57th
International Astronautical Congress
BRINGING SPACE CLOSER TO PEOPLE
1st Announcement

Call for Papers & Registration of interest

Valencia, Spain - October 2-6, 2006
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Message from the President of the IAF

In 2006 the International Astronautical Congress organized by the International Astronautical Federation (IAF) in cooperation with the International Academy of Astronautics and the International Institute of Space Law will be held in Valencia, Spain. This will be our 57th International Astronautical Congress or IAC with the theme “bringing space closer to people”. This theme permits us to focus on the growing use of space to improve the lives of humankind. It also provides an opportunity to consider our many robotic and human space exploration activities that inspire our citizens.

My IAF colleagues and I invite you to join us at and to participate in this 57th IAC which will feature more than 130 technical sessions as well as a series of plenary events and highlight lectures on topics of interest to the global space community. The many volunteers who contribute to the IAF’s International Program Committee and who are working on the Valencia Local Organizing Committee are actively engaged in planning a comprehensive and very exciting Congress that will maintain the IAC’s reputation as the premier annual conference on global space activities.

James V. Zimmerman

A message from the chairman of the Local Organizing Committee

I would like to invite you to join us for the 57th IAC in 2006 at Valencia, on behalf of the members of the Local Organizing Committee, a consortium made up of the most important and representative institutions of the Community of Valencia: the Town Council, the Generalitat Valenciana, its two largest Universities and an IAF member SENER.

Valencia is a melting pot of cultures combining the essential elements of the oldest Mediterranean civilizations, beginning with the Greeks and Phoenicians, and later with the dominant cultures of Rome and Islam. But it is Mediterranean trade and navigation which have been the two driving forces of our city since its foundation 2000 years ago, reaching a peak in the 15th century when Valencia, together with Genova, dominated Mediterranean trade. This was its golden age, its wealth envied in all of Europe and notable for its ship building, the prototyping of the modern accounting system, detailed cartography of the Mediterranean with Portulanos drawing, and the first University chair in Spain (in Astrology and Navigation) created at the beginning of the 16th century. The first gold brought back from America by Christopher Columbus can still be seen covering the ceiling of the main government building, the Palau de la Generalitat, in the town centre.

The Community of Valencia is one of the most dynamic economic areas of the Reino de España in the manufacturing of automobiles, furniture, ceramics, shoes and textiles. This industrial activity is also complemented by a large influx of tourists making it one of the main vacational destinations of Europe for the way it offers its own combination of culture, cuisine, and the relaxation of a sunny Mediterranean lifestyle.

In our community there is not yet a noticeable presence of the aerospace industry, but there has been increasing activity during the last fifteen years by research groups in Space Project development, both at a national level and with substantial technological involvement in ESA and NASA missions, with more than 100 researchers currently working in 20 projects. Valencia is also a very active intellectual society as shown by its many colleges and universities with more than 120,000 students studying in nearly all areas of human knowledge. In this respect it is an ideal testing ground for the main purpose of the 57th IAC in “bringing Space closer to people” in a society where there is no direct involvement in the aerospace industry but which is eager for knowledge about it and the way it affects everyday life.

The main site for the IAC, at the stunning Ciudad da las Artes y las Ciencias, is a good example of Valencia’s interest in science and advanced technology. It is an architecturally futuristic complex with ambitious intellectual aims, devoted to the promotion of knowledge in Spaces Science at the Planetarium, Natural Sciences in the Museo de las Ciencias “Príncipe Felipe”, Life Sciences at l’Oceanografic and Scenic Sciences at the Palau de les Arts.

In 2007 Valencia will become the capital of the yachting world as the venue for the America’s Cup but first it will become the Space Capital of the world in 2006 by hosting the IAC. So, on behalf of all the LOC institutions I am honoured and pleased to invite you all onboard for an enjoyable new phase in the history of Valencia. Come and see the launch!

Victor Reglero
MESSAGE FROM IPC CO-CHAIRS

The 57th International Astronautics Congress will be held on October 2006 in Valencia, the third largest city in Spain and located on the Mediterranean coast. Valencia, with its sunny climate and traditional hospitality, will be the fourth Spanish city to host the Congress.

Once more, the international astronautics community, grouped in its three host organisations - Federation (IAF), Academy (IAA) and Institute (IISL) - will meet to exchange experiences, maintaining a union of interests inherited from the pioneers of this activity, a union which has formed the most solid basis on which its spectacular development has been built.

However, development is not synonymous with progress, since development is a scientific fact, and therefore measurable, whereas progress is a social consideration and has an ethical element which inevitably leads to differing opinions and controversy. Consequently, there is a need for our community to maintain a fluid and constant relation among its members and with the rest of society, which is why the theme chosen for the Congress is “bringing space closer to people”.

So how do we go about this? In terms of the Congress, we will open our forum to people unfamiliar with our daily duties, yet whose experience and interest in our activity can help to strengthen our community. By opening the Congress to the general public on special occasions and placing an emphasis on Congress activities geared towards the outside world, we will encourage them to visit the exhibition. Also, we will maintain the already increased attention paid to new generations, namely the international student programme, improve on-line access of speakers to the Congress, increase the information the Congress will distribute to all participants and prioritise the IPC’s attention to the fulfilment of the Congress’s theme. All this should contribute to strengthening the support to our community at a time when it faces important challenges.

In terms of the organisation of the Congress, we believe that the changes introduced in previous years, namely the operation of the International Programme Committee Steering Group and the categorization of Symposia, have been beneficial and should be maintained in the light of the successful results obtained during the last Congress in Vancouver and the preparations for this year’s Congress in Fukuoka. The Plenary Events and Highlight Lectures provide an opportunity to contribute significantly to the theme of the Congress.

Finally, we believe that we are responding to a demand by stating our commitment to achieve the best possible efficiency from the common effort devoted to the Congress, avoiding any overlapping among the activities of the various symposia and seeking a high level of compliance with the approved programme.

This First Announcement details the technical programme planned for the Valencia Congress, and we hope that this Call for Papers will be attractive enough to make you decide to participate and to submit your contribution.

The place is Valencia and the date 2-6 October 2006.

We look forward to seeing you there.

José M. Dorado
Ramesh P. Singh

José M. Dorado
Ramesh P. Singh
The International Astronautical Federation

The International Astronautical Federation (IAF) is a global space association established in 1951 to promote the exchange of information and to encourage international cooperation on space activities. The IAF’s 154 members include government agencies, companies, professional associations and research centers located in 44 countries around the world.

Each year the IAF organizes the International Astronautical Congress in cooperation with the International Academy of Astronautics and the International Institute of Space Law. More than 2,000 space professionals, journalists and students participate in these annual meetings. The International Astronautical Congresses feature plenary presentations by key space officials and than 100 technical sessions during which approximately 1,000 papers are presented on a wide variety of space program activities. Selected papers from each International Astronautical Congress are published in the journal Acta Astronautica.

The International Astronautical Federation manages an international remote sensing networking project and periodically sponsors symposia on current space topics. In collaboration with the United Nations the IAF organizes an annual workshop for developing countries as well as seminars on space activities at U.N. meetings. The International Astronautical Federation – together with the Committee on Space Research and the International Institute for Space Law – also prepares an annual space activities report for the United Nations.
IAF MEMBER ORGANIZATIONS

- Acronis Schweiz AG (SWITZERLAND)
- Aerospace Research Institute (IRAQ)
- Agrupacion Aeronautica Espanola (SPAIN)
- Alcatel Space Industries (FRANCE)
- Alenia Spazio S.p.A (ITALY)
- American Astronautical Society (USA)
- American Institute of Aeronautics & Astronautics (AIAA) (USA)
- Analytical Graphics, Inc. (USA)
- Andoya Rocket Range (NORWAY)
- Argentine Association for Space Technology (ARGENTINA)
- ArianeSpace (FRANCE)
- Asociacion Argentina de Ciencias Espaciales (ARGENTINA)
- Association Aeronautique & Astronautique de France (AAAF) (FRANCE)
- Association Tunisienne de la Communication (ATCOM) (TUNISIA)
- Associazione Italiana di Aeronautica e Astronautica (AIDA) (ITALY)
- Astronomic Technology SDN (MALAYSIA)
- Astronautical Society of India (INDIA)
- Austrian Research Promotion Agency (AUSTRIA)
- Azerbaijan National Aerospace Agency (AZERBAIJAN)
- Babakin Science & Research Space Center (RUSSIA)
- Brazilian Space Agency (AEB) (BRAZIL)
- Brazsat Commercial Space Services Ltda. (BRAZIL)
- British National Space Center (BNSC) (UK)
- Bufete Capin Capdeville y Asociados, S.C (MEXICO)
- Bulgarian Aerospace Agency (BULGARIA)
- Canadian Aeronautics & Space Institute (CASI) (CANADA)
- Canadian Space Agency (CANADA)
- Centre R&D Institute of Robotics and Technical Cybernetics (RUSSIA)
- Central Research Institute for Machine Building (TNMIMAS) (RUSSIA)
- Centre National des Techniques Spatiales (ALGERIA)
- Centre National d’Etudes Spatiales (CNES) (FRANCE)
- Centre Royal de Télédetection Spatiale (CERTS) (MOROCCO)
- Centre Spatial de Liège (BELGIUM)
- Centro de Investigacion y Difusion Aeronautica Espacial (CIDA-E) (URUGUAY)
- Centro Para el Desarrollo Tecnologico Industrial (CDTI) (SPAIN)
- Chinese Society of Astronautics (CHINA)
- CIRA - Italian Space Agency (ITALY)
- Comision Nacional de Actividades Espaciales (CONAE) (ARGENTINA)
- Commission d’Astronautique de l’Academie Roumaine (ROMANIA)
- Companhia Espacial Portuguesa Limitada (PORTUGAL)
- Cooperative Research Centre for Satellite Systems (CRCSS) (AUSTRALIA)
- Cyprus Astronautical Society (CYPRUS)
- Czech Space Office (CZECH REPUBLIC)
- Danish Astronautical Society (DENMARK)
- Dassault Aviation (FRANCE)
- Design Bureau of Transport Machinery (KBTM) (RUSSIA)
- Deutsche Gessellschaft für Luft- und Raumfahrt-Lilienthal-Oberth (GERMANY)
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) (GERMANY)
- Dutch Space (NETHERLANDS)
- EADS Astrium (FRANCE)
- EADS CASA Espacio (SPAIN)
- EADS Space Transportation (FRANCE)
- Engineers Australia (EA) (AUSTRALIA)
- EURIS (FRANCE)
- Eurocopter Launch Services GmbH (GERMANY)
- European Space Agency (ESA)
- Europespace (FRANCE)
- Fédération de Recherche “Energetique, Propulsion, Espace, Environnement” (FREPEE)
- General Organization of Remote Sensing (GODS) (SYRIA)
- ILHII Aerospace Co. Ltd. (JAPAN)
- Indian Space Research Organization (ISRO) (INDIA)
- Indonesian National Institute of Aeronautics and Space (INDONESIA)
- Institut Français d’Histoire de l’Espace (FRANCE)
- Instituto Nacional de Pesquisas Espaciais (INPE) (BRAZIL)
- Instituto Nacional de Tecnologia Aeroespacial (INTA) (SPAIN)
- Instituto Politecnico Nacional (MEXICO)
- International Association for the Advancement of Safety (THE NETHERLANDS)
- International Launch Services (ILS) (USA)
- International Space University Organization (ISU)
- Internationaler Fördekreis für Raumfahrt Hermann Oberth Wernher von Braun (GERMANY)
- Israel Aircraft Industries Ltd (ISRAEL)
- Israel Society of Aeronautics & Astronautics (ISRAEL)
- Israel Space Agency (ISRAEL)
- Italian Space Agency (ASI) (ITALY)
- Japan Aerospace Exploration Agency (JAXA) (JAPAN)
- Japan Society for Aeronautics and Space Sciences (JASS) (JAPAN)
- Kawasaki Heavy Industries (JAPAN)
- Kharkiv State Research & Production Space Center (RUSSIA)
- King Abdulaziz City for Science & Technology (KACST) (SAUDI ARABIA)
- Korea Aerospace Research Institute (KARI) (KOREA)
- Law Offices of Sterns and Tenen (USA)
- Lockheed Martin Corporation (USA)
- MacDonald Dettwiler & Associates (CANADA)
- MANT- Hungarian Astronautical Society (HUNGARY)
- MARS s.r.l (ITALY)
- Marsh SA (FRANCE)
- Microcosm, Inc. (USA)
- Mitsubishi Electric Corporation (JAPAN)
- Mitsubishi Heavy Industries, Ltd. (JAPAN)
- Moscow Aviation Institute (RUSSIA)
- National Aeronautics and Space Administration (NASA) (USA)
- National Aerospace Laboratory (NLR) (THE NETHERLANDS)
- National Oceanic and Atmospheric Administration (NOAA) (USA)
- National Space Agency of Ukraine (NSAU) (UKRAINE)
- National Space Society (USA)
- NEC Toshiba Space Systems, Ltd. (JAPAN)
- Netherlands Agency for Aerospace Programs (NIVR) (THE NETHERLANDS)
- Netherlands Industrial Space Organisation (NISO) (THE NETHERLANDS)
- Netherlands Society for Aerospace Commission (NVO) (THE NETHERLANDS)
- Norsk Astronautikk Forening (NORWAY)
- Norwegian Space Centre (NORWAY)
- Novespace (FRANCE)
- Office National d’Etudes et de Recherches Aérospatiales (ONERA) (FRANCE)
- OHB System AG (GERMANY)
- Pakistan Space & Upper Atmosphere Research Commission (PAKISTAN)
- PBI Media Ltd. (USA)
- Polish Astronautical Society (POLAND)
- Prospace (FRANCE)
- Prospective 2100 (FRANCE)
- Ramiz de Arellano y Abogados, S.C. Law Firm (MEXICO)
- Rocket Research Institute, Inc. (USA)
- Russian Academy of Sciences (RAS) (RUSSIA)
- Russian Space Agency (RUSSIA)
- Russian Technology Transfer Center (RUSSIA)
- SAAB Ericsson Space AB (SWEDEN)
- School of Engineering, UNAM (MEXICO)
- SENER Ingeniería y Sistemas S.A. (SPAIN)
- SES-GLOBAL (HUNGARY)
- Shamakhy Astrophysical Observatory (AZERBAIJAN)
- Snoemca Motore (FRANCE)
- Sodarm (FRANCE)
- Space Communications Corporation (JAPAN)
- Space Generation Advisory Council “SGAC” (AUSTRALIA)
- Spacehub, Inc. (USA)
- Spaceweek International Association (USA)
- Starsem (FRANCE)
- Sunset Energy Council (USA)
- Suomen Avaruustutkimusmuseo - Finnish Astronautical Society (FINLAND)
- Surrey Space Centre - Satellite Technology Ltd. (UK)
- Swedish Space Corporation (SWEDEN)
- Swedish Society of Aeronautics and Astronautics (SWEDEN)
- Swiss Association for Astronautics (SWITZERLAND)
- Swiss Federal Institute of Technology in Lausanne (SWITZERLAND)
- Techno System Developments S.R.L (ITA)
- Teljesat (CANADA)
- Telespace S.p.A. (ITA)
- The Aeronautical and Astronautical Society of the Republic of China (TAINAN, CHINA)
- The Aerospace Corporation (USA)
- The Boeing Company (USA)
- The British Interplanetary Society (UK)
- The Planetary Society (USA)
- Thokiol Propulsion Group - ATK (USA)
- TNO Space (THE NETHERLANDS)
- Union pour la Promotion de la Propulsion Phonique (U3P) (FRANCE)
- United Space Alliance (USA)
- University of Lapland (FINLAND)
- Volvo Aero Corporation (SWE)
- Yuzhnoye State Design Office (UKRAINE)
- ZARM Fab (GERMANY)
- Zarm University of Bremen (GERMANY)
The International Academy of Astronautics (IAA)

