explosion introduces a whole new families of cyber-security threats to space missions. To send commands to a spacecraft now you would not need to build a ground station, but you can penetrate from your home or office the existing ground infrastructures, bypassing their protection measures, from anywhere in the world. The questions to be addressed in the session will span across the following issues: - What is the interest of cyber-crime and cyber-activism with respect to space activities? - How are aerospace organisations managing the ability to introduce the right level of security measures in the process to plan and develop new missions? - What legal and protection framework is or has to be put in place to enable secure cooperation across corporate and international boundaries? - How is knowledge about security threats captured, shared, and used to follow the evolution of cyber threats? - Which ones of these specific threats are to be expected to target space missions, from the ground and from space? - What is particularly to be expected from the cyber-space to target outer space? Contribution are expected to focus on cyber-specific legislation, best practices, processes, collaboration methods between law enforcement and institutional partners, and any other aspects of the organization of space missions that are all constituting the formal components to keep a mission “cyber secure”.</p> Co-Chairs Julien Airaud <i>Centre National d'Etudes Spatiales (CNES) — FRANCE</i> Stefano Zatti <i>University of Rome “La Sapienza” — ITALY</i>
E9.3	Norms and Standards for Safe and Responsible Behaviour in Space <p>The rapid expansion and evolution of the global space arena is characterized by an increasing number and diversity of space actors and the emergence of new kinds of space systems, some of which involve very large constellations of satellites numbering in the thousands to tens of thousands, and also new kinds of space activities, such as on-orbit servicing, refueling, in-orbit assembly and manufacturing, active debris removal, and so on. With increasing congestion in the Earth's orbital environment, these new kinds of space activities raise questions about the safety of space operations, particularly when contingency situations arise (such as conjunctions), or when spacecraft operate in close proximity to each other and there are no clear, widely accepted international standards or norms of behaviour. For this reason, it is important to identify and leverage best practices from government and industry to ensure safety of flight and safe rendezvous and proximity operations of spacecraft. These best practices may subsequently be codified as norms and standards for safe and responsible behaviour in space. This session is intended to be a forum to allow practitioners to discuss and socialize the types of norms, standards and behaviours that would be conducive to the safety of space operations.</p> Co-Chairs Peter Martinez <i>Secure World Foundation — UNITED STATES</i> Annamaria Nassisi <i>Thales Alenia Space Italia — Italy</i> Rapporteur Rachel Venn <i>Space Generation Advisory Council (SGAC) — UNITED KINGDOM</i>
E9.4 A6.10.	Space carrying capacity assessment and allocation <p>Space in Earth's orbit has a finite capacity and, due to the boosting of space activities, the space orbital system is slowly overloading. Assessing and managing orbital carrying capacity requires an international and interdisciplinary approach that embrace space engineering, policy, and economy. This session covers the theoretical approaches, computational tools, and techniques to measure space environment thresholds and overall carrying capacity of space. It will discuss proxies for monitoring boundaries for the maximum capacity, such as space debris metrics. The application of these metrics to space debris evolution scenarios and their role in the definition of debris mitigation guidelines will be discussed. This session will also address the legal and policy implications, including relevance to regulation and licensing, the needed steps to enforce the implementation of capacity thresholds evaluation, and correlation with space debris mitigation measures. Finally, economic incentives or payments systems for ensuring sustainable space activities will be discussed. This is a frontier topic in the space debris field: modelling and simulations of the debris environment are applied to the definition of indicators for the management of the space traffic and links with space law and policy. This topic is one example of Space Science Diplomacy.</p> Co-Chairs Peter Martinez <i>Secure World Foundation — UNITED STATES</i> Camilla Colombo <i>Politecnico di Milano — ITALY</i> Francesca Letizia <i>European Space Agency (ESA) — THE NETHERLANDS</i> Rapporteur Alessandro Rossi <i>IFAC-CNR — ITALY</i>

E9.5

Strategic Risk Management for Successful Space & Defence Programmes

The many benefits of space-based activities to the global economy, technology innovation, national defense, science, and exploration are only realizable if the use of space is secure and sustainable. Risk management plays a crucial role in establishing and maintaining this secure and sustainable use of space. This session will explore how Enterprise Risk Management (ERM) frameworks can help space organizations (civil, government and military) manage interconnected strategic, operational, and compliance risks, promoting resilience, sustainability, and collaboration across sectors.

