

6 June 2011

English only

**Committee on the Peaceful Uses
of Outer Space**

Fifty-fourth session

Vienna, 1-10 June 2011

Human Space Technology Initiative (HSTI)

**Report on Outreach Seminar on the International Space
Station (ISS) Tuesday, 8 February 2011,
Vienna International Centre**

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V.11-83510 (E)



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1. Introduction

1. The United Nations Office for Outer Space Affairs (UNOOSA) organized an Outreach Seminar on the International Space Station (ISS) in Vienna on 8 February 2011, during the forty-eighth session of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space.

A. Background and objectives

2. The Seminar took place as part of the Human Space Technology Initiative (HSTI) which has been launched under the framework of the United Nations Programme on Space Applications. The initiative builds on the relevant recommendations related to human spaceflight and exploration contained in the report of the Third United Nations Conference on the Peaceful Uses of Outer Space (UNISPACE III) (A/CONF.184/6. para. 400, 401 and 402) held in July 1999.

3. The Seminar was organized by the Office in close cooperation with the ISS partners: the Canadian Space Agency (CSA), the European Space Agency (ESA), the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan along with the Japan Aerospace Exploration Agency (JAXA), the National Aeronautics and Space Administration (NASA) of the United States of America, and the Russian Federal Space Agency (Roscosmos).

4. The objectives of the Seminar were to present the status of educational and research activities on the ISS and to provide information on utilization and cooperation opportunities.

B. Programme

5. The Seminar consisted of morning and afternoon sessions.¹ The morning session focused on an overview of the ISS including ISS research as well as its research accomplishments. The afternoon session focused on each ISS partner's facilities, research and educational activities. The complete programme of the seminar is shown in Annex I.

C. Attendance

6. Representatives from 17 Members States attended the seminar: Canada, Chile, the Czech Republic, Germany, Indonesia, Israel, Italy, Japan, Malaysia, Mexico, Nigeria, Russian Federation, Saudi Arabia, South Africa, Switzerland, the United States of America, and Zimbabwe.

7. Representatives from five ISS partners (CSA, ESA, JAXA, NASA, and Roscosmos) participated in the seminar.

2. Summary of presentations

8. At the opening of the meeting, Director of the Office for Outer Space Affairs Ms. Mazlan Othman welcomed the participants and extended her appreciation to

¹ www.unoosa.org/oosa/en/SAP/hsti/outreach-seminar.html.

them and particularly to the ISS partners for their cooperation in organizing the Seminar. Ms. Othman expressed her excitement for the new Human Space Technology Initiative (HSTI) of the Office and shared her experience as head of the Malaysian National Space Agency. Ms. Othman also emphasized that HSTI is part of the capacity-building activities and that it is important that all the countries benefit from the opportunities available for carrying out microgravity activities on the ISS.

A. International Space Station (ISS) overview

9. A presentation on the ISS which included an overview of ISS research and on-orbit facilities was made by Mr. Rod Jones of NASA. The presentation showed key features and facts about the ISS, research and payload resources available on-board, internal and external research accommodations, robotics, assembly and maintenance aspects, communication and control, and crew and cargo capabilities.²

10. Since 1998, when the first modules were launched, the ISS has been assembled by a partnership of five space agencies (CSA, ESA, JAXA, NASA, and Roscosmos) representing 15 countries. The unique features of the ISS are: robust, continuous, and sustainable microgravity platform; continuous human presence in space; access to the ultra-high vacuum of space; unique altitude for observation and testing; and payload-to-orbit-and-return capability.

11. The ISS, including its large solar arrays, is 110 meters long and 70 meters wide. It weighs more than 800,000 pounds (362,874 kilograms), and the power generation with eight solar arrays is approximately 80 kilowatts. The ISS currently accommodates six crewmembers who can perform scientific research, Earth and celestial observations, and operations and maintenance work.