The International Academy of Astronautics (IAA) is an international, twelve-hundred member scholarly Academy, which aims to foster the development of astronautics and space activities throughout the world for peaceful purposes. It also aims to recognize prestigious individuals of international reputation. This is a unique non governmental organization, 75-nationality body, established in the sixties at the time of the race to the Moon and recognized by the United Nations in 1996. It is an honorary society with an action agenda. Its members work closely with national and international space agencies, industry, and the academic community; particularly 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 is organized by sections that are talent pools and guardians of high quality of membership, and commissions that create and oversee interdisciplinary activities which are implemented through Program Committees and Study Groups. The Academy cooperates with national academies and continues to enjoy and appreciate its close relations with the IAF and COSPAR, and its participation in the International Astronautical Congresses and COSPAR Assemblies by sponsoring and co-sponsoring sessions, symposia, round tables and plenary sessions. In addition the Academy publishes the journal Acta Astronautica, which contains refereed papers and also selected proceedings of the Congresses and scientific meetings.

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The International Institute of Space Law (IISL)

The International Institute of Space Law (IISL) was founded by the International Astronautical Federation (IAF) in 1960. The IISL replaced the Permanent Committee on Space Law which the IAF had created in 1958 under the chairmanship of Andrew G. Haley. Since 1958, the IISL has held over 40 annual Colloquia on space law in many nations, the Proceedings of which are published by the American Institute of Aeronautics and Astronautics. The Institute also publishes a bi-annual Newsletter. The IISL has elected individual and institutional members from more than 40 countries, who are distinguished by their contributions to or proven interest in the field of space law or other social science aspects related to space activities.

The purposes and objectives of the Institute include the cooperation with appropriate international organizations and national institutions in the field of space law, the holding of meetings, colloquia and competitions on juridical and social science aspects of space activities, the preparation or commissioning of studies and reports and the publication of books and proceedings. Since 1990, the IISL organizes the annual Manfred Lachs Space Law Moot Court Competition. A hypothetical space law case is written by IISL members on invitation of the Organizing Committee established by the IISL Board of Directors to manage the competition. Preliminary competitions are organized each spring in the USA, Europe and the Asia Pacific region. The winning teams of the preliminaries meet in the final round held in conjunction with the annual IISL Space Law Colloquium, which is judged by members of the International Court of Justice. As the IAF 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, members of the IISL are entitled to be designated IAF observers to those sessions.

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 annual session of the UN COPUS Legal Subcommittee in Vienna, Austria. The programs deal with topical space law issues, and the papers there presented are published in the IISL Proceedings. Since 2001, the IISL holds regional conferences in addition to the annual colloquia. The first of these was held in Singapore in 2001, the second in April 2004 in Beijing, China and a third one will be held from 26-29 June 2005 in Bangalore, India.

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<td><strong>B5.2</strong> Small Space Science Missions</td>
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<td><strong>B5.3</strong> Small Satellite Operations</td>
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<td><strong>B5.6</strong> Design and Technology for Small Satellites</td>
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<td><strong>B5.7</strong> Interface Standards for Small Robotic Explorers</td>
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<td><strong>B6.2</strong> Risk Analysis and Modelling</td>
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<td><strong>B6.4</strong> Mitigation and Standards</td>
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<td><strong>B6.P</strong> Poster Session on Space Debris</td>
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### CATEGORY C – TECHNOLOGY
Common Technologies to Space Systems Including Astrodynamics, Structures, Power and Propulsion

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<td>C2.2</td>
<td>Space Structures II - Development and Verification (Deployable and Dimensionally Stable Structures)</td>
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<td>C2.3</td>
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<td>C2.4</td>
<td>New Materials and Structural Concepts</td>
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<td>C2.P</td>
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<td>C3.2</td>
<td>Advanced Space Power Systems and Technologies</td>
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<td>Experiments and Demonstrations for Advanced Space Power</td>
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<td>C3.5</td>
<td>Joint Session on Advanced Concepts for Space Power: Enabling Ambitious Space Exploration and Utilization</td>
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<tr>
<td>C3.P</td>
<td>Poster Session on Space Power</td>
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| C3.6 | Advanced Propulsion - Non Chemical, non Electric |
| C3.7 | Joint session on Nuclear Propulsion and Power |
| C3.8 | Joint session on New Missions enabled by Nuclear Propulsion |
| C3.P | Poster Session on Space Propulsion |

### CATEGORY D – INFRASTRUCTURE
Systems Sustaining Space Missions Including Space System, Transportation, Future Systems and Safety

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<td>D1.3</td>
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<td>D1.P</td>
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<td>D2.3</td>
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<td>D2.4</td>
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<td>D2.5</td>
<td>Future Space Transportation Systems Technologies</td>
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<td>D2.P</td>
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<th>D3</th>
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<td>D3.2</td>
<td>Novel Concepts and Technologies for the Exploration and Utilization of Space</td>
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<td>D3.3</td>
<td>“System-of-Systems” Infrastructures to Enable Ambitious Future Exploration and Utilization of Space</td>
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<td>D3.4</td>
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<td>D3.5</td>
<td>Science Mission Enabled by Nuclear Electric Propulsion</td>
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<td>D3.P</td>
<td>Poster Session on Stepping Stones to The Future</td>
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<td>D4.2</td>
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<td>D4.3</td>
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<td>D5.P</td>
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# Category E – Space and Society


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<th>49TH Int’l Colloquium on the Law of Outer Space (IISL)</th>
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<td>Space Law at Times of Armed Conflict</td>
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<td>Other Legal Matters, including the Relationship between Government and Private Sector in Space Activities</td>
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</table>
German Aerospace Center

DLR is Germany’s Aerospace Research Center and Space Agency. It is a member of the Helmholtz Association of German Research Centers. DLR performs research and development projects in collaboration with national and international partners and it serves as the German Space Agency. As an agency, DLR manages the national space program and the German contributions to ESA’s programs on behalf of the German federal government.

With its research activities, DLR operates in the following four key areas: aeronautics, space, energy, technology and transport. Its research aims at the exploration of the earth and the universe, at the preservation of the earth’s environment, at improvements for mobility, communication and security. DLR is also active in turning the results of its research and development work into industrial applications, supported by activities of internal technology marketing and of technology transfer.

The main research programs in space are:
- earth observation and its applications
- communication and navigation
- space science and exploration
- microgravity research
- space transportation
- technology for space-flight systems

DLR has around 5000 employees in eight locations: Cologne (including the executive offices), Berlin, Bonn, Braunschweig, Göttingen, Lampoldshausen, Oberpfaffenhofen and Stuttgart, as well as offices in Brussels, Paris and Washington, D.C.
Systems Sustaining Space Missions Including Life, Microgravity, Space Exploration and SETI.

A1. STEPPING STONES TO HUMAN EXPLORATION
A2. MICROGRAVITY SCIENCES AND PROCESSES (IAF J.)
A3. SPACE EXPLORATION (IAF Q.)
A4. THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps - 35th SYMPOSIUM (IAA.1.1.)
A5. Integrated Approaches To The Exploration & Utilization Of Moon & Mars (IAA.3.7.)

A1. STEPPING STONES TO HUMAN EXPLORATION
The Symposium focuses on all aspects of life sciences preparations for human exploration.

Rapporteur:
Chairs:

A1.1. Behavioral Issues and Space Exploration
This session will deal with psychological, interpersonal, cultural, performance and human factors issues involved with space exploration.

Chairs:

A1.2. Nutrient and Metabolic Effect in Actual and Simulated Space Flight
The session will explore how available nutrient supply alters physiological responses in real and simulated space flight.

Chairs:

A1.3. Sensorimotor Effects of Spaceflight: Mechanisms and Countermeasures
The results of studies on sensorimotor effects of real and simulated weightlessness which are responsible for the decrement of motor performance in space will be considered.

Chairs:

A1.4. Cellular and Molecular Mechanisms Underlying Spaceflight Responses
This session will explore the physiological effects of spaceflight at the cellular, proteomic and genomic levels.

Chairs:

A1.5. Medical Issues for Space Tourists
This session will focus on the medical issues that are important to consider for the casual space tourists of the future.

Chairs:

This session will cover the technology and science of astrobiology ground-based projects and planetary missions.

Chairs:

A1.7. Astrobiology in the Solar System
This session will cover the technology and science of astrobiology ground-based projects and planetary missions.

Chairs:

A1.8/A2.7. Joint session on Life and Physical Sciences for Space Exploration
Space life science and physical science is essential in preparation for the exploration in space and long duration flights. The understanding the biology consequences of microgravity and radiation exposure will be significant to humans living in space. The session will be to bring together scientists from different fields to discuss topics of interdisciplinary character for space exploration, i.e. radiation biology, radiation shielding, bio-fluids under microgravity, habitats and life support systems, exploration of planetary resources, biochemical analysis, environmental resource utilization.

Chairs:

A2. MICROGRAVITY SCIENCES AND PROCESSES
The objective of this Symposium is to highlight and discuss the state of the art in microgravity physical sciences and processes as well as to prepare the future orbital infrastructure. Session topics cover all microgravity sciences disciplines (materials sciences, fluid sciences, combustion science, fundamental physics, multi-phase flows), current results and research perspectives, together with relevant technology developments.

Coordinators:

Rapporteur:
A2.1. Gravity and Fundamental Physics
This session is devoted to the search of new fields of research in condensed matter physics and gravitational physics including cryogenic fluids, critical fluids, equivalence principle, atomic clock, plasma crystals.

Chairs:
Joachim Richter
Institute for Physical Chemistry - RWTH Aachen - GERMANY
Email: richter@rwth-aachen.de
Francois Gonzalez
CNES - FRANCE
Email: francois.gonzalez@cnes.fr

Rapporteur:
Marcus Dejneka
Canadian Space Agency - CANADA
Email: marcus.dejneka@canadastate.gc.ca

A2.2. Fluid and Materials Sciences
The main focus of the session is on perspective research fields in fluid and materials sciences, multiphase and chemically reacting flows including theoretical modelling, numerical simulations, and results of Pathfinder laboratory experiments.

Chairs:
Nikolai N. Smirnov
Moscow Lomonosov State University - RUSSIA
Email: efbisun1@mech.math.msu.su
Raimondo Fortezza
ARAS - Microgravity Advanced Research and Support Center - ITALY
Email: rai.fortezza@unina.it

Rapporteur:
Peter Hoffmann
Kaiser-Threde GmbH - GERMANY
Email: peter.hoffmann@kaiser-threde.com

A2.3. Microgravity Experiments from Sub-orbital to Orbital Platforms
This session presents recent results of microgravity experiments from all disciplines using different microgravity platforms, including drop towers, parabolic aircrafts, sounding rockets and capsules.

Chairs:
Ziad M. Saghir
Ryerson Polytechnic University - CANADA
Email: zsaghir@ryerson.ca
Rafaelle Savino
University of Naples Federico II - ITALY
Email: rai.savino@unina.it

Rapporteur:
Vladimir Plese
ESA/ESTRACK NETHERLANDS
Email: vladimir.plese@esa.int

A2.4. Science Results from Ground Based Research
This session is focused on the results of ground based preparatory experiments from all disciplines.

Chairs:
Antonio Viviani
Seconda Universita di Napoli - ITALY
Email: antonio.viviani@unina2.it
Valentina Stevtovska
Universite Libre de Bruxelles - BELGIUM
Email: vshev@ulb.ac.be

Rapporteur:
Nikolay N. Smirnov
Moscow Lomonosov State University - RUSSIA
Email: efbisun1@mech.math.msu.su

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).

Chairs:
Gerard Cambon
CNES - FRANCE
Email: gerard.cambon@cnes.fr
Rainer Willen Becker
DLR - Institute fur Raumfahrtmedizin - GERMANY
Email: rainer.willenbecker@dlr.de

Rapporteur:
John Hering
University of Victoria - CANADA
Email: jhering@uvic.ca

A2.6. Microgravity Sciences onboard the International Space Station and Beyond
Aimed to the presentation of results obtained from large orbiting platforms, in particular the ISS, as well as preparation scenarios for further long term flight opportunities. The session includes description and performance of ground and in-orbit infrastructures.

Chairs:
Kenneth Jules
NASA Glenn Research Center - USA
Email: kenneth.jules1@nasa.gov
Roberto Monti
University of Naples Federico II - ITALY
Email: Monti@unina.it

Rapporteur:
Romain Marcout
EADS SPACE Transportation - FRANCE
Email: romain.marcout@space.eads.net

A2.7/A1.8. Joint session on Life and Physical Sciences for Space Exploration
Space life science and physical sciences is essential for preparation to the exploration in space and long duration flights. The understanding the biology consequences of microgravity and radiation exposure is essential to human life in space. The session will be to bring together scientists from different fields to discuss topics of interdisciplinary character for space exploration, i.e. radiation biology, radiation shielding, bio-fluids under microgravity, habitats and life support systems, exploration of planetary resources, biotechnology, environmental resource utilisation.