Abstracts would be welcome on the following topics:

1. Strategic Risk & Scenario Planning
 - How global Geopolitical & Socio-Economic challenges (e.g., military conflicts, extreme weather events, etc.) shape ERM practices and long-term risk-based planning in space.
 - Preparing for “black swan” events (e.g., space conflicts, space weather events, etc.) through ERM.
 - Risks in Military Space Operations: Examining ERM’s role in national security space functions and its impact on security strategies.
 - How to best make use of advances in new technologies development such as AI, quantum, etc. and what threats/opportunities to a secure world do they represent?
2. Insurance & Crisis Management Best Practices
 - Integrating insurance and crisis management best practices with ERM frameworks
3. ERM for Public-Private Sector Collaboration
 - Effective ERM frameworks for joint risk management between governments and private space entities.

Co-Chairs

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

Katarzyna Malinowska
European Space Foundation (ESF) — POLAND

Christopher Geiger
Lockheed Martin Corporation (LMC) — UNITED STATES

Rapporteur

Andrew Court
TNO — THE NETHERLANDS

E9.IP

Interactive Presentations - IAF SYMPOSIUM ON SPACE SECURITY, STABILITY AND SUSTAINABILITY OF SPACE ACTIVITIES

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

Coordinator

Serge Plattard
University College London (UCL)
— UNITED KINGDOM

E10

IAF SYMPOSIUM ON PLANETARY DEFENSE AND NEAR-EARTH OBJECTS

This symposium, organized by the International Astronautical Federation (IAF), will address all aspects of the hazards associated with the impact of asteroids and comets on Earth and their mitigation. Due to the multidisciplinary nature of planetary defense, the symposium additionally aims to establish joint sessions with other symposiums investigating synergies and lessons learned.

Coordinators

Alex Karl
Space Applications Services — BELGIUM

Alissa J. Haddaji
Harvard University — UNITED STATES

E10.1

Planetary Defense from Asteroids and Comets

This session will address all aspects of the hazards associated with the impact of asteroids and comets on Earth and their mitigation, covering these broad areas of interest: 1. An overview about the latest developments and mission summaries related to recent, ongoing or upcoming missions with a focus on planetary defense. 2. Advances in pre-impact determinations and prevention of impacts, such as discovery and characterisation, along with mission & campaign designs to deflect or disrupt a hazardous object. 3. Advances in preparation for impact, such as impact consequences & disaster management and response coordination on local and international levels. 4. General considerations such as the influence of legal, social and economic aspects on the decision to act by decision makers, the deflection methods used as well as public education and communication to various audiences 5. Lessons learned from other missions and endeavours that could benefit planetary defense and vice versa.

Co-Chairs

Daniel Mazanek
NASA — UNITED STATES

Aur lie Moussi
Centre National d’Etudes Spatiales (CNES) — FRANCE

Rapporteurs

Alejandro J. Roman Molinas
Paraguayan Space Agency — PARAGUAY

Alex Karl
Space Applications Services — BELGIUM

E10.2

Informing Planetary Defense

This session will address all aspects that contribute towards informing future planetary defense, including: 1. Results from the first impact deflection test with DART (e.g., results, including ground-based observations regarding the orbital period change, physical characteristics of Didymos and Dimorphos, geology of the impact site, revised numerical modelling of DART impact, and Didymos’ dynamics based on DART impact); 2. Results from NEO sample return missions, as well as perspectives regarding ongoing and future NEO missions; 3. Legal considerations that would contribute towards the decision to act; and 4. Any other transdisciplinary research that enhances our understanding to make better decisions and increase the likelihood of a successful mitigation of an asteroid or comet impact.