B. ISS research overview

12. The major ISS research accomplishments were presented by Ms. Julie Robinson of NASA, focusing on why research in space is important and why it is done on the ISS, what has been done, the most important results, and how non-partners have participated to date. Several of the disciplines that use the ISS laboratory are: Biology & Biotechnology, Human Physiology & Performance, Physical Science, Technology Development & Demonstration, Earth and Space Science, and Education. Major scientific achievements in each discipline were presented.³

13. Through the year 2010, 58 countries in total have participated in ISS utilization. NASA informed the participants that in order to optimize cooperation and avoid duplication in the utilization of the ISS laboratories, international working groups for coordination of ISS utilization were created. The working groups are assisted by the ISS User Operations Panel (UOP) for the coordination of strategic planning and program research objectives, and by the ISS Program Science

² *Reference Guide to the International Space Station, Assembly Complete Edition, November 2010 (NP-2010-09-682-HQ).*

³ *The Era of International Space Station Utilization, Perspectives on Strategy From International Research Leaders (NP-2010-03-003-JSC).*

Forum (PSF) for the coordination of research issues, research communication, and results tracking.

14. Representing non-partners of the ISS, Mr. Mohd. Alauddin Mohd. Ali of Malaysia presented information about space activities carried out in Malaysia, mainly focusing on research in microgravity, space weather, ionospheric studies in the equatorial region, astronomy, and satellite technology.

15. Mr. Adigun Ade Abiodun of Nigeria presented a view on the utilization of the ISS by the developing countries: emphasized the benefits that developing countries could gain from the ISS, why and how they want to participate in the ISS and HSTI, and concluded with the suggestion of creating guidelines for such participation. It was also emphasized that the real key would be building local capacity for the advancement of science and technology in support of national priority needs and development goals. The audience noted his suggestion that in order to participate in the utilization of the ISS, a developing country needs to define the research it wants to carry out and the expected outcomes as well as estimate the national readiness to participate in terms of available national professional expertise and funding. The audience noted that a further step could involve the Office.

16. Some participants expressed the need for the Office to act as a bridge between the ISS partners and developing countries interested in cooperating with the partners by setting up guidelines and specifications for the preparation and design of ISS on-board experiments.

17. CSA's involvement in the assembly of the ISS and the programme for utilization was reported by Ms. Nicole Buckley. The double approach followed by CSA is based on "Push (basic)" knowledge through world-class research on one hand, and "Pull (Applied)" innovation on the other. The activities carried out by CSA on the ISS are the following: space robotics, technology development, scientific research, and outreach and education.

18. ESA's research capabilities on-board the ISS were introduced by Mr. Eric Istasse, focusing on ESA contributions to the ISS in terms of modules as well as research and payload resources available on-board the ISS, its research assets deployed with the Columbus module for a broad science community, and the agency's utilization achievements. ESA follows a multi-disciplinary/interdisciplinary approach to get an objective evaluation of the implementation status of its research projects, to collect novel ideas/concepts in the various research cornerstones, to foster an interdisciplinary approach, and to change a research strategy, if necessary. In particular, given the unique structure of the agency, Mr. Istasse emphasized the special relationship between ESA and the European Commission and the cross-disciplinary approach followed in the selection of the areas of research to be carried out on the ISS.

19. The overview of the Japanese Experiment Module on the ISS, named KIBO, was presented by Mr. Tai Nakamura of JAXA. The presentation included an overview of accommodation for payloads inside KIBO, the long-term perspective of its utilization, life science and microgravity experiments, industrial applications, human body research, KIBO external payloads, and educational activities carried out so far. Particular emphasis was given concerning cooperative activities with countries in Asia and the Pacific. Mr. Nakamura referred to the report issued by the Space Activity Commission of Japan in 2009 which noted the importance of Japan

as “the gateway to the ISS for Asia”. Mr. Nakamura informed the participants that JAXA promotes ISS/KIBO utilization cooperative activities with Asia-Pacific countries through the Asia-Pacific Regional Space Agency Forum (APRSAF) and that a task force under the Space Environment Utilization Working Group of APRSAF has been working to plan joint KIBO utilization missions with Asian countries.

20. The objectives of the U.S. Research on the ISS linked to NASA Authorization Acts of 2005 and 2008 were presented by Ms. Julie Robinson, pointing out that other U.S. government agencies use the ISS to meet their agencies’ objectives and that commercial and non-profit organizations use the ISS in the interest of economic development in space. The ISS Program Office works in three major directions: ISS National Laboratory, NASA-funded Research, and International Partner Integration. Ms. Robinson briefed the audience on the ISS research in-progress and highlighted upcoming research programs.

21. An overview of the ISS Russian segment research and facilities was presented by Mr. Georgy Karabadzhak of Roscosmos, focusing on a long-term research programme and its applications (applied science and future exploration technologies) in the following fields: bio-medicine, physical and chemical process in reduced gravity conditions, geophysics, Earth remote sensing, bio-technology, space technologies, and solar system and astrophysics investigations.