Chairs:
Benton C. Clark
Lockheed Martin Space Systems – USA
Email: benton.c.clark@lmco.com
Rainer Willen Becker
DLR Institute for Simulation - GERMANY
Email: rainer.willenbecker@dlr.de

Rapporteurs:
Vladislav M. Petru
Institute of Biomedical Problems – Russia
Email: petrov@imb.ru
Ziad M. Saghir
Ryerson Polytechnic University - CANADA
Email: zsaghir@ryerson.ca

A2.8. Poster Session on Microgravity Sciences and Processes
Rapporteur:
Antonio Viviani
Seconda Universita di Napoli - ITALY
Email: antonio.viviani@unina2.it

A3. SPACE EXPLORATION
The Symposium covers the current and future robotic missions and material plans for initiatives in the exploration of the Universe from Space. The emerging field of Astrobiology or origins of the Universe and Solar Systems are included in all sessions where appropriate.

Coordinators:
Bernard H. Fong
ESA/ESTRACK - NETHERLANDS
Email: bernard.fong@esa.int
Christian Salibeberger
MDA Space Missions - CANADA
Email: csallabe@mda.ca

A3.1. Space Based Astronomy
This Session is devoted to innovative new ideas and concepts for current and future missions for observing the Universe from space.

Chairs:
Roger Malina
CNRS/Lab. d’Astronomie Spatiale - FRANCE
Email: malina@alm.mit.edu
Henk Olthof
ESA/ESTRACK - NETHERLANDS
Email: henk.olthof@esa.int

Rapporteur:
Kandy Suego
KFKI Research Inst. For Particle & Nuclear Physics - HUNGARY
Email: suego@kfkirki.hu

A3.2. Solar System Exploration
This Session covers robotic missions for Solar System exploration (inner and outer planets and their satellites, and space plasma physics) except the Earth, Moon, Mars, and small bodies covered in other sessions of this symposium.

Chairs:
Luc Lefèvre
Alcatel Space Industries - FRANCE
Email: luc.lefevre@space.alcatel.fr
Marc D. Rayman
Jet Propulsion Laboratory - California Inst. of Technology - USA
Email: mrayman@jpl.nasa.gov

Rapporteur:
Jim Middelton
MDA Space Missions - CANADA
Email: jmiddelton@mda.ca
A3.3. Mars Exploration

The planet Mars will be explored during the next decade with multiple robotic missions from a variety of nations. This Session will cover current results from ongoing Mars missions and the designs for proposed Mars missions including expected experiments. Papers on any aspects of the search for evidence of extinct or extant Martian Life, and forward and backward contamination are particularly welcome.

Chairs: Christian Sallberger
MDA Space Missions - CANADA
Email: christian.sallberger@mda.ca

Rapporteur: Luigi Bussolino
Bussolino & Associates – ITALY
Email: luigi.bussolino@virgilio.it

A3.4. New Mission Concepts for Space Exploration

This Session will deal with the new fields of space missions which are today emerging such as fundamental physics, exobiology, etc. Mission concepts as well as the associated specific technologies will be addressed.

Chairs: Juntaro Kawaguchi
ISAS/JAXA - JAPAN
Email: kawaguchi.juntaro@jaxa.jp
Denis Moura
CNES - FRANCE
Email: denis.moura@cnes.fr

Rapporteurs:
Douglas A. O’Handley - USA
Email: dohphd@earthlink.net
William H. Siegfried
The Boeing Company (retired) - USA
Email: w.siegfried@comcast.net

A3.5. Small Bodies Missions and Technologies

The Session will present the missions and technological aspects related to the exploration of small bodies including a search for pre-biotic signatures.

Chairs: Susan McKenna-Lawlor
Space Technology (Ireland) Ltd - IRELAND
Email: sl@slmjrue
Stephan Ulamec
DLR - GERMANY
Email: stephan.ulamec@dlr.de

Rapporteurs:
Marc D. Rayman
Jet Propulsion Laboratory - California Inst. of Technology - USA
Email: mrrayman@jpl.nasa.gov
Zhengyin Lu
CAS - Center for Space Science & Applied Research – CHINA
Email: lu.zy@csrc.ac.cn

A3.6. Moon Exploration

This Session will address historical, current and future lunar missions. It will cover the status of missions such as SMART-1, Selene, Luna-A, Chandrayaan-1, Chang’e, Lunar Reconnaissance Orbiiter, and Lunar Sample Return. The Session will also address the next generation of robotic surface missions, as well as life sciences on the Moon, resource utilisation and preparatory activities for future solar system exploration.

Chairs: Bernard Forie
ESA/ESTEC - NETHERLANDS
Email: bernard.forie@esa.int
Jim Middleton
MDA Space Missions - CANADA
Email: j.middlet@mda.ca

Rapporteur:
William H. Siegfried
The Boeing Company (retired) - USA
Email: w.siegfried@comcast.net

A3.7/D2.7. Joint session on Access to Space for New Exploration Missions

This is a joint session between Space Transportation and Space Exploration. Giving fidelity to the transportation systems needed for robust and sustainable space exploration, this session addresses a range of topics such as the various systems required to enable robotic and human missions from Earth to the Moon, Mars, and destinations beyond. It also serves as a venue for international participants to present updates on individual and collaborative efforts in the area of transportation systems for both near- and long-term exploration initiatives, as well as a forum to present current and projected space transportation needs.

Chairs: Luigi Bussolino
Bussolino & Associates – ITALY
Email: luigi.bussolino@virgilio.it
(TBC)

Rapporteurs:
David Gliss
NASA Langley Research Center - USA
Email: david.e.gliss@nasa.gov
(TBC)

A3.P. Poster Session on Space Exploration

Rapporteurs:
Bernard H. Forie
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Christan Sallberger
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A4. The Search for Extraterrestrial Intelligence (SETI) – The Next Steps (35th SYMPOSIUM)

The symposium deals with the scientific, technical and interdisciplinary aspects of the search for extraterrestrial intelligence (SETI) including a discussion of all kinds of contacts. The technical side is not limited to the microwave window, but includes also optical and any other radiation. The interdisciplinary aspects include all societal implications, risk communication and philosophical considerations of any kind of discovery or contact.

Coordinators:
Claudio Maccone – ITALY
Email: clmacc@libero.it
Seth Shostak
SETI Institute - USA
Email: seth@seti.org

A4.1. SETI I – Technical Aspects

All technical aspects involved in the search for extraterrestrial intelligence, including current and future search strategies.

Chairs: Ray Norris
Australia Telescope National Facility – AUSTRALIA
Email: ray.norris@csiro.au
Paul Shuch
SETI League – USA
Email: pshuch@setileague.org

Rapporteur:
Seth Shostak
SETI Institute - USA
Email: seth@seti.org

A4.2. SETI II – Interdisciplinary Aspects

All aspects concerning the societal implications of extraterrestrial intelligence are considered, including public reaction to a discovery, risk communication and the possible impacts on society.

Chairs: Kathryn Denning
York University – CANADA
Email: Kathryn@logmancer.com
Douglas Vakoch
SETI Institute - USA
Email: vakoch@seti.org

Rapporteur:
Alex Illingworth
Rijksuniversiteit Leiden – NETHERLANDS
Email: alexill@fys.kun.nl

A5. Integrated Approaches to the Exploration and Utilization of the Moon and Mars

As the international discussion of specific space exploration program options continues, there is an increasing need for more “synthetic” consideration of several key strategic issues that cut across multiple missions, technologies and communities. This Symposium will examine two of these issues. First, it will examine integrated frameworks for the ambitious exploration and utilization of the Moon (beginning with a suite of increasing ambitious robotic missions, and leading to eventual lunar colonization), and the exploration of Mars and the search for life (including both early robotic activities to establish the data needed for eventual human explorers to join the search, as well as eventual human and robotic exploration of the planets). Also, it will consider the integration of human and robotic capabilities and technologies to more efficiently and safely explore such destinations and will consider cooperative human and robotic extraterrestrial activity and extra-habitat activities (EVA/HMA) in locations such as on the lunar surface and in space (e.g., on the Earth-Moon L6 invariant point) in preparation for subsequent, more distant operational venues.

Coordinators:
George W. Morganthaler
University of Colorado at Boulder – USA
Email: morgenth@colorado.edu
Christian Sallberger
MDA Space Missions - CANADA
Email: csallbe@mda.ca
On-Going and Future Operational Applications, Including Earth Observation, Disaster Reduction, Communication, Space Station, Small Satellites and Space Debris

B1. EARTH OBSERVATION (IAF B.)
B2. SPACE AND NATURAL DISASTER REDUCTION (IAF C.)
B3. SPACE COMMUNICATIONS AND NAVIGATION (IAF M.)
B4. SPACE STATIONS (IAF T.)
B5. SMALL SATELLITE MISSIONS (IAA.4.11)
B6. SPACE DEBRIS (IAA.5.12)

B1. EARTH OBSERVATION

This Symposium focuses on space missions which deal with collecting information about the Earth and its environment. Session topics deal with all aspects of Earth Observation missions including the policy and infrastructure of international cooperation and coordination, the emergence of commercial systems to satisfy market needs, the technical descriptions of new missions and sensors to be used, data processing and GIS, environmental applications and global change studies and the use of space-based technologies.

Coordinators:
W. John Hussey
The Aerospace Corporation – USA
Email: john.hussey@aero.org

Pierre Ranzoli
EADS Astrium - GERMANY
Email: p_ranzoli@gmx.de

B1.1. International Cooperation in Earth Observation Missions

Focus is on efforts being made by governments, agencies and society to achieve coordination, cooperation and compatibility in the development of space-based earth observation systems. Presentations are encouraged which involve cooperative efforts with developing countries. Papers on current and ongoing missions involving coordination among commercial, government and other entities are especially encouraged.

Chairs:
W. John Hussey
The Aerospace Corporation – USA
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Pierre Ranzoli
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Email: p_ranzoli@gmx.de

Rapporteur:
Jan Kolar
Charles University – CZECH REPUBLIC
Email: kolar@e-kolar.net

B1.2. Future Earth Observation Systems

Emphasis is on technical descriptions of planned and new space systems and missions for experimental and operational earth observation. Descriptions of new concepts and innovative earth observation systems are encouraged.

Chairs:
Benoit Boissin
CNES - FRANCE
Email: benoit.boissin@cnes.fr

Mukund Rao
ISRO Headquarters - INDIA
Email: mrao@isro.in

Rapporteur:
Gilles Coifay
Sodern - FRANCE
Email: gilles.coifay@sodern.fr

B1.3. Earth Observation Sensors & Technology

Focus is on sensors now being developed or tested for all aspects of earth observation. Particular emphasis is on new sensors for meeting the growing demand of user markets.

Chairs:
Andrew Court
TNO Institute of Applied Physics - NETHERLANDS
Email: andrew.court@tno.nl

David L. Glackin
The Aerospace Corporation – USA
Email: david.glackin@aero.org

Rapporteur:
Pierre Ranzoli
EADS Astrium - GERMANY
Email: p_ranzoli@gmx.de

B1.4. Earth Observation Data Management Systems

Earth Observation Data Acquisition, Communication, Processing, Dissemination and Archiving.

Chairs:
Bruce K. Quirk
U.S. Geological Survey - EROS Data Center – USA
Email: quirk@usgs.gov

Carlo Ulvieri
University of Rome “La Sapienza” - ITALY
Email: ulvieri@sysm.uniroma1.it

Rapporteur:
Bhaskar J. Choudhury
NASA Goddard Space Flight Ctr - USA
Email: bhaskar@te.gsc.nasa.gov
B1.5. Earth Observation Applications and Economic Benefits

Earth Observation value-added products.

Chairs:
- Luigi Russelino
  Atmosfera S.p.A. - ITALY
  Email: ruselino@atmosfera.it
- Paul Kambon
  Alcatel Space Industries - FRANCE
  Email: p.kambon@alcatel-space.alcatel.fr

Rapporteur:
- Y. J. H. M. Sijp"eijer
  The Aerospace Corporation - USA
  Email: y.j.h.m.sijpeijer@aero.org

B1.6. Global Earth Observation Initiatives

Cooperation in meteorological satellite systems.

Chairs:
- Jan Kolar
  Charles University – CZECH REPUBLIC
  Email: kolarj@e-kolar.net
- D. Briten Smith
  NOAA/NESDIS - USA
  Email: briten.smith@noaa.gov

Rapporteur:
- Y. J. A. Chong
  National University of Singapore – SINGAPORE
  Email: y.j.a.chong@alumni.nus.edu.sg

B1.P. Poster Session on Earth Observation

Rapporteur:
- Andras Court
  TNO Institute of Applied Physics - NETHERLANDS
  Email: andries.court@tno.nl

B2. SPACE AND NATURAL DISASTER REDUCTION

Following two sessions will cover scientific and application aspects devoted to natural disaster mitigation, together with discussion of possible international collaboration among various agencies to identify joint programs for early warning and mitigation of natural disaster.

Coordinators:
- Kornel P Singh
  School of Computational Sciences - George Mason University – USA
  Email: kpsingh@gmu.edu
- Dimitar Gurovsky
  NASA Goddard Space Flight Center/SSAI - USA
  Email: gurovska@ssai.gsfc.nasa.gov

B2.1. Climate Change and Natural Disasters

Natural disasters (Floods, droughts, Earthquakes, Volcanoes, Snow Avalanches, Erosion, Dust storms) occur every year. These disasters bring out short and long term changes on the land, land cover and ocean properties which have direct linkage with the climate conditions. Anticipated climate change is known will change distribution and intensity of natural disasters on land and ocean surfaces. Heavy and extreme precipitation event are likely become more frequent, yet some regions will get drier and intensity of natural disasters on land and ocean surfaces. Heavy and extreme precipitation event are likely become more frequent, yet some regions will get drier and extremes. This will make ecosystems more vulnerable resulting in species shifts or even disappearance or fragmentation of certain ecosystems. The session will discuss the response natural disasters to global climate changes. The discussions might focus on water availability and distribution, vulnerability of ecosystems (coral reefs, fish habitat, crops area), food security in terms of supply and demand, especially due to accelerated population growth, land surface changes (deforestation, desertification, land degradation) both natural and human-induced, damage in coastal zone and permafrost areas, human health and epidemics especially vector-born. Also important issues will be feedback of these changes on climate.

Chairs:
- Katarzyna Dobrowolska-Zelinska - POLAND
  Email: kska@wgg.edu.pl
- Felix Kogan
  NASA/NESDIS - USA
  Email: felix.kogan@noaa.gov

Rapporteur:
- Kornel P Singh
  Department of Civil Engineering - Indian Institute of Technology - INDIA
  Email: ramesh@iit.ac.in

B2.2. International Cooperation for Natural Hazards Management

Recent initiatives on Natural Hazard Management have raised awareness of the issue globally. The UN Action Team on Disaster Management, Charter on Space Disaster, CESDIS Disaster Management Support Group and the Integrated Global Observing Strategy have contributed to a significant improvement in society’s capacity to cope with disasters. Political recognition of the development has been seen in the Earth Observation Summits and the associated GIS process. This session will examine progress in these initiatives and focus on how they help improve the mapping, monitoring, mitigation, risk assessment and forecasting of a range of natural hazards. Issues of interest include user requirements for observations, the technology to make them, the infrastructure to manage the resulting data and capacity building within the relevant policy making, operational and research committee.