Co-Chairs

Daniel Mazanek
NASA — UNITED STATES

Alissa J. Haddaji
Harvard University — UNITED STATES

Rapporteur

Philipp Maier
Institute of Space Systems, University of Stuttgart — GERMANY

E10.IP

Interactive Presentations - IAF SYMPOSIUM ON PLANETARY DEFENSE AND NEAR-EARTH OBJECTS

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

Co-Chairs

Alex Karl
Space Applications Services — BELGIUM

Alissa J. Haddaji
Harvard University — UNITED STATES

E11 IAF SYMPOSIUM ON EMERGING SPACE ECOSYSTEMS

The IAF Symposium on Emerging Space Ecosystems is driven by key objectives aligned with the International Astronautical Federation's (IAF) 3G Diversity Agenda. The IAF Symposium will address the dynamic space landscape. It will serve as a platform for discussions on emerging space ecosystems, with a focus on fostering innovation in space access, entrepreneurship, and engaging emerging countries. The IAF Symposium will explore technology, policies, and strategies for achieving these goals. Entrepreneurship will be encouraged, fostering collaboration between established companies and startups. Emerging spacefaring nations will have an opportunity to share experiences and form partnerships.

Coordinator

Matias Campos
Astralintu Space Technologies — ECUADOR

E11.1 Connecting Emerging Space ecoSystems

This session will delve into holistic space ecosystem development, emphasizing the interconnectedness of research, education, policy, and industry. Sustainability will be a central theme, promoting responsible space practices and alignment with global sustainability.

Co-Chair

Matias Campos
Astralintu Space Technologies — ECUADOR

Alejandro J. Roman Molinas
Paraguayan Space Agency — PARAGUAY

Rapporteur

Marlene Losier
Space Renaissance International —

E11.IP Interactive Presentations - IAF SYMPOSIUM ON EMERGING SPACE ECOSYSTEMS

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

Co-Chair

Matias Campos
Astralintu Space Technologies — ECUADOR

Ian Grosner
Brazilian Space Agency (AEB) — BRAZIL



GTS. GLOBAL TECHNICAL SYMPOSIUM (GTS)

The Global Technical Symposium (GTS) is designed to offer a modern and eclectic platform at the IAC for sharing technical content to an open minded audience on-site but also online! Jointly organized by associated technical committees and the Workforce Development-Young Professional Programme Committee, these sessions are similar to the conventional technical sessions in terms of abstract selection and paper submissions. However, in addition to the on-site presentation of the technical papers, these sessions are also broadcast online. Authors are allowed to present remotely or on-site, and participants are also allowed to listen to the session from the comfort of their homes or at their workplaces in addition to the IAC venue. The IAF hopes that this approach will enable more students and young professionals without the ability to join IAC on-site to contribute to discussion at the IAC.

- GTS.1 ENTREPRENEURSHIP AROUND THE WORLD
- GTS.2 HUMAN SPACEFLIGHT GLOBAL TECHNICAL SESSION
- GTS.3 SPACE COMMUNICATIONS AND NAVIGATION GLOBAL TECHNICAL SESSION
- GTS.4 STUDENT TEAM COMPETITION
- GTS.5 SMALL SATELLITE MISSIONS GLOBAL TECHNICAL SESSION

Coordinated by Eleonora Lombardi, *Fondazione E. Amaldi — ITALY*

GTS.1 Entrepreneurship Around the World

E6.4

Entrepreneurship has different characteristics that differ from country to country around the world. Some of the challenges that entrepreneurs face transcend national and cultural borders, but some others do not. This session welcomes papers and presentations that describe the barriers experienced by real entrepreneurs in their different countries and regions around the world. A summary discussion will identify the commonalities and unique characteristics of nation-specific entrepreneurial barriers as identified by the presenters. This is a technical session co-sponsored by the IAF Entrepreneurship and Investment Committee (EIC) and the IAF Workforce Development/Young Professionals Programme Committee, as part of the Global Technical Sessions – presenters can present in person at the IAC or from their home/work/university location.