22. The presentation also informed the audience about the international collaboration projects carried out by the agency and it emphasized the availability of Roscosmos to build up new relationships and cooperation with developing countries.

23. The Seminar noted that the time between the official request for an experiment and the conduct of the experiment highly depends on the disciplines, the modules to be utilized, and the queue for the ISS partner agency that sponsors the research. For NASA, experiments that use existing hardware or simple hardware have been implemented in as little as six months. Experiments requiring complex new hardware to be built can require several years.

C. ISS educational activity overview

24. Under this agenda item, the importance of the ISS as an education platform to develop science and technology was emphasized. Each representative from the ISS partners presented his/her respective initiatives on education concerning space research, promotion of the achievements of the experiments conducted on board the ISS and increasing Education and Outreach in general at all levels.

25. NASA has organized events that have involved over 31 million school students around the world, offering learning opportunities in Earth Knowledge, Amateur Radio on the ISS (ARISS), audio/video interaction between the ISS crew and the students, and demonstrations of the behaviour of simple items in microgravity. Students have conducted classroom controls of ISS experiments and investigated autonomous rendezvous technologies, and students have competed to design experiments to be conducted on the ISS.

26. Roscosmos conducts experiments and lessons from space to popularize space research, promote achievements of cosmonautics, and involve students in

software/hardware development and other experiments in an amateur radio network and physics.

27. CSA offers Mathematics, Science, and Technology learning products to students and educators providing direct access to CSA scientists, engineers, and astronauts to increase educator awareness of the space context as well as tools and scenarios to support learning. The CSA Education and Outreach learning programmes provide unique learning experiences that encourage hands-on space-focused science learning.

28. ESA offers Primary and Secondary schools online lessons about various topics, including the Columbus Module, ISS education kits containing fully illustrated information, sources, and experiments conducted on the ISS, and radio contact between astronauts on the ISS and students (ARISS). The SUCCESS program (Space station Utilisation Contest Calls for European Student initiativeS) allows University-level students to submit ideas for payloads which are reviewed by scientists at ESA for scientific merit and feasibility.

29. JAXA has conducted experiments on the mutation effects of spaceflight on seeds and, through JAXA's Spaceflight Kids Space Mission I, studied the ecosystem and the Earth's environment by growing spaceflight plant seeds. The seeds were then distributed to the schools. In order to increase public awareness, JAXA periodically conducts a number of zero-gravity experiments selected by the general public and has a Space Poem Chain.

30. It was also learned at the seminar that in order to share best practices and unite efforts to foster interest in space, science, and technology among students worldwide, the Centre National d'Etudes Spatiales (CNES) of France, CSA, ESA, JAXA, NASA, and non-agency partners involved in space-related educational pursuits created the International Space Educators Board (ISEB).

31. The representative from Indonesia emphasized the need to train the young generation and the importance of developing capacity-building activities in this field. He noted that receiving education material from the ISS partners could greatly contribute to boosting that effort, and the United Nations could have a pivotal role in coordinating the distribution of that material to developing countries.

D. Non-partner participation policy

32. NASA informed the participants that the ISS partnership developed a Non-Partner Participation Policy that governs how Non-ISS partners can participate in the ISS program. After an initial bilateral agreement between a Non-ISS partner participant with one of the five partners of the ISS, the ISS partnership will review the proposed bilateral cooperation for approval. Non-ISS partners are encouraged to cooperate with ISS partners to discuss research proposals.

33. There would be different ways to involve developing countries in doing research in space and in the utilization of the laboratories on the ISS. The best option would be to identify experiments and research that could be beneficial for meeting national development priorities and current challenges. Capacity building and training of local scientists and researchers would be the prerequisite for this kind of cooperation.

34. The Seminar noted that the ISS partners work together to plan the full utilization of the ISS. Working groups evaluate and coordinate the experiments as they are planned by each partner in order to optimize the plan. There are waiting lists for some agencies and some disciplines needing access to specific facilities. There are opportunities for collaborative research and growth included in these plans, and the ISS partners welcome future dialogue on such collaboration.