Chairs:
- Stuart Marsh
  British Geological Survey - UK
  Email: sam@bgs.ac.uk
- Hormoz Modaresi
  French Geological Survey – FRANCE
  Email: h.modaresi@brgm.fr

Rapporteur:
- Robert Missotten
  UNESCO - FRANCE
  Email: r.missotten@unesco.org

B3. SPACE COMMUNICATIONS AND NAVIGATION

This Symposium on space communications examines developments in the technology, design and system, as they relate to the areas of mobile, broadcasting, fixed and broadband interactive multimedia satellite services. In addition space based navigation systems and technologies will be addressed.

Coordinators:
- Robert D. Briskman
  Sirius Satellite Radio – USA
  Email: rbbriskman@siriusradio.com
- M.G. Chandrashekhar
  WorkSpace Corporation – USA/INDIA
  Email: mchandra@workspace.com

B3.1. Near-Earth and Interplanetary Communications Systems

Both the configuration and requirements associated with space and ground segments may be very different when there is constant relative motion between them, as compared to the situation in which they are relatively fixed, as is the case for geostationary systems. This session addresses such systems, which may operate in both near-earth and interplanetary environments, with particular regard to their unique concepts, techniques, and technologies.

Chairs:
- Ramon De Paula
  NASA Headquarters – USA
  Email: rdpaula@hq.nasa.gov
- Matt C. Nelson
  Nilson Research Corporation – USA
  Email: mcn@nilsonresearch.com

Rapporteur:
- Makoto Kaji
  Japan Aerospace Exploration Agency (JAXA) – JAPAN
  Email: kaji.makoto@jaxa.jp

B3.2. Advanced Technologies

New and promising space communication technologies which can be applied to both existing and new systems.

Chairs:
- Edward W. Ashford
  Ascend/SpaceX – USA
  Email: edashford@ascend.com
- Halley Benz
  Telesat Canada – CANADA
  Email: hbenzel@telesat.ca

Rapporteur:
- Bruno Perrot
  SES ASRA – LUXEMBURG
  Email: bruno.perrot@ses-astrea.com

B3.3. Fixed and Broadcast Services

Advances in fixed and broadcast services will be presented, including its frequency band systems, television and radio direct-to-user systems and related satellite technology improvements.

Chairs:
- Robert D. Briskman
  Sirius Satellite Radio – USA
  Email: rbbriskman@siriusradio.com
- Joe M. Straus
  The Aerospace Corporation – USA
  Email: jmsstraus@aero.org

Rapporteur:
- Carlo Elia
  ESA/ESTEC – NETHERLANDS
  Email: carlo.elia@esa.int
B3.4. Communication Satellite Infrastructure and Economics

The interoperability, policy, and regulatory environments can considerably impact the development of satellite communication systems, as these can greatly influence both the technical and economic feasibility of such systems. Domestic, regional and global satellite systems will be addressed and reviewed with respect to these and other non-technical considerations.

Chairs:
- Conine Contant-Jørgensen
  AIAA – USA
  Email: ccm@space.gc.ca
- Sergei Chernikov
  United Nations Office of Vienna–AUSTRIA
  Email: petr@lala-web.cz

Rapporteur:
- Daniel Hernandez
  CNES – FRANCE
  Email: daniel.hernandez@ones.fr

B3.5. Advanced Systems

Advanced satellite communications concepts and systems will be presented.

Chairs:
- Elemer Berentey
  Telesat Canada – CANADA
  Email: e.berentey@telesat.ca
- Robert Previaux
  Space Systems Local – USA
  Email: previaux.robert@ssl.local.com

Rapporteur:
- Bruno Perrot
  SES ASTRA – LUXEMBURG
  Email: bruno.perrot@ses-astra.com

B3.6. Mobile Communications and Satellite Navigation

New and emerging mobile and personal communications systems will be addressed, including those providing services to hand held terminals, cars, trains, trucks, ships and planes. Existing and future satellite navigation systems will also be covered. The synergy between and convergence of satellite communications and navigation to allow innovative new services will be given particular emphasis.

Chairs:
- Takashi Iida
  National Institute of Information & Comm. Technology - JAPAN
  Email: iida.toshiyuki@jaxa.jp
- Ciron Rossetti
  FRFL UK – FRANCE
  Email: ciron.roisetti@hotmail.com

Rapporteur:
- Al G. Chandrasekhar
  Worldspace Corporation – USA
  Email: mchandra@worldspace.com

B4. SPACE STATIONS

This Symposium addresses all aspects of space stations, including their design, development, operation, utilisation and evolution. The scope covers past, present and future space stations.

Coordinators:
- Carlos Vera
  EADS Space Transportation – NETHERLANDS
  Email: carlos.vera@eads.net
- Mag Iskander
  MD Robotics – CANADA
  Email: miskande@mdrobotics.ca

B4.1. Overview

Topics of a broad nature should be addressed, including the planning, status, outlook and evolutionary prospects of space stations.

Chairs:
- Graham Gibbs
  Canadian Space Agency – USA
  Email: graham.gibbs@space.gc.ca
- Tony Reese
  NASA Headquarters – USA
  Email: tony.reese@nasa.gov

Rapporteur:
- Masuzuru Miyake
  JAXA – JAPAN
  Email: miyake.masuzuru@jaxa.jp

B4.2. Assembly and Operations

Topics should address experiences on actual ISS assembly and integration, as well as flight, ground operations and planning.

Chairs:
- Gunther Brandt
  EADS Space Transportation - GERMANY
  Email: gunther.brandt@eads.net
- Todd Fox
  The Boeing Company - USA
  Email: todd.fox@boeing.com

Rapporteur:
- Klaus Wittmann
  DLR - GERMANY
  Email: klaus.wittmann@dlr.de

B4.3. International Utilization of Space Stations

Topics should address academic, commercial or engineering research on space stations, including planning, development and utilization of activities. Papers involving international collaboration will receive priority.

Chairs:
- John-David F. Bartoe
  NASA – USA
  Email: john-david.f.bartoe@nasa.gov
- Toshiyuki Nakamura
  JAXA – JAPAN
  Email: nakamura.toshiyuki@jaxa.jp

Rapporteur:
- Thomas J. Sultiff
  NASA Glenn Research Center – USA
  Email: thomas.j.sultiff@nist.gov

B4.4. Evaluation, Enhancement, New Programs

Topics should address novel evolutionary uses, configuration and operation methods of ISS. Papers addressing the use of ISS experiences to support future human spaceflight programs are also encouraged.

Chairs:
- Mag Iskander
  MD Robotics – CANADA
  Email: miskande@mdrobotics.ca
- Sergei K. Shaevich
  Khouryev State Research & Production – RUSSIA
  Email: shaevichs@khrunichev.com

Rapporteur:
- Raimondo Fortezza
  MARS - ITALY
  Email: fortezza@marcenter.it

B4.5. Space Station Human Research for Exploration

This session is dedicated to results on researches performed on ISS and dedicated to preparation for human exploration.

Chairs:
- Geneviève Gargir
  CNES – FRANCE
  Email: genevieve.gargir@cnes.fr
- Victor M. Baranov
  Institute for Biomedical Problems – RUSSIA
  Email: vmb@imb.ru

Rapporteur:
- Anthony R. Gross
  NASA Ames Research Center - USA
  Email: anthony.gross@nasa.gov

B5. SMALL SATELLITE MISSIONS

This Symposium addresses Small Satellite programmes for Science & Technology, encompassing space science and earth observation missions and focusing on lessons learned, results achieved, and next generation missions. The Symposium also addresses four areas across the entire spectrum of small satellite missions – design and technology, planning for and executing cost-effective operations, affordable and reliable space access, and implementing small satellite programmes in developing countries.

Coordinators:
- Rhoda S. Hornstein
  NASA Headquarters - USA
  Email: rhoda.hornstein@nasa.gov
- Rainer Sandau
  DLR - GERMANY
  Email: rainer.sandau@dlr.de

B5.1. 7th UN/IAA Workshop on Small Satellite Programmes at the Service of Developing Countries

This workshop is organized jointly by the United Nations Office for Outer Space Affairs (UN/UNOOSA) and the International Academy of Astronautics (IAA). It shall review the needs that could be satisfied by developing and using small satellites, with a particular emphasis on the Mediterranean area and the African perspective.

Following subjects shall be open for discussion:
- progress status in small satellite programme implementation and development
- experience gained with existing programmes and difficulties to set up new projects
- results and benefits achieved by such small satellites already in orbit

Consideration shall be given to education, training and international cooperation.

Chairs:
- Pierre Molette
  France
  Email: pierre.molette@centraliens.net
- Serguei Chemikov
  United Nations Office of Vienna – AUSTRIA
  Email: sergei.chemikov@unvienna.org

Rapporteur:
- Petr Lala
  Czech Space Office – CZECH REP
  Email: petr.lala@web.cz
**B5.2. Small Space Science Missions**

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

Chairs:
- S. McEwen
  The Johns Hopkins University - USA
  Email: tom.mcewen@jhuapl.edu
- Denis Moura
  CNES - FRANCE
  Email: denis.moura@cnes.fr

**B5.3. Small Satellite Operations**

This session covers the planning for and execution of cost-effective approaches for Small Satellite Operations, with emphasis on missions recently accomplished and lessons learned. A discussion of Life-cycle costing vs. life-cycle effectiveness is invited. Papers addressing new business opportunities, innovative management techniques, and international cooperation in support of Small Satellite Operations are also encouraged.

Chairs:
- Rhoda S. Hornstein
  NASA Headquarters - USA
  Email: rhoda.hornstein@hq.nasa.gov
- Peter Allan
  Rutherford Appleton Laboratory – UK
  Email: p.m.allan@rl.ac.uk

**B5.4. Small Satellites for Earth Observation – Lessons Learned & New Generation Missions**

The session presents information to decision makers, scientists, engineers and managers about lessons learned from small satellite Earth observation missions and planned missions.

Chairs:
- Larry Paxton
  The Johns Hopkins University - USA
  Email: larry.paxton@jhuapl.edu
- Amnon Ginati
  ESA/ESTEC – NETHERLANDS
  Email: amnon.ginati@esa.int

Rapporteur:
- Klaus Bress
  Institut für Luft- und Raumfahrt - GERMANY
  Email: klaus.bress@ilr.tu-berlin.de

**B5.5. Small Spacecraft Launch, Injection, and Orbit Transfer Systems**

A key challenge facing the viability and growth of the small satellite community is affordable and reliable space access. This is achieved through small launchers, rideshares, piggyback launches, and spacecraft propulsion technologies to reach final operational orbit. Topics of interest for this session include existing and conceptual launch platforms for small spacecraft, launchers and small spacecraft component and sub-system development that will enable efficient small spacecraft access to orbit and orbit change (e.g., propulsion systems, separation and dispenser systems, upper stages), and lessons learned from users on technical and programmatic approaches.

Chairs:
- Alex da Silva Gurel
  Surrey Satellite Technology Ltd. – UK
  Email: a.da-silva-gurel@stt.co.uk
- Jeffrey L. Endree
  The Aerospace Corporation - USA
  Email: jeffrey.l.endree@aero.org

**B5.6. Design and Technology for Small Satellites**

This session covers the design and technology required and developed for small satellites, including micro and nano-satellites.

Chairs:
- Richard Holdaway
  Rutherford Appleton Laboratory – UK
  Email: r.holdaway@jifl.ac.uk
- Phil Davies
  Surrey Satellite Technology Ltd. – UK
  Email: p.davies@stt.co.uk

**B5.7. Interface Standards for Small Robotic Explorers**

Interface standards are important for the interoperability of space systems. Current interfaces such as RS422, MIL-STD 1553, and others are broadly used for interfacing spacecraft electrical systems. Mechanical interfaces between a launch vehicle and spacecraft are defined for each individual launch vehicle type. Today however, plug-and-play interface standards can be further defined and used to simplify the integration and test of elements of a system. For instance, an instrument or component can be connected in such a way as to become immediately recognizable to the overall system, whether through mechanical alignment features, or through software drivers. Small spacecraft are ideal proving grounds for testing new plug-and-play interfaces. This session explores available or planned interface standards (mechanical, electrical, data systems, and fluids) across all interfaces of small robotic explorers, whether for Earth observation Space Science, or Exploration applications.

Chairs:
- Jaime Esper
  NASA Goddard Space Flight Center – USA
  Email: jaime.esper@nasa.gov
- Marco D’Enrico
  Dipartimento di Ingegneria Aerospaziale e Meccanica
  Seconda Università di Napoli – ITALY
  Email: marco.denrico@unina2.it

**B6. SPACE DEBRIS**

The Symposium will address the complete spectrum of technical issues of space debris: measurements and space surveillance, modeling, risk assessment in space and on ground, reentry, hypervelocity impacts and protection, mitigation and standards.

**B6.1. Measurements and Space Surveillance**

The session will address advanced ground- and space-based measurement techniques, related processing methods, and results on the derived spatial and temporal distribution of debris and meteoroids. This includes space surveillance concepts, their implementation and operation, and the establishment and maintenance of space objects catalogs.

Chairs:
- Fernand Alby
  CNES – FRANCE
  Email: fernand.alby@cnes.fr
- Vladimir Agapov
  Keldysh Inst. of Applied Mathematics – RUSSIA
  Email: avm@kIAM1.rssi.ru

Rapporteur:
- Patrick Setzler
  University of Michigan – USA
  Email: psetzler@umich.edu

**B6.2. Risk Analysis and Modelling**

The session will address methods for on-orbit (collision) and on-ground risk assessment. The on-orbit analysis will cover collision risk estimates (based on statistical population models and deterministic catalogs) and active avoidance (evasive maneuvers).

Chairs:
- Mark Matney
  NASA Johnson Space Centre – USA
  Email: mark.matney-1@nasa.gov
- Carmen Pardina
  ISTI/CNR – ITALY
  Email: carmen.pardina@isti.cnr.it

Rapporteur:
- Heiner Klinkrad
  ESA/ESOC – GERMANY
  Email: heiner.klinkrad@esa.int

**B6.3. Hypervelocity Impacts and Protection**

The session will address passive protection, shielding and damage predictions. Shielding aspects will be supported by experimental and computational results of HVI tests.