Co-Chairs

George A. Danos
Cyprus Space Exploration Organisation (CSEO) — CYPRUS

Nancy C. Wolfson
American Institute of Aeronautics and Astronautics (AIAA) — UNITED STATES

Susana Fornies Rodriguez
— FRANCE

Samuel Peterson
Embry-Riddle Aeronautical University Worldwide — UNITED STATES

GTS.2 Human Spaceflight Global Technical Session

B3.9

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

Co-Chairs

Guillaume Girard
Zero2infinity — SPAIN

Andrea Jaime
Isar Aerospace Technologies GmbH — GERMANY

GTS.3 Space Communications and Navigation Global Technical Session

B2.8

This is a hybrid (virtual and in person) session that targets a global audience where developments in a wide range of satellite communication and space-based PNT (position, navigation, timing) topics are presented and discussed. Communication topics include fixed, mobile, broadcasting, and data relay technologies and services. Space-based PNT topics include sensors, systems, architectures, applications, and services. Topics ranging from Earth orbit to interplanetary space can be addressed. Authors are welcome to either present their work in person at the conference or remotely via the IAF's online platform. This session offers authors the unique opportunity to directly engage an audience beyond just the on-site attendees and is co-sponsored by the Space Communications and Navigation Committee and the Workforce Development/Young Professionals Programme Committee.

Co-Chairs

Joshua Critchley-Marrows
Nottingham Scientific Ltd — UNITED KINGDOM

Eric Wille
ESA — THE NETHERLANDS

GTS.4 E2.3

Rapporteur

Behnoosh Meskoob

École de technologie supérieure — CANADA

Manish Saxena

Indian Space Research Organization (ISRO) — INDIA

Student Team Competition

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 selection of the oral presentations is solely based on the submitted abstracts. We strongly recommend that you submit an abstract with an extensive description of your topic, including a detailed explanation of your contribution and the novelty of your work. Furthermore, a short description how your team worked together to achieve the project goal should be included. The guidelines for the student competition will be distributed from the session chairs to the authors after abstract acceptance.

Co-Chairs

Emmanuel Zenou

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

Andrea Jaime

Isar Aerospace Technologies GmbH — GERMANY

Rapporteur

Kathleen Coderre

Lockheed Martin (Space Systems Company) — UNITED STATES

GTS.5 B4.9

Small Satellite Missions Global Technical Session

The Small Satellite Missions Global Technical Session (GTS) is a collaboration between the International Academy of Astronautics (IAA) Small Satellite Missions Symposium and the International Astronautical Federation (IAF) Workforce Development/Young Professionals Programme Committee. This session is unique in that it allows for sharing of information on a global scale with presenters and audience both at the IAC venue and online at their home/work/university locations. Abstracts are solicited regarding operational missions or mature proposals for small satellite systems and related topics. These must have clear relevance on an international scale or at a business level, and must also provide young professionals a taste of what the space sector has to offer. Where possible, abstracts should have a wide interest in the community and should include transferable knowledge or lessons learned. Abstracts highlighting ingenuity or innovation are preferred. Examples include space missions utilizing small satellites that address specific new societal, scientific or commercial challenges, or novel technologies that have the potential to revolutionize space missions and/or enable their access to space. Papers are to describe the specific need, the small satellite approach that addresses this need, the benefits of this approach and the use of space technology, and demonstrate that other non-space approaches provide inferior solutions. Papers from, or directed at the young professional community are preferred. This session will be accepting submissions for oral presentations only.