35. Regarding industry participation for use of the laboratories on-board the ISS, JAXA provides two ways for private entities to participate in ISS utilization. One is a collaboration programme between JAXA and industries in the field of applied research aiming to contribute to society by creating beneficial products. The other is a commercial utilization program in which any user may use the facilities and crew time provided by JAXA on a reimbursement basis.

36. NASA enables U.S. industry utilization of the ISS through the designation of a portion of its share of ISS capabilities as a U.S. National Laboratory. NASA also engages in cooperative projects with industry that provide commensurate benefits to the U.S.

3. Human Space Technology Initiative (HSTI)

37. The Office, under the framework of the United Nations Programme on Space Applications, has launched HSTI with the objective to promote international cooperation in human spaceflight and space exploration-related activities.

38. The ISS will be completely assembled in 2011. Currently, fully operational with a permanent crew of six (6), the ISS is an excellent facility for science and technology research (material science and life science), astronomy, Earth observation, and educational outreach. The microgravity condition of the ISS provides a unique opportunity to deepen the understanding of space science and technology as well as space medicine. As a unique symbol of international collaboration, the ISS could be regarded as one of the greatest resources for humankind to explore space.

39. In close cooperation with the ISS partners, HSTI will aim to create awareness among Member States on the benefits of utilizing human space technology and its applications in contributing to international cooperation in the peaceful uses of outer space. HSTI will also aim to build capacity in developing countries.

40. Aiming at building capacity in developing countries, HSTI is expected to achieve a greater understanding of the potential of the ISS and the research currently being conducted on the ISS. Non-ISS partners would be in a better position to assess opportunities for collaborative research which could eventually lead to a larger number of countries benefiting from human space flight activities.

41. Mr. Takao Doi of the United Nations Office for Outer Space Affairs presented the objectives, team members, and goals of HSTI. The major activities of the HSTI will be:

(a) To conduct expert meetings, workshops, and seminars on human space technology;

(b) To provide information to Member States on ISS utilization activities;

- (c) To build global capacity in microgravity education and research.

He also thanked China, Germany, and Japan for providing the Office with experts who will work on HSTI under non-reimbursable loan (NRL) arrangements.

4. Conclusion

42. The 48th Session of the Scientific and Technical Subcommittee noted with appreciation the participation of the International Space Station partners in the Outreach Seminar on the International Space Station, held on 8 February, organized by the Office in the framework of the Human Space Technology Initiative (A/AC.105/987, para. 40).

43. The Seminar brought together all the ISS partners and many Non-ISS partner countries with the United Nations to start discussions on how HSTI could play a role as an advocate for non-ISS partners for broader use of the ISS.

44. The Seminar established that HSTI could be a meaningful mechanism for creating awareness about the potential of the ISS and the research conducted on the ISS among countries, regions and potential users that have to date not been involved with such activities, thereby contributing to capacity building in space science and technology education.

Annex I

Programme of Outreach Seminar on the ISS

United Nations Office at Vienna
Vienna International Centre, Vienna, Austria
Room M7, 8 February 2010

Morning Session

- 9:00 Opening Mazlan Othman (UNOOSA)
- 9:15 International Space Station (ISS) Overview Rod Jones (NASA)
- ISS Research and On-Orbit Facilities
 - ISS Non-Partner Participation Policy
- 10:15 Coffee Break
- 10:45 ISS Research Accomplishments and Potential for Future Research
- Examples of Non-Partner Utilization Julie Robinson (NASA)
 - Space Activities in Malaysia Mohd. Alauddin Mohd. Ali (Malaysia)
- 11:30 Member State Expression of Interest Adigun Ade Abiodun (Nigeria)
- 11:45 United Nations Human Space Technology Initiative Takao Doi (UNOOSA)

Afternoon Session

- 13:00 Overview on ISS International Partners' Research and Facilities
- Canadian Space Agency (CSA) Nicole D. Buckley (CSA)
 - European Space Agency (ESA) Eric Istasse (ESA)
 - Ministry of Education, Culture, Sports, Science and Technology/
 - Japan Aerospace Exploration Agency (MEXT/JAXA) Tai Nakamura (JAXA)
 - National Aeronautics and Space Administration (NASA) Julie Robinson (NASA)
 - Russian Federal Space Agency (Roscosmos) Georgy Karabadzha (Roscosmos)
- 14:45 ISS-enabled Educational Opportunities Julie Robinson (NASA)
- 15:00 Question-and-Answer Session
- 16:00 Closing