Chairs:
- Michel Lambert
  ESA/ESTEC – NETHERLANDS
  Email: michel.lambert@esa.int
- Eric L. Christiansen
  NASA Johnson Space Centre – USA
  Email: eric.l.christiansen@jsc.nasa.gov

Rapporteur:
- Wen Zhang
  Harbin Institute of Technology – CHINA
  Email: zhiewei@hit.edu.cn
B6.4. Mitigation and Standards
The session will focus on the definition and implementation of debris prevention and reduction measures (debris mitigation) and on related economical issues. The session will also address space debris mitigation guidelines and standards that exist already or are in preparation at national and international level.

Chairs:
- W. John Hussey
  The Aerospace Corporation - USA
  Email: john.hussey@aero.org
- Seishiro Kibe
  JAXA – JAPAN
  Email: kibe.seishiro@jaxa.jp

Rapporteur:
- Christophe Bonnal
  CNES – FRANCE
  Email: christophe.bonnal@cnes.fr

C1. ASTRODYNAMICS
This Symposium addresses advances in orbital mechanics, attitude dynamics, guidance, navigation, control operations and robotics in space.

Coordinators:
- Alberto Foni
  ISTI Istituto del CNR - ITALY
  Email: alberto.foni@isti.cnr.it
- Arun Misra
  McGill University - CANADA
  Email: arun.misra@mcgill.ca

Chairs:
- Shinishi Nakasuka
  University of Tokyo - JAPAN
  Email: nakasuka@space.t.u-tokyo.ac.jp
- Uwe Feucht
  DLR – GERMANY
  Email: uwe.feucht@dlr.de

Rapporteur:
- Paolo Teofilatto
  University of Rome La Sapienza – ITALY
  Email: paolo.teofilatto@uniroma1.it

C1.1. Attitude Dynamics, Modelling and Determination
This session deals with all aspects of spacecraft attitude, modelling, simulation of large flexible spacecraft and attitude stabilization.

Chairs:
- Shinichi Nakasuka
  University of Tokyo - JAPAN
  Email: nakasuka@space.t.u-tokyo.ac.jp
- Uwe Feucht
  DLR – GERMANY
  Email: uwe.feucht@dlr.de

Rapporteur:
- Paolo Teofilatto
  University of Rome La Sapienza – ITALY
  Email: paolo.teofilatto@uniroma1.it

C1.2. Attitude Control, Sensors and Actuators
This session deals with developments in the field of attitude sensors and actuators, robust control, adaptive control, identification and stabilization of flexible systems including design, validation, simulation, and experiments.

Chairs:
- Amalia Eini
  Politecnico di Milano - ITALY
  Email: amalia.eini@polimi.it
- Michael Ovchinnikov
  Keldysh Institute of Applied Mathematics – RUSSIA
  Email: ovchinni@keldysh.ru

Rapporteur:
- Christopher Dean Hall
  Aerospace and Ocean Engineering – USA
  Email: cdhall@vt.edu

C1.3. Multibody Dynamics
The session will cover topics in dynamic simulations and controls of multiple rigid and flexible bodies including tethered systems space robots.

Chairs:
- Elbert N. Macau
  INPE/LA/C – BRAZIL
  Email: elbert@la.inpe.br
- Tatsuhiko Mori
  ISAS/JAXA – JAPAN
  Email: morita@news.sio.isas.jaxa.jp

Rapporteur:
- Andre P. Mazzoleni
  North Carolina State University – USA
  Email: mazzoleni@ncsu.edu

C1.4. Optimization
Optimization of trajectories including launch, orbital transfer, rendez-vous, atmospheric reentry, manoeuvring and station keeping will be covered in this session.

Chairs:
- David C. Folta
  NASA GSFC – USA
  Email: david.c.folta.1@gsfc.nasa.gov
- Moshe Guelman
  Technion, I.I.T. – ISRAEL
  Email: aerglmn@aerodyne.technion.ac.il

Rapporteur:
- Jean-Paul Aguttes
  CNES – FRANCE
  Email: jean-paul.aguttes@cnes.fr

C1.5. Orbital Dynamics
All aspects of satellite orbital dynamics under perturbing, and control forces including all phases of the mission will be covered in this session.

Chairs:
- Robert Melton
  The Pennsylvania State University – USA
  Email: rgmelton@psu.edu
- An-Ning Wu
  National Space Organization – TAIWAN
  Email: armw@nspo.org.tw

Rapporteur:
- Colin R. McInnes
  University of Strathclyde – UK
  Email: colin.mcinnes@strath.ac.uk

C1.6. Mission Operations
Discussed in this session will be all aspects of design, implementation and control of single or multi satellite systems, including on-board and ground operations as well as the emerging technologies.

Chairs:
- Thérèse Donath
  ONERA - FRANCE
  Email: Therese.Donath@onera.fr
- Veniamin Malyshev
  Moscow Aviation Institute – RUSSIA
  Email: mavi604@online.ru

Rapporteur:
- Ming Li
  CAST – CHINA
  Email: liming@dfhsat.com

C1.7. Guidance and Control
Studies and Applications related to guidance and control of spacecrafts and rockets, including rendez-vous and docking.

Chairs:
- Filippo Graziani
  University of Rome La Sapienza - ITALY
  Email: glossis@polimi.it
- Jun’ichiro Kawaguchi
  ISAS/JAXA – JAPAN
  Email: kawaguchi.jun@jaxa.jp

Rapporteur:
- Werner Enderle
  The Engineers Australia - AUSTRALIA
  Email: w.endele@lat.edu.au
C1.8. Mission and Constellation Design
The session deals with mission, constellation and formation flying with emphasis on studies and experiences related to current and future projects as well as taking into account mission constraints and implementation problems.

Chairs:
- Antonio F. Bertachini Almeida Prado
- Jean-Paul Aguttes

Rapporteur:
Pierre Rochus
Alcatel Space – FRANCE
Email: jean-alain.massoni@space.alcatel.fr

C1.9. Poster Session on Astrodynamics

Rapporteur:
Jean-Paul Aguttes
CNES – FRANCE
Email: jean-paul.aguttes@cnes.fr

C2. MATERIALS AND STRUCTURES
This Symposium provides an international forum for recent advancements in the assessment of the latest technology achievements on space structures, structural dynamics and materials. The Symposium addresses the design and development of space vehicle structures and mechanical/thermal/fluidic systems. Future advances in a number of space systems applications for space power, space transportation, astrodynamics, space exploration, space propulsion and space station will depend primarily on the successful application of innovative new materials and the development of new structural concepts - particularly those relating to very large deployable (and assembled) space structures. For these applications to occur, increased sharing and collaboration between these technology communities, and discussion among technologists and mission planners, must be pursued. Substantial improvements in a wide range of current technologies must occur, yet projected costs must be reduced, potential scientific returns must be increased from respective mission system applications. Papers in this symposium will review the projected advances in materials and large space structures in this domain for advanced space systems applications.

Coordinators:
- Constantin P. Stavrinides
  ESA/ESTEC – NETHERLANDS
  Email: constantinos.stavrinides@esa.int
- Pavel M. Trivailo
  RMIT University (Royal Melbourne Institute of Technology) - AUSTRALIA
  Email: trivailo@rmit.edu.au

C2.1. Space Structures I - Development and Verification (Space Vehicles and Components)
The following topics will be included: Analysis versus test results for spacecraft, launch vehicles and their components (e.g. pressurized structures, tanks, load introductions, primary structures, fluidic equipment, control surfaces), examination of both on-ground and in-orbit testing, launch dynamic environments as related to structural design, development and verification, such as sine, random and acoustic vibration and lessons learned.

Chairs:
- Michael Doggili
  MAN Technology AG - GERMANY
  Email: michael.doggili@mt.man.de
- Andreas Rittweger
  EADS Space Transportation - GERMANY
  Email: andreas.rittweger@space.eads.net

Rapporteur:
Jean-Alain Massoni
Alcatel Space – FRANCE
Email: jean-alain.massoni@space.alcatel.fr

C2.2. Space Structures II - Development and Verification (Deployable and Dimensionally Stable Structures)
The following topics will be included: Analysis versus test results for deployable and/or dimensionally stable structures (e.g. reflectors, telescopes, antennas), examination of both on-ground and in-orbit testing, thermal distortion and shape control, structural design, development and verification; lessons learned.

Chairs:
- Paolo Gisborn
  University of Rome “La Sapienza” - ITALY
  Email: paolo.gisborn@uniroma1.it
- Jean-Alain Massoni
  Alcatel Space – FRANCE
  Email: jean-alain.massoni@space.alcatel.fr

Rapporteurs:
Pierre Rochus
CIL / University of Lège – BELGIUM
Email: prodho@dug.ac.be

C2.3. Space Structures - Dynamics and Microdynamics
Topics included in this session are: Dynamics analysis and testing, modal identification, landing and impact dynamics, pyrotech test facilities, vibration suppression techniques, damping, micro-dynamics, in-orbit dynamic environment, wave structural propagation, excitation sources and in-orbit dynamic testing.

Chairs:
- Peter M. Banaim
  Howard University - USA
  Email: pbaimam@elc.howard.edu
- Ijar M. Da Fonseca
  INPE - BRAZIL
  Email: ijar@dem.inpe.br

Rapporteur:
Paolo Gisborn
University of Rome “La Sapienza” - ITALY
Email: paolo.gisborn@uniroma1.it

C2.4. New Materials and Structural Concepts
Topics of discussion in this session will be: advanced materials and structural concepts applied in expendable and future reusable transportation systems and space vehicles. Of main interest are high temperature and cryogenic materials, nano-materials, composites, and ceramics including their structural application.

Chairs:
- Detlef Alves
  DLR - GERMANY
  Email: detlef.alves@dlr.de
- Marc Laroste
  Stercom Propulsion Solide – France
  Email: marc.laroste@stercom.fr

Rapporteur:
Yury Meshcheryakov
Yuzhnoye State Design Office - UKRAINE
Email: info@yuzhnoye.com

C2.5. Smart Materials and Adaptive Structures
The focus of the session will be on application of smart materials to spacecraft and launch vehicle systems, novel sensor and actuator concepts and new concepts for multi-functional and intelligent structural systems. Also included in the session will be new control methods for vibration suppression and shape control using adaptive structures as well as comparisons of predicted performance with data from ground and in-orbit testing.

Chairs:
- Michael J. Eiden
  ESA/ESTEC - NETHERLANDS
  Email: michael.eiden@esa.int
- Jun-jiro Onoda
  ISAS/JAXA - JAPAN
  Email: onoda.junjiro@jaxa.jp

Rapporteurs:
Paolo Gisborn
University of Rome “La Sapienza” - ITALY
Email: paolo.gisborn@uniroma1.it

C2.6. Space Environmental Effects and spacecraft Protection
In this session space environment effects will be covered. For example, the effects of radiation, atomic oxygen, space debris, space weather, solar eclipses; meteoroids, space debris and vacuum on space systems, microelectronics, materials and structures will be discussed. Protective and shielding technologies, including debris impact simulation, testing and susceptibility of Commercial-Off-The-Shelf (COTS) micro-electronics to space radiation will be presented.

Chairs:
- Murray Hirschheim
  NASA Headquarters - USA
  Email: murray.hirschheim@hq.nasa.gov
- Akira Meguro
  NTT Network Innovation Laboratories – JAPAN
  Email: meguro@vsdl.ntt.co.jp

Rapporteur:
Fredéric Leleu
EADS Astrium – FRANCE
Email: frederic.leleu@space.eads.net

C2.7. Space Vehicles – Mechanical/Thermal/Fluidic Systems
Discussed in this session are novel technical concepts for mechanical/thermal subsystems of launchers, manned and unmanned spacecraft, re-entry vehicles and small satellites. Also included in this session will be cost efficiency and reliability, material selection, new theoretical approaches, low cost manufacturing and test verification. Advanced subsystems and design for future exploration missions will also be included.

Chairs:
- Olga M. Alifanov
  Moscow Aviation Institute - RUSSIA
  Email: alif@cosmos.com.ru
- Mario Marchetti
  University of Rome “La Sapienza” - ITALY
  Email: mario.marchetti@uniroma1.it

Rapporteur:
Guoliang Mao
Beijing Institute of Aerodynamics - CHINA
Email: ghmao@aria.com
C3. Advanced Space Power Systems and Technologies

This session will address systems-level technologies to meet the power needs of future space missions including solar, nuclear, thermal, energy storage and other advanced topics (such as the general subject of space solar power technologies).

Chairs:
- Henry W. Brandhorst
  Auburn University – USA
  Email: brandth@auburn.edu
- Susumu Sasaki
  ISAS/JAXA – JAPAN
  Email: sasaki@newsisas.isas.jaxa.jp

Rapporteurs:
- Frank Steinseik
  EADS Space Transportation – GERMANY
  Email: frank.steinsieck@space.eads.net
- Nantel Suzuki
  NASA Headquarters – USA
  Email: nantel.h.suzuki@nasa.gov

C3. SPACE POWER

The successful future exploration and development of space depends on the research into and deployment of new, more affordable and more reliable energy sources from diverse types ranging from the very small to the extraordinarily large. Moreover, the continuing support of government-sponsored space activities by the public will require that these activities serve human needs in obvious ways. One visionary way to achieve the latter goal is to provide non-polluting, economical power to the Earth from space.

The Space Power Symposium will thus address space power systems for use in space and on the Earth. It will include topics such as nuclear systems for spacecraft power and propulsion; systems using solar energy; and matters of storage, energy management, conversion, transmission and distribution. The Symposium will also examine the prospects of using space-based energy on the Earth and the use of key enabling technologies such as wireless power transmission for both space and terrestrial applications.

Coordinator:
- John Mankins
  NASA Headquarters – USA
  Email: john.c.mankins@nasa.gov

C3.1. Power from Space - Prospects for the 21st Century

General topics bearing on the use of space-based power for the Earth are the subject of this session. It will address needs and benefits of space-based power, policy, economic, technical and architectural issues, as well as environmental and societal aspects of the acquisition and use of space power on the Earth.

Chairs:
- Nobuyuki Kaya
  Kobe University - JAPAN
  Email: kaya@kobe-u.ac.jp
- Leopold Summerer
  ESA/ESTEC – NETHERLANDS
  Email: leopold.summerer@esa.int

Rapporteurs:
- Lucien Deschamps
  Prospective 2 100 – FRANCE
  Email: deschamps@2100.org
- Harvey J. Willenberg
  Independent Consultant – USA
  Email: harvey@willenberg.com

C3.2. Advanced Space Power Systems and Technologies

This session will address systems-level technologies to meet the power needs of future space missions including solar, nuclear, thermal, energy storage and other advanced topics (such as the general subject of space solar power technologies).