Co-Chairs

Matthias Hetscher

DLR (German Aerospace Center) — GERMANY

Norbert M.K. Lemke

OHB System AG - Oberpfaffenhofen — GERMANY

Likhit Waranon

Geo-Informatics and Space Technology Development Agency (Public Organization) — Thailand

Rapporteurs

Alex da Silva Curiel

Surrey Satellite Technology Ltd (SSTL) — UNITED KINGDOM

Victoria Barabash

Luleå University of Technology — SWEDEN

11. IAC 2025 Call for Papers Deadlines

	November 2024	December 2024	January 2025	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025
1												
2							START					IAC 2025
3												
4												
5											Deadline	
6												
7												
8												
9												
10												
11												
12											Deadline	
13												
14												
15												
16												
17												
18							Notification to Authors					
19												
20											Deadline	
21												
22												
23												
24												
25												
26												
27												
28												
29												
30											IAC 2025	
31												

-> 28 February 2025

-> 25-27 March 2025

-> 5 September 2025

-> 12 September 2025

-> 20 September 2025

-> 29 Sep - 3 Oct 2025

Abstracts Submission Period

Abstract Selection Period

Registration of Presenting Authors Deadline

Paper Submission Period

Presentations Submission Period (for IP)

Congress Dates

12. Preliminary IAC 2025 at a Glance



Please Note:

*By invitation only; Pre-Congress events as well as the IISL Moot Court are dedicated to the respective participants

13. Instructions for Authors

Abstract Preparation

Format

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

Content

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

Co-authors

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

Abstract Submission

Signing in

- The submission of abstracts must be done exclusively on the IAF website restricted area <https://iafastro.directory/iaf/account/login/>
- 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, interactive presentation only, oral or interactive.
- Confirm that the material is new and original and that it has not been presented at a previous meeting.
- Confirm that your attendance at IAC 2025 to deliver and present the paper is assured.

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

Abstract Selection

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

Paper and Presentation Submission

- Details on how to prepare and submit your final paper as

well as your presentation material will be available on www.iafastro.org by mid-April.

- Authors with an abstract accepted for oral presentation will be offered a presentation slot of 10 to 20 minutes.
- Authors with an abstract accepted for interactive presentation will be offered a presentation slot of 10 minutes.
- Authors with an abstract accepted for an interactive presentation will be asked to prepare slides and display them for the duration of the congress on screens. Authors will be assigned a specific screen number and will have a dedicated slot during which they will have the opportunity to engage in interactive discussion with other Congress attendees.

Additional Information

Preliminary versions of the IAC proceedings will be available to participants at the Congress electronically. More information about the IAF Digital Library is available on the IAF website:

<https://dl.iafastro.directory/>

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

Guidelines for ethical and responsible AI use for IAC abstracts

- We value originality, uniqueness and high-quality science at IAC.
- Use of AI is authorized to improve the readability and language of the IAC abstract work being produced, such tools can be used for content structure and improvement in texts.
- AI tools shall not be used for performing key authoring tasks such as producing scientific work and recommendations. Authors are responsible for carefully reviewing and editing the abstract to avoid incorrect, incomplete, or biased content.
- When submitting abstracts, authors must disclose the reasons for using AI and AI-assisted technologies, and a statement will appear in the published abstract.

DEADLINES

Abstract Submission	28 February 2025
Paper Submission	12 September 2025
Interactive Presentation Submission	20 September 2025

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

QUESTIONS

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

Interactive presentations: ipsupport@iafastro.org



14. Space in Australia: since time immemorial

Australia has a rich history of space activities, including above all our First Nations Australians who are recognised as the world's earliest astronomers.

Australia has played a pioneering role in the space industry for decades. Australia's first satellite WRESAT-1 in 1967, placed it among the earliest nations to launch a national satellite. By 1969, Australia had become a crucial partner in NASA's space missions, hosting the largest number of NASA tracking stations outside the United States. These stations played an instrumental role in supporting NASA's networks for planetary exploration, human spaceflight, and Earth-orbiting satellites. Notably, Honeysuckle Creek station in the Australian Capital Territory played a critical role in the Apollo lunar program, with Honeysuckle Creek and CSIRO's Parkes radio telescope, Murriyang, broadcasting the first images of the Apollo 11 Moonwalk to the world. Since 1979, Australia has also supported space tracking for the European Space Agency.