Chairs:
- Henry W. Brandhorst
  Auburn University – USA
  Email: brandth@auburn.edu
- Susumu Sasaki
  ISAS/JAXA – JAPAN
  Email: sasaki@newsisas.isas.jaxa.jp

Rapporteurs:
- Frank Steinseik
  EADS Space Transportation – GERMANY
  Email: frank.steinsieck@space.eads.net
- Nantel Suzuki
  NASA Headquarters – USA
  Email: nantel.h.suzuki@nasa.gov

C3.3. Advanced Space Power Component/Subsystem Technologies

This session will address component- and subsystem- level technologies to meet the power needs of future space missions, including solar PV, dynamic energy conversion, thermal management, batteries, fuel cells and other topics (such as wireless power beaming technologies).

Chairs:
- Gerard Gave
  CNES – FRANCE
  Email: gerd.gave@cnes.fr
- Nantel Suzuki
  NASA Headquarters – USA
  Email: nantel.h.suzuki@nasa.gov

Rapporteurs:
- Richard M. Dickinson
  Off Earth-WPT – USA
  Email: offearth@jol.com
- Wolfgang Seboldt
  DLR – GERMANY
  Email: wolfgang.seboldt@dlr.de

C3.4. Experiments and Demonstrations for Advanced Space Power

Diverse new technologies will be needed to enable the development of future large space power systems. This session will discuss a range of needed technology demonstrations and flight experiments to validate these new concepts.

Chairs:
- Nobuyuki Kaya
  Kobe University - JAPAN
  Email: kaya@kobe-u.ac.jp
- Harvey J. Willenberg
  Independent Consultant – USA
  Email: harvey@willenberg.com

Rapporteurs:
- Alain Celeste
  Université de la Réunion – FRANCE
  Email: celeste@univ-reunion.fr
- Joe T. Howell
  NASA Marshall Space Flight Centre – USA
  Email: Joe.Howell@nasa.gov

C3.5/03.4. Joint Session on Advanced Concepts for Space Power: Enabling Ambitious Space Exploration and Utilization

This session will encompass exceptionally novel concepts for space power and their potential to enable visionary space goals in the far term future.

Chairs:
- John Mankins
  NASA Headquarters – USA
  Email: john.c.mankins@nasa.gov
- Leopold Summerer
  ESA/ESTEC – NETHERLANDS
  Email: leopold.summerer@esa.int

Rapporteurs:
- Ivan Ikeley
  Ikeley Designs, Inc. – USA
  Email: Ikeley@Ikeley.com
- George W. Morgenbenter
  University of Colorado at Boulder – USA
  Email: mgmorgen@colorado.edu
C3.6/C4.7. Joint session on Nuclear Propulsion and Power

This session addresses all issues of nuclear power in space applications.

Chairs:
Oleg A. Gorshkov
Keldysh Research Center - RUSSIA
Email: kercgor@dol.ru
Harvey J. Willenberg - USA
Email: harvey.willenburgs.com

Rapporteur:
Giorgio Saccoccia
ESA/ESTEC – NETHERLANDS
Email: giorgio.saccoccia@esa.int

C4. Space Propulsion

Propose, report on and include all propulsion systems, including those for Earth-to-orbit, orbital control and interplanetary missions.

Coordinators:
Claudio Bruno
University of Rome - ITALY
Email: claudio.bruno@uniroma1.it
Dana G. Andrews
Andrews Space & Technology - USA
Email: dandrews@andrews-space.com

C4.1. Propulsion Systems I

This session is dedicated to all aspects of Liquid rocket Engines.

Chairs:
Max Calabro
Consultant - FRANCE
Email: max.calabro@freeurs.net
Hans Imrich
EADS Space Transportation GmbH - GERMANY
Email: hans.imrich@space.eads.net

Rapporteur:
Marcel Poulquier
Sncema Motore - FRANCE
Email: marcel.poulquier@sncema.fr

C4.2. Propulsion Systems II

This session is dedicated to all aspects of Solid and Hybrid Propulsion.

Chairs:
Jean-François Guery
SNPE Matériaux Energetiques – FRANCE
Email: jf.guery@snpe.com
Randy C. Parsley
Pratt & Whitney - USA
Email: randy.parsley@pw.utc.com

Rapporteur:
John Harlow
Consultant - UK
Email: john@jharlow.fsnet.co.uk

C4.3. Propulsion Technology

This session includes all science and technology supporting all aspects of space propulsion.

Chairs:
Francesca Lillo
Avio - Propulsion Aerospaziale - ITALY
Email: francesca.lillo@avio-group.com
Gennaro Russo
C.I.R.A. - ITALY
Email: g.russo@cira.it

Rapporteur:
Hongjiang Liu
The 11th Institute of China Aerospace Sc. & Technology Corp. - CHINA
Email: liuhj2003@263.net

C4.4. Electric Propulsion

This session is dedicated to propulsion based on electricity as prime mover.

Chairs:
Garry A. Popov
RIAME - RUSSIA
Email: name@okol.ru
Giorgio Saccoccia
ESA/ESTEC - NETHERLANDS
Email: giorgio.saccoccia@esa.int

Rapporteur:
Oleg A. Gorshkov
Keldysh Research Center - RUSSIA
Email: kercgor@dal.ru

C4.5. Hypersonic and Combined Cycle Propulsion

This session includes papers dealing with use of air in earth to orbit propulsion. It is a joint ISOABE/IAF session.

Chairs:
Pavel Czysz
Hypertech – USA
Email: p.czysz@att.net
Nobuhiro Tanatsugu
The Muroran Institute of Technology – JAPAN
Email: tana@mim.muroran-it.ac.jp

Rapporteur:
Shigeru Aso
Kyushu University - JAPAN
Email: aso@aero.kyushu-u.ac.jp

C4.6. Advanced Propulsion - Non Chemical, non Electric

All aspects of innovative propulsion technology/propulsion systems are included.

Chairs:
Timothy J. Lawrence
USAF - USA
Email: timothy.lawrence@usafa.mil
Vladimir Prisniakov
Academy of Science of Ukraine - UKRAINE
Email: kprisn@e-teleport.com

Rapporteur:
Pascal Pempie
CNES – FRANCE
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C4.7. Joint session on Nuclear Propulsion and Power

This session addresses all issues of nuclear power in space applications.

Chairs:
Oleg A. Gorshkov
Keldysh Research Center - RUSSIA
Email: kercgor@dal.ru
Harvey J. Willenberg - USA
Email: harvey.willenburgs.com

Rapporteur:
Giorgio Saccoccia
ESA/ESTEC – NETHERLANDS
Email: giorgio.saccoccia@esa.int

C4.8. Joint session on New Missions enabled by Nuclear Propulsion

This session addresses all issues of nuclear power in space applications.

Chairs:
Oleg A. Gorshkov
Keldysh Research Center - RUSSIA
Email: kercgor@dal.ru
Harvey J. Willenberg - USA
Email: harvey.willenburgs.com

Rapporteur:
Michael L. Burris
NASA Marshall Space Flight Center - USA
Email: m.l.burris@msfc.nasa.gov
D1. SPACE SYSTEMS (IAF U.)
D2. SPACE TRANSPORTATION (IAF V.)
D3. STEPPING STONES TO THE FUTURE (IAA.3.6)
D4. THE FAR FUTURE: RENEWED VISIONS (IAA.3.8)
D5. SAFETY AND QUALITY IN SPACE ACTIVITIES - 39TH SYMPOSIUM (IAA.4.9)

D1. Space Systems
Innovative Space Systems for Future and Current Missions and Applications.

Coordinators:
- Hans F.A. Roefs
  National Aerospace Laboratory (NLR) - NETHERLANDS
  Email: roefs@nlr.nl
- Lawrence D. Thomas
  NASA Marshall Space Flight Centre - USA
  Email: dale.thomas@nasa.gov

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

Chairs:
- Moshe Guelman
  Technion, I.I.T., Israel Institute of Technology - ISRAEL
  Email: aerglmn@aerodyne.technion.ac.il
- Alan Wilhite
  Georgia Institute of Technology - USA
  Email: wilhite@nianet.org

Rapporteur:
- Jean-Paul Aguttes
  CNES - FRANCE
  Email: jean-paul.aguttes@cnes.fr

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

Chairs:
- Marco Guglielmi
  ESA/ESTEC - NETHERLANDS
  Email: marco.guglielmi@esa.int
- Qi Zheng Hu
  Chinese Academy of Space Technology – CHINA
  Email: huq@cast.cn

Rapporteur:
- Charles D. Edwards
  NASA Jet Propulsion Laboratory - USA
  Email: chad.edwards@jpl.nasa.gov

D1.3. System Engineering Tools, Processes & Training
This session will focus on state-of-the-art system engineering methodologies, design techniques, tools, processes, and training that reduce the time and cost, and improve the quality of space system design. Of special interest are multidisciplinary methods, tools, and processes used to define system architectures to improve risk management, safety, reliability, testability, quality of life cycle cost estimates, and to improve the training of system engineers.

Chairs:
- Hans F.A. Roefs
  National Aerospace Laboratory (NLR) - NETHERLANDS
  Email: roefs@nlr.nl
- Lawrence D. Thomas
  NASA Marshall Space Flight Centre - USA
  Email: dale.thomas@nasa.gov

Rapporteur:
- Qi Zheng Hu
  Chinese Academy of Space Technology – CHINA
  Email: huq@cast.cn

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

Chairs:
- Charles D. Edwards
  NASA Jet Propulsion Laboratory - USA
  Email: chad.edwards@jpl.nasa.gov
- Erick Lansard
  Alcatel Space - FRANCE
  Email: erick.lansard@space.alcatel.fr

Rapporteur:
- Genesio Hubscher
  INPE – LIT - BRAZIL
  Email: genesio@lit.inpe.br
D1.5. Lessons Learned in Space Systems
Experiences, both positive and negative, that have been encountered in space systems (hardware & software) development and operation. End-to-end lessons learned and impacts on cost, schedule and performance, in the areas of (among others): international cooperation, the use of COTS products, partitioning of functions between flight and ground systems, the extent and fidelity of simulations, integration, test and operations.

Chairs:
Jean-Paul Aguttes
CNES - FRANCE
Email: jean-paul.aguttes@cnes.fr
Genésio Hubscher
INPE - LIT - BRAZIL
Email: genesio@lit.inpe.br

Rapporteur:
Marco Guglielmi
ESA/ESTEC - NETHERLANDS
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D1.1. Poster Session on Space Systems

Rapporteurs:
Erick Lansard
Alcatel Space - FRANCE
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Moshe Guelman
Technion, I.I.T., Israel Institute of Technology - ISRAEL
Email: aerglmn@aerodyne.technion.ac.il

D2. SPACE TRANSPORTATION
Topics should address worldwide space transportation solutions and innovations. The goal is to foster understanding and cooperation amongst the world’s space-faring organizations.

Coordinators:
Christophe Bonnal
CNES - FRANCE
Email: christophe.bonnal@cnes.fr
Richard Tyson
NASA - Marshall Space Flight Centre - USA
Email: richard.tyson@nasa.gov

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

Chairs:
Ray F. Johnson
The Aerospace Corporation - USA
Email: ray.f.johnson@aero.org
Ulf Palmnäs
Volvo Aero Corporation - SWEDEN
Email: ulf.palmnas@volvo.com

Rapporteur:
Paul Maley
United Space Alliance - USA
Email: paul.d.maley@usaspace.gov

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

Chairs:
Laurent Bouaziz
EADS - SPACE Transportation - FRANCE
Email: laurent.bouaziz@nglauncher.net
Patrick M. McKernan
Lockheed Martin Space Systems Company – USA
Email: pat.m.mckernan@lmco.com

Rapporteur:
S.S. Balakrishnan
ISRO Headquarters – INDIA
Email: balki@isro.org

D2.3. Upper Stages, Space Transfer and Reentry Systems
Discussion of existing, planned or new advanced concepts for cargo and human orbital transfer. Includes current and near term transfer and re-entry systems as well as technologies for transforming spacecraft crew cargo in space.

Chairs:
S.S. Balakrishnan
ISRO Headquarters – INDIA
Email: balki@isro.org

Rapporteur:
Serguey F. Kostromin
TSNIIMASH - RUSSIA
Email: abt@tse.ru

D2.4. Future Space Transportation Systems
Discussion of future system designs and operational concepts for both expendable and reusable systems for Earth-to-orbit transportation and beyond, with airbreathing or rocket propulsion.

Chairs:
Debra Fidler Lepore
Kistler Aerospace Corporation - USA
Email: dllepore@kistleraero.com
Rolf Klaedtke
EADS – Space Transportation – GERMANY
Email: ralf.klaedtke@space.eads.net

Rapporteur:
Tim Self
NASA Marshall Space Flight Center - USA
Email: tms.self@msfc.nasa.gov
D2.5. Future Space Transportation Systems Technologies
Discussion of technologies enabling new reusable or expendable launch vehicles and in-space transportation systems. Emphasis on hardware verification.

Chairs: 
Yoshifumi Inatsi
Institute Of Space and Astronautical Science/JAXA – JAPAN
Email: inatsi.yoshifumi@jaxa.jp

Gennaro Rusti
CIRA, Italian Aerospace Research Center – ITALY
Email: g.rossi@cira.it

Rapporteur: 
Norbert Püttmann
DLR – GERMANY
Email: norbert.puettmann@dlr.de

D2.6. Future Space Transportation Systems Technologies In-Flight Experimentation
Discussion of technologies enabling new reusable or expendable launch vehicles and in-space transportation systems. Emphasis on hardware verification.

Chairs: 
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ESA Headquarters - FRANCE
Email: christian.dujardin@esa.int

John P. Sumrall
NASA – Marshall Space Flight Center - USA
Email: john.p.sumrall@nasa.gov

Rapporteur: 
Shigeru Aso
Kyushu University - JAPAN
Email: aso@aero.kyushu-u.ac.jp

D2.7./A3.7. Joint session on Access to Space for New Exploration Missions
This is a joint session between Space Transportation and Space Exploration. Giving fidelity to the transportation systems needed for robust and sustainable space exploration, the session addresses a range of topics such as the various systems required to enable robotic and human missions from Earth to the Moon, Mars, and destinations beyond. It also serves as a venue for international participants to present updates on individual and collaborative efforts in the area of transportation systems for both near- and long-term exploration initiatives, as well as a forum to present current and projected space transportation needs.

Chairs: 
Luigi Bussolino
Bussolino & Associates – ITALY
Email: luigi.bussolino@virgilio.it

D2.8./C4.8. joint session on New Missions enabled by Nuclear Propulsion
This session covers topics that are beyond the present scope of near-term nuclear propulsion missions such as Mars or inner solar system exploration. It may include, for example, such novel missions as interstellar transportation and technologies required to enable such missions. Other topics include asteroid divert, DART object investigation or outer sample return missions not covered in other sessions. It can include missions enabled by nuclear power or propulsion, such as, for example, surface hoppers to explore other worlds without having to move on the surface. All forms of nuclear propulsion and advanced propulsion are welcome as possible candidates for these missions opportunities.

Chairs: 
Roger X. Lenard
Sandia National Laboratories – USA
Email: rl35@sandia.gov

Douglas O. Stanley
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Email: stanley@nianet.org

Rapporteur: 
Michael L. Burns
NASA – Marshall Space Flight Center - USA
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D2.P. Poster session on Space Transportation
Rapporteur: 
Walt Faulconer
The John Hopkins University – USA
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D3. STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES, CONCEPTS AND TECHNOLOGIES
The international discussion of future directions for space exploration and utilization 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 utilization during the coming decades. This 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.

Coordinators: 
John C. Mankins
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Rapporteur: 
William H. Siegfried
The Boeing Company (retired) – USA
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D3.1. Strategies to Establish a “Stepping Stone” Approach to our Future in Space
Future scenarios for sustainable space exploration and utilization will unfold in the context of global conditions that vary greatly from those of the 1950s-1970s. It is likely that space-faring countries will pursue their goals and objectives in a step-wise fashion, rather than through massive, geo-politically driven programs (such as those that typified the Moon race of the 1960s). As a result, it is important that the international community engage in an ongoing discussion of strategies to establish a “stepping stone” approach to our future in space. Such a strategy should involve sustainable budget levels and multiple-purpose system-of-systems capabilities that lead to a diverse range of future activities of broad benefit to humanity and would represent a substantial departure from past models for major space programs. Moreover, nearer term developments, such as those in the Earth’s neighbourhood (e.g., in support of the 2004 U.S. Vision for Space Exploration), should be structured to best support later evolution and reconfiguration to pursue still more ambitious missions—such as continuing robotic exploration of the Solar System, human and robotic exploration of Mars and targets beyond, and the search of Earth-like planets around nearby stars. This session will address strategies and approaches that may allow for a new paradigm—a “stepping stone” approach—to be established among the space-faring countries. Papers are solicited in these and related areas.

Chairs: 
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Rapporteur: 
Nanette Suzuki
NASA Headquarters – USA
Email: nanettesuzuki@nasa.gov

D3.2. Novel Concepts and Technologies for the Exploration and Utilization of Space
In order to realize future, sustainable programs of space exploration and utilization, a focused suite of transformational new systems concepts and supporting technologies must be advanced during the coming decade. The technical objectives to be pursued should be drawn from the broad panoply of potential technologies and systems, but must be sufficiently well-focused to allow tangible progress—and dramatic improvements over current systems—to be realized in the foreseeable future. This session will address cross cutting considerations in which a number of discipline research topics and/or technologies may be successfully synthesized to enable a transformational new systems concept to be realized. Papers are solicited in these and related areas.

Chairs: 
Lionel Sachtel
CNES – FRANCE
Email: l.sachtel@cnes.fr

Nanette Suzuki
NASA Headquarters – USA
Email: nanettesuzuki@nasa.gov

Rapporteur: 
Mara Anticavetta Pernici
Alenia Spazio S.p.A – ITALY
Email: mapernici@to.aleniaospazio.it
D3.3. “System-of-Systems” Infrastructures to Enable Ambitious Future Exploration and Utilization of Space

Although innovative systems concepts and technologies are critical to future space activities, these systems cannot succeed if they are used in “one-at-a-time” mission approaches. Instead, the emergence of novel “system-of-systems” infrastructures will also be needed to enable ambitious scenarios for sustainable future space exploration and utilization. New, reusable space infrastructures must emerge in various areas, including the following: (1) infrastructures that enable affordable, reliable access to space for both exploration systems and logistics; (2) infrastructures for affordable, reliable transportation in space, including access to/from lunar and planetary surfaces, for crew, robotic and supporting systems and logistics; (3) infrastructures that allow sustained, affordable and highly effective operations on the Moon, Mars and other destinations; and, (4) supporting in-space infrastructures that provide key services (such as communications, navigation, etc.). Papers are solicited in these and related areas.

Chairs:
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The Boeing Company (retired) – USA
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Yoshisada Takizawa
JAXA – JAPAN
Email: takizawa.yoshisada@jaxa.jp
Rapporteurs:
Scott Hoxland
ESA/ESTEC – NETHERLANDS
Email: scott.hoxland@esa.int
Gordon Woodcock
Space America Inc. – USA
Email: gwa@mduping.com


This session will encompass exceptionally novel concepts for space power and their potential to enable visionary space goals in the near future.

Chairs:
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Email: john.c.mankins@nasa.gov
Leopold Summerer
ESA/ESTEC – NETHERLANDS
Email: leopold.summerer@esa.int
Rapporteurs:
Ivan Bekey
Bekey Designs, Inc. – USA
Email: bekey@cox.net
George W. Morgenthaler
University of Colorado at Boulder – USA
Email: morgenth@colorado.edu

D3.5. Science Mission Enabled by Nuclear Electric Propulsion

Nuclear electric propulsion has long been recognized as a major enabling technology for exploration of the solar system and it may form the basis for a cost-effective space transportation system. This session will explore the kinds of planetary, interplanetary, sample return, and human exploration missions that can be enabled by a robust, mature NEP program.

Chairs:
Robert L. Salheim
NASA Marshall Space Flight Centre – USA
Email: bsb.salheim@nasa.gov
Ralph L. McNutt
The Johns Hopkins University - USA
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D4. THE FAR FUTURE: RENEWED VISIONS

Papers are sought here with an emphasis on “Far Future” and “Renewed Vision.” With a world still churning with wars, disease and terrorism, sustained funding has not been available to implement the Lunar, Mars and deep space expeditions, bases and colonies of the classical visions of the past decades. Therefore we have time to seek entirely new approaches to Earth-to-Disk Space transportation, Lunar base construction and lunar utilization, advanced Mars bases and missions as well as planning and preparing for the space-development’s societal impact of the “Renewed Vision.”

Coordinators:
Hans Hoffman
DRB Comm LLC – GERMANY
Email: hans.e.vohffmann@t-online.de
George Morgenthaler
University of Colorado at Boulder – USA
Email: morgenth@colorado.edu

D4.1. Bases and Space Colonization

What kind of bases, when, where and how (Moon, Mars, Phobos, Deimos, etc.) are needed for Space Colonization? We are also interested in how humans might establish space colonies: perhaps devoted to space exploration, or for the beginning of space resource utilization. Space colonies might thus establish space solar power farms on the Moon, perform the extraction of oxygen from the lunar regolith, erect a Space Telescope on the far side of the Moon, or conduct extensive studies on Mars, etc. Papers are solicited in these and related areas.

Chairs:
Claudio Magcone – ITALY
Email: cimacon@libero.it
Wendell Mendell
NASA JSC – USA
Email: wendell.mendell@jsc.nasa.gov
Rapporteur:
Gordon Woodcock
Space America Inc. – USA
Email: gwa@comcast.net

D4.2. Space Elevator Systems – Engineering and Science

The revolutionary access to space afforded by the Space Elevator promises tremendous savings in infrastructure recurring costs. Although much R&D into the Space Elevator concept has already been carried out, there remain areas to be studied further. This session invites papers on the systems architecture, engineering and science aspects of the Space Elevator as well as on current progress with the development and manufacture of carbon nanotubes for such an application.

Chairs:
Bradley C. Edwards
Carbon Designs, Inc. – USA
Email: brad.edwards@yahoo.com
Peter Swan
SouthWest Analytic Network – USA
Email: dr.swan@cox.net
Rapporteur:
David Raitt
ESA/ESTEC – NETHERLANDS
Email: davrid.raitt@esa.int
D4.3. Space Elevators and Advanced Tethers: Programs and Applications

The Space Elevator will provide virtually unlimited cheap access (c. $100/kg) to space and thus this remarkable concept will revolutionize the transportation for non-human cargo and enable missions in space not currently feasible. This session will cover the uses and applications of Space Elevators and advanced tethers as well as the associated policies, risks, and investment opportunities afforded by such systems.

Chairs:
- David Raitt
  ESA/ESTEC - NETHERLANDS
  Email: david.raitt@esa.int
- Peter Swan
  SouthWest Analytic Network – USA
  Email: dr-swann@cox.net

Rapporteur:
- Bradley C. Edwards
  Carbon Designs, Inc. - USA
  Email: brad_edwards@yahoo.com

D5. Safety And Quality In Space Activities

(39th SYMPOSIUM)

The Symposium addresses management approaches, methods, design solutions and regulations to improve the quality, reliability, efficiency and safety of space programs. All aspects are considered: risk from space environment, complexity of systems and operations, human factors, economical constraints, international cooperation, norms and standards, agencies/industry relationship,…

Coordinator:
- Max Grimard
  EADS – FRANCE
  Email: max.grimard@eads.net

D5.1. Making Space Programs more Efficient

A lot of big space programs, both in civil and defense field, have shown recently severe cost and schedule overviews, in order to get closer to people space community shall demonstrate its ability to pay the tax payers money in an efficient manner. This session shall address the following topics: root causes of these programmatic failures, solutions to recover efficient management of space programmes, in particular for big initiative like space exploration.

Chairs:
- Max Grimard
  EADS – FRANCE
  Email: max.grimard@eads.net
- Michael Greenfield
  NASA Headquarters – USA
  Email: michael.greenfield@hq.nasa.gov

D5.2. Coping with Space Environment in Near Earth and Exploration Missions

Missions toward other planets have to cope with alien environment but even near earth condition are not fully under control especially when new technologies are to be considered. This session deals with:
- understanding and specification of space environments
- methods, procedure, test ground
- in-flight observations and lessons learned.

Chairs:
- Magdeleine Dinguirard
  ONERA - DESP - FRANCE
  Email: magdeleine.dinguirard@onera.fr
- Tateo Goka
  ISAS/JAXA - JAPAN
  Email: goka.tateo@jaxa.jp

Rapporteur:
- Manola Romero
  SUPAERO - FRANCE
  Email: manola.romero@supaero.fr

D5.3. Knowledge Management

With the overall evolution of the society, it appears that industry is facing a new problem related to information keeping. Indeed, new fields of research and tool development are emerging on “knowledge management”, in order to ease information collection, storing, maintenance, enrichment, extraction, transfer and use. Space activities are also particularly concerned by this challenge and this session will concentrate on the past and present experiences as well as on the state of art in term of tools and organisations (space field or not).

Chairs:
- Denis Moura
  CNES – FRANCE
  Email: denis.moura@cnes.fr
- Jeanne Holm
  NASA Jet Propulsion Laboratory – USA
  Email: jeanne.holm@jpl.nasa.gov
- Manfred Warhaut
  ESA European Space Operation Center - Germany
  Email: manfred.warhaut@esa.int

**E1. SPACE EDUCATION AND OUTREACH (IAF P.)**

**E2. 36TH STUDENT CONFERENCE (IAF W.)**

**E3. WHICH DIRECTION IN SPACE? BALANCING APPLICATIONS AND EXPLORATION (IAA.5.13)**

**E4. HISTORY OF ASTRONAUTICS – 40TH SYMPOSIUM (IAA.6.15)**

**E5. SPACE ACTIVITY AND SOCIETY - 17TH SYMPOSIUM (IAA.6.16)**

**E6. 49TH INT’L COLLOQUIUM ON THE LAW OF OUTER SPACE (IISL)**

### E1. SPACE EDUCATION AND OUTREACH

The Symposium deals with methods and techniques for space education and outreach. Contributions reporting on programmes/activities that have already taken place will usually be received more favorably than those reporting on future concepts and plans. Similarly, more weight will be given to contributions that include some measure of critical assessment and clearly identify relevant target groups, benefits, lessons learned, good practices, etc.

**Coordinator:**

Pierre-Louis Contreras  
CNES - FRANCE  
Email: pierre.contreras@cnes.fr

#### E1.1. "Hands-On" Space Education

This session will focus on space education projects that use physical, practical and/or interactive activities as their primary means of engaging with their participants.

**Chairs:**

Pierre-Louis Contreras  
CNES - FRANCE  
Email: pierre.contreras@cnes.fr  
Fernando Stancato  
Metropolitana-IESB - BRAZIL  
Email: stancato@ump.edu.br

**Rapporteur:**

Stephen Brock  
AIAA - USA  
Email: stephenb@aiaa.org

#### E1.2. Structures for Space Education

This session will focus on formalised, higher-level strategies, methods and systems for space education and outreach.

**Chairs:**

Yolanda Berenguer  
UNESCO – FRANCE  
Email: y.berenguer@unesco.org  
Dennis A. Stone  
Spaceweek International Association - USA  
Email: dstone@spaceweek.org

**Rapporteur:**

Benedicte Escudier  
ENSAE/SUPAERO - FRANCE  
Email: benedicte.escudier@supaero.fr

#### E1.3. Educational Outreach

This session will focus on activities that promote both space and space education activities through engagement with the general public.

**Chairs:**

Cansten Holze  
Macht Wissen DE AG - GERMANY  
Email: cansten.holze@machtwissen.de  
Olga Zhdanovich  
Space Technology Consultant - RUSSIA  
Email: navigator@mail.ru

**Rapporteur:**

Victoria Mayorova  
Bauman Moscow State Technical University - RUSSIA  
Email: vika210@online.ru

#### E1.4. Beyond Education

This session will focus on novel and non-standard ways of communicating space in non-traditional areas and to non-traditional target groups.

**Chairs:**

Jean-Daniel Dessimon  
HESSO-EIVD - SWITZERLAND  
Email: jean-daniel.dessimon@eivd.ch  
Victoria Mayorova  
Bauman Moscow State Technical University - RUSSIA  
Email: vika210@online.ru

**Rapporteur:**

Gulnara Amaraeva  
Observatory, Almaty, Kazakhstan  
Email: omarova@mtc.gov.kz

#### E1.5. Space Exploration Education

This session will focus on educational and outreach activities, regardless of age range, that leverage the inspirational value of space exploration and aim to prepare today’s students and future generations to be actively involved in turning space exploration visions into a real and sustainable endeavour.