Soon Australian Space Agency's Trailblazer Program will see the design and development of an Australian-made rover, lovingly named "Roo-ver" as voted by the Australian public, which will go to the Moon as a part of NASA's Artemis program.

Within the international realm, Australia is one of the founding signatories of NASA's Artemis Accords. Australia's long-standing engagement in multilateral space forums continues through the nation's role in global discussions on the peaceful use of outer space. Australia is also a founding member of the Committee on the Peaceful Uses of Outer Space (COPUOS) and a permanent member of the Conference on Disarmament (CD).

Australia's vast, open spaces and strategic geography within the Southern Hemisphere and Indo-Pacific region have made Australia an ideal location for all space-related activities from launch services to space domain awareness (SDA), satellite communications and imagery, and ground stations. Australia has also been a pioneer in the application of remote sensing data and an early and innovative adopter of all space applications. With over 600 organizations in the space ecosystem, together with the rest of our Indo-Pacific region, we provide an incredible opportunity for the space industry and economy.

Australia has hosted two IACs previously: IAC 1998 Melbourne and IAC 2017 Adelaide where the establishment of Australian Space Agency was announced.

IAC 2025 Sydney will showcase the rapid progress of Australia's space industry and its growing importance to our way of life, as well as our Indo-Pacific region.

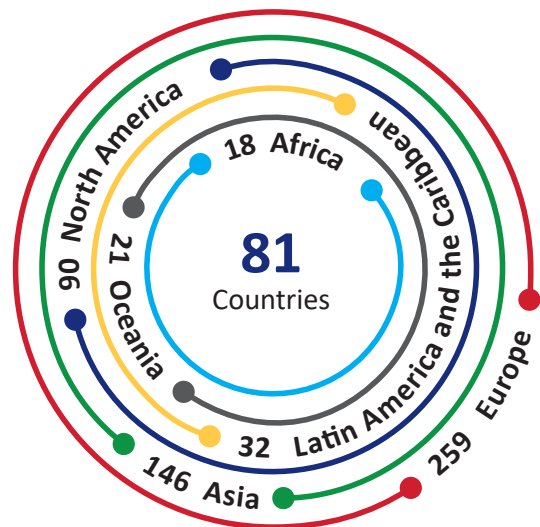


Picture Credit: Av-Comm Space & Defence



Picture Credit: Curtin University [Binar ISS Deployment 2021]

Join the IAF, the world's leading and most diverse space advocacy body



Become an IAF Member

- ✓ Download the Application Form on <https://www.iafastro.org/assets/files/static/iaf-membership-application-form.pdf>
- ✓ Participate in the IAF Committees in charge of defining the Technical Programme
- ✓ Propose to host a Plenary Event during the IAC
- ✓ Propose a Global Networking Forum (GNF) Event to showcase your organization's latest achievements or to discuss the most interesting topics about Space
- ✓ Participate and vote in the General Assembly and nominate IAF Officers
- ✓ Host one of our events!

JOIN US

1 

Download the **Application Form** on our website (www.iafastro.org) or request it to the Secretariat.

2 

Complete the Application Form and attach the **requested documents**.

3 

Send everything to our Secretariat. (info@iafastro.org)

4 

We will review your application and ask in case of missing information.

5 

Once reviewed, your application will be recommended by the **IAF General Counsel**.

6 

Final approval by the General Assembly during the IAC.

*Connecting @ll Space People
for a sustainable future* 



ORGANIZER :



International Astronautical Federation

100 Avenue de Suffren
75015 Paris, France

Phone: +33 1 45 67 42 60

E-mail: info@iafastro.org

www.iafastro.org

*Connecting @ll Space People
for a sustainable future*

HOST :



Space Industry Association of Australia

Suite 102, Level 1, 13-15 Bridge Street
Sydney NSW 2000
Australia

Phone: +61 476 358 611

Email: operations@spaceindustry.com.au
www.spaceindustry.com.au

Be part of the conversation [@iafastro](#) and [#IAC2025](#)