**Chairs:**

Piero Messina  
ESA Headquarters - FRANCE  
Email: piero.messina@esa.int  
Lyn Wigbels  
RWI – USA  
Email: lyn.wigbels@cox.net

**Rapporteur:**

Christine Legault  
Ecole Des Métiers de l’Aérospatiale De Montréal - CANADA  
Email: legaultc@csdm.qc.ca
E3.4. Space Tourism: Keeping the Dream Alive

SpaceShipOne’s historic flight on October 4, 2004 over the Mojave Desert captured the ten million dollar Ansari X-Prize, becoming the first private industry manned spacecraft to reach the edge of space and land safely back on Earth. Keeping the dream alive while moving forward with the important issues facing both private industry and government organizations still remains a challenge. This session will cover a broad range of topics that include, but are not limited to: safety and regulatory issues, space vehicles, human factors, space medicine, social/psychological issues, space architecture, art, and entertainment.

Chairs:  
Richard Gar  
Art Technologies - FRANCE  
Email: rgar@arttechnologies.com  
Christophe Bonnal  
CNES - FRANCE  
Email: christophe.bonnal@cnes.fr  
Rapporteur:  
André van Gaver  
ESA Headquarters - FRANCE  
Email: andre.vangaver@esa.int

This roundtable will bring together scientific-technical as well as legal views on the issue of the use of nuclear power systems (NPS) in space. This topic has been on the technical and legal agenda for almost three decades now but it has gained new and prominent impetus through the recent initiatives for space exploration. The invited papers will shed light on the current international plans for using NPS and also reflect on the current and a future international regulatory framework in order to guarantee the safe use of the technology.

Chairs:
- Wendell W. Mendell
  NASA Johnson Space Center – USA
  Email: wendell.w.mendell@nasa.gov
- Vladimir Kopal
  University of Pilsen – CZECH. REP.
  Fax: (00) 420 25 19 37 90

Rapporteur:
- Patricia Sterns
  Law Offices of Sterns and Tennen – USA
  Email: pms@astrolaw.com

E4. HISTORY OF ASTRONAUTICS (40TH SYMPOSIUM)

History of space science, technology & development, rocketry, personal memoirs. The entire spectrum of space history, at least 25 years old, is covered.

Coordinators:
- George James
  Rocket Research Institute Inc, Eastern – USA
  Email: george.james@eere.doe.gov
- Christophe Rothmund
  SNECMA – FRANCE
  Email: christophe.rothmund@snecmsa.fr

E4.1. Memoirs

Autobiographical & biographical memoirs of individuals who have made original contributions to astronautics & rocketry.

Chairs:
- Frederick I. Ordway
  US Space & Rocket Center – USA
  Email: ordmars@aol.com
- Ake Ingemar Skoog – GERMANY
  Email: ake.ingemar-skoog@t-online.de

Rapporteurs:
- Théo Pirard
  Space Information Center – BELGIUM
  Email: theopirard@hotmail.com
- Susan McKenna-Lawlor
  Space Technology (Ireland) Ltd – IRELAND
  Email: stlaw@nuim.ie

E4.2. Organisational Histories

History of government, industrial, academic & professional societies & organisations long engaged in astronautical endeavours.

Chairs:
- Marsha Freeman
  21st Century – USA
  Email: kraft@eolos.com
- Hervé Moulin
  IFHE – FRANCE
  Email: herve.moulin-hms@wanadoo.fr

Rapporteurs:
- Philippe Cosyn – BELGIUM
  Email: philippe.cosyn@chello.be
- Richard Dowling
  Space Media – USA
  Email: rldowling@aol.com

E4.3. Scientific & Technical Reviews

Historical summaries of rocket & space programs.

Chairs:
- Kerrie Dougherty
  Curator Space Technology – AUSTRALIA
  Email: kerried@phm.gov.au
- Philippe Jung
  AAF – FRANCE
  Email: philippe.jung@space.alcatel.fr

Rapporteurs:
- Julius Braun
  United States Army – USA
  Email: toothe@bigplanet.com
- John Harlow – U.K.
  Email: johnh@hallofscinet.co.uk

E4.4. History of Spanish Contribution to Astronautics

Special session with invited speakers.

Chairs:
- Otfrid Liepack
  Jet Propulsion Laboratory – USA
  Email: otfrid.liepack@jpl.nasa.gov
- José M. Dorado
  EASL – SPAIN
  Email: jmdorado@recol.es

Rapporteurs:
- Roger Launius
  Smithsonian Institution – Space History – USA
  Email: launiusr@si.edu
- Randy Lieberman
  History of Technology – USA
  Email: lunaicity@aol.com
**E5. SPACE ACTIVITY AND SOCIETY (17th SYMPOSIUM)**

The symposium will review the impact and benefits of space activities on the various segments and aspects of society (eg development and structure; arts and culture; spin-offs to improve everyday life, etc.). The symposium will also consider society’s expectations from space activities.

**Coordinators:**
- Roger Malina
- Charles – France
- Email: malina@alum.mit.edu
- David Ratt
- ESA/ESTEC- NETHERLANDS
- Email: david.ratt@esa.int

**Chairs:**
- Nana Cheeks
- NASA Goddard Space Flight Centre – USA
- Email: nana.k.cheeks@nasa.gov

**Rapporteur:**
- Katsuya Terasawa
- JAXA – JAPAN
- Email: katsuya@jaxa.jp

**E5.1. Social Benefits of Space Spin-Offs**

This session will provide an opportunity to describe and discuss space technologies which have been successfully adapted for space spin-off, particularly as they relate to the improvement of everyday life on Earth. The session will also cover innovative technologies available for spin-in, in so far as they relate to the safety, convenience and well-being of astronauts in space, and have a potential for being subsequently spin-off. The mechanisms, processes and networks of technology transfer will also be explored.

**Chairs:**
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- Nana Cheeks
- NASA Goddard Space Flight Centre – USA
- Email: nana.k.cheeks@nasa.gov

**Rapporteur:**
- Jonathan Galloway
- Lake Forest College - USA
- Email: jgallow@lakeforest.edu

**E5.2. Space Spin-Offs: Investment Opportunities**

Space technologies, proven, robust and innovative, have much to offer by way of the creation of new products and services for non-space sectors. This session will explore how entrepreneurs and start-up companies can develop and market space-based technological products, as well as the possibilities, opportunities and mechanisms for investing in such space spin-offs. Aspects covered will include raising venture capital as well as setting up incubators for fledgling companies.

**Chairs:**
- David Ratt
- ESA/ESTEC- NETHERLANDS
- Email: david.ratt@esa.int
- Nana Cheeks
- NASA Goddard Space Flight Centre – USA
- Email: nana.k.cheeks@nasa.gov

**Rapporteur:**
- Jonathan Galloway
- Lake Forest College - USA
- Email: jgallow@lakeforest.edu

**E5.3. Popularization of Space**

Space activities have had a certain impact on society as a whole, but such activities have been largely driven by governments and space agencies rather than public input. This session will discuss what society expects from space programmes and activities and how the general public can be made more aware and enthusiastic about space exploration through art, literature and cultural events. The session will also consider how to focus the interest and attention of both the public and the community of artists and cultural space users in projects and demonstrations which will engage the collective mind of society and facilitate its participation in this great adventure.

**Chairs:**
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- ESA/ESTEC- NETHERLANDS
- Email: david.ratt@esa.int
- Arthur Woods
- Ours Foundation – SWITZERLAND
- Email: awoods@ours.ch

**Rapporteur:**
- Patrick J. Gygax
- Alaxon D’Afflars – SWITZERLAND
- Email: pgygax@alaxon.ch

**E5. P. Poster Session on Space Activity and Society**

**Rapporteur:**
- Päivi Jukola
- Helsinki University of technology – FINLAND
- Email: p.jukola@hut.fi
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INSTRUCTIONS FOR SUBMITTING AN ABSTRACT

Deadline: MARCH 10, 2006

Preparation

Abstracts must
1 - be of one page (maximum 400 words)
2 - be written in English

Authors are required to express their preference for oral or poster presentation

The following information should be prepared before the login to the web service at http://www.iac-paper.com
1 - Paper Title
2 - Name of contact author
3 - Name of co-author(s)
4 - Organization(s)
5 - Oral or Poster

Provide full postal address, phone, fax and e-mail of the author and co-author(s).

Prospective author(s) should certify that the paper was not presented at a previous meeting and that financing and attendance of an author at the respective IAC at Valencia to present the paper is assured.

International Academy of Astronautics

Technical session

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

Technical Session evaluations will be submitted to their Symposium Coordinators. The Symposium Coordinator recommendations should be sent to the responsible IAA Commission who will provide the acceptance recommendations to the IPC.

Manuscript Publication

Acceptance of abstracts (in oral or poster form) will be emailed by mid May, 2006 by the IAF. Full manuscripts must then be submitted in accordance with written instructions to be sent to the contact author accompanying the notification of acceptance. Selected papers (either oral or poster) may be published in special issues of Acta Astronautica, the journal of the International Academy of Astronautics. Acceptance of papers for presentation at the Congress does not imply acceptance for publication.

Abstracts will not be accepted through post

Electronic Submittal

Please submit your abstract online: (http://www.iac-paper.com/).

If you are already registered as a user, please log into the web site. If you are a new user, please follow the “New author” link and fill out the corresponding fields. An automated email will be sent to you with your login information. If you have logged into the system, follow the “compose abstract” link and copy and paste all relevant information in the required fields: A PDF file will be generated automatically and can be downloaded.

Manuscript Publication

Acceptance of abstracts (in oral or poster form) will be emailed by mid May, 2006 by the IAF. Full manuscripts must then be submitted in accordance with written instructions to be sent to the contact author accompanying the notification of acceptance. Selected papers (either oral or poster) may be published in special issues of Acta Astronautica, the journal of the International Academy of Astronautics. Acceptance of papers for presentation at the Congress does not imply acceptance for publication.

Abstracts will not be accepted through post

Paper Selection

Papers offered for the Congress will be evaluated by the Session Chairs for technical quality and suitability. Relation to the Congress Theme will also be considered. They will be selected for oral or poster presentation with no distinction in quality. Their evaluation will be submitted to the responsible Symposium Coordinators, who will make acceptance recommendations to the International Program Committee which will make the final decision. Ensuring the high quality of the papers presented at the 57th Congress will be a primary goal of the International Program Committee.

The following criteria for paper selection will be observed:

- Abstracts should specify: purpose, methodology, results and conclusions.
- Abstracts should indicate that substantive technical and/or programmatic content is included.
- Abstracts should clearly indicate that the material is new and original, explain why and how.

Preparation of the abstract:

We kindly advise you to check the IAF Web Site at:
http://www.iafastro.com

for potential updates to this Call for Papers. Modifications will probably occur after the Congress in Fukuoka.

Deadline

No extension will be granted to the above deadline date
Introduction to Valencia

Valencia offers you all the excitement of a big city whilst also being extremely easy to get around. A perfect example of the Mediterranean lifestyle, Valencia is a productive working environment combined with numerous possibilities for leisure and personal enhancement opportunities. Over the centuries, great historic events have left their mark on the city, enriching its heritage, so you will be surprised by the beauty of the abundant historical monuments such as the Cathedral, the old fortifications, the beautiful Baroque palaces and Modernist urban buildings. Today, it still honours its historic past whilst pursuing the future with ultra-modern infrastructures, an urban transformation lead by the bold audacity of the Ciutat de les Arts i les Ciències.

Nestled in a rich garden plateau extending to the nearby mountains, the city of Valencia long ago embraced tourism as an industry. It is thus full of recreational activities, restaurants and bars, where you can taste the best *paellas* and try lots of different *tapas*. Valencia is also known as a golfer’s paradise, and for those who are seeking the sun and fine sand, the Malvarrosa beach, in the very heart of Valencia, is accessible by public transport from most hotels. Close to the beach is the Valencia harbour, which has been selected to host the “America’s Cup” in 2007.

Indeed, a cosmopolitan city, where the Mediterranean sun shines more than 300 days a year. Luminous, lively, busy, slightly chaotic... you will be fascinated by this welcoming land: a perfect place to live, to work and relax in.

Conference Venue

The *Ciutat de les Arts i les Ciències* is one of the most modern leisure complexes in the world and also the largest cultural and educational park in Europe. It was created around some of the most fundamental issues to mankind, namely, Science, Art, the Future and Nature. Its state of the art architecture was designed by Santiago Calatrava and Felix Candela and has attracted more than 20 million visitors to this day.

It is made up of four different parts: *L’Hemisfèric* (IMAX Theatre), *L’Oceanogràphic*, the *Palau de les Arts* and finally the *Museo de las Ciencias Príncipe Felipe*, where the event will take place. With three floors, a total of 24,000 m2, fully equipped for disabled people and latest technology, the *Museo de las Ciencias Príncipe Felipe* is an ideal place to hold a remarkable IAC in 2006.

Tours and Social Events

To say that the city on the River Turia captivates its visitors with each step is no understatement. At every turn, there is a different vision of reality waiting to be discovered, where the past, the present and the future blend together in harmony.
The Local Organising Committee is already working on a social activities programme to raise awareness about our Mediterranean culture and to organise a great deal of fun events for congress delegates and their companions. This programme will include visits to such places as Sagunto Castle, a fortress situated on a hill overlooking the surrounding countryside and the nearby Mediterranean, or the Albufera Natural Park, one of the largest fresh water areas of Spain. Guided tours will also be offered around the City of Valencia.

You can be sure that all this and more will give congress delegates the opportunity to experience that special Mediterranean way of life. Bring your family with you and enjoy this heady cocktail of action and feeling together.

**Accommodation**

Valencia has become a regular venue for Science and Technology. The growth of tourism has surpassed average European urban tourism five-fold over the last 10 years, becoming the fastest growing European city of the decade.

The city and its surrounding area offer a wide range of accommodation. There are more than 12,000 rooms in luxury and superior hotels, 3,000 of which are located in the city centre itself, and 1,000 more in lower category accommodation such as hostels.

So, visitors can choose from a wide range of prices: from a Presidential Suite at the luxurious Sidi Saler to an economic hostel by the beach.

The city’s improved infrastructures and its aim to bring the city closer to the sea are the foundations for a promising future that you all are invited to witness and enjoy!

**October Climate**

The Region of Valencia has a typically Mediterranean climate with warm, dry summers, and mild winters. October is a beautiful time of year with temperatures hovering around 16-20º Celsius (63-68º Fahrenheit) with slightly cooler evenings, so you may need to bring a light jacket or sweater.

**Sponsorship/Exhibits**

The 57th International Astronautical Congress will provide a good opportunity to present your organisation/company and its activities, products and services before key decision makers and industry leaders in the worldwide space community. Make the most of this opportunity to be seen and to your company profile by becoming a sponsor and/or exhibitor at this great event.
Registration of interest

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