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**Committee on the Peaceful  
Uses of Outer Space****Report on the Sixth United Nations/International Academy  
of Astronautics Workshop on Small Satellites in the Service  
of Developing Countries****(Fukuoka, Japan, 19 October 2005)**

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## **I. Introduction**

### **A. Background and objectives**

1. The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) recommended, *inter alia*, that the joint development, construction and operation of a variety of small satellites offering opportunities to develop indigenous space industry should be undertaken as a suitable project for enabling space research, technology demonstrations and related applications in communications and Earth observation.<sup>i</sup> Additional recommendations emanated from the activities of the Technical Forum held at UNISPACE III.<sup>ii</sup> In accordance with those recommendations, the Office for Outer Space Affairs of the Secretariat has substantially extended its existing cooperation with the Subcommittee on Small Satellites for Developing Nations of the International Academy of Astronautics (IAA).<sup>iii</sup>

2. At the 1999 meeting of the IAA Subcommittee, it was agreed that the fifty-fifth International Astronautical Congress, which was to be held in Rio de Janeiro, Brazil, from 2 to 6 October 2000, would be an ideal opportunity to review the status of programmes in Latin America. It was further agreed that the workshop should be open to participants from other regions, but that the situation in Latin America would be used as an example of how developing countries could benefit from small satellites and that that topic should form the core of the discussion. The report of the first United Nations/IAA workshop (A/AC.105/745) was submitted to the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space at its thirty-eighth session, in 2001. Based on the positive response from participants and from member States of the Committee, it was decided that that regular activity should continue, with emphasis on different aspects of the issue and the specific needs of individual regions.

3. The second workshop was held in Toulouse, France, on 2 October 2001, the third in Houston, United States of America, on 12 October 2002, the fourth in Bremen, Germany, on 30 September 2003 and the fifth in Vancouver, Canada, on 5 October 2004. The corresponding reports (A/AC.105/772, A/AC.105/799, A/AC.105/813 and A/AC.105/835) were submitted to the Scientific and Technical Subcommittee at its thirty-ninth, fortieth, forty-first and forty-second sessions, in 2002, 2003, 2004 and 2005, respectively.

4. At its forty-seventh session, in 2004, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned within the framework of the United Nations Programme on Space Applications by the Office for Outer Space Affairs for 2005.<sup>iv</sup> Subsequently, the General Assembly endorsed the United Nations Programme on Space Applications for 2005 in its resolution 59/116 of 10 December 2004.

5. Pursuant to resolution 59/116 and in accordance with the recommendation of UNISPACE III, the United Nations/International Academy of Astronautics Workshop on Small Satellites in the Service of Developing Countries: Current and Planned Small Satellite Programmes, was held in Fukuoka, Japan, on 19 October 2005. It was the sixth workshop organized jointly by the Office for Outer Space Affairs and IAA within the framework of the International Astronautical Congress.

Following the reorganization of the structure of IAA, the responsibility for such cooperation was assigned to IAA Commission V (Space Policies, Law and Economics).

## **B. Attendance**

6. The Workshop was an integral part of the Congress and was attended by some 60 registered Congress participants. Many of those attending the Workshop had also attended the United Nations/International Astronautical Federation Workshop on Space Education and Capacity Building for Sustainable Development, held in Kitakyushu, Japan, on 14 and 15 October 2005 (A/AC.105/854). The sponsors of the Workshop provided financial support to selected participants from developing countries.

7. One of the objectives of the Workshop was to review the benefits of small satellite programmes, with particular emphasis on the contribution that small satellites could make to supporting scientific, Earth observation and telecommunication missions. Emphasis was placed on international cooperation, education and training and the benefits of such programmes for developing countries. The Workshop was also attended by several participants of previous workshops, who provided valuable continuity and were able to assess the progress that had been made during the series of workshops.

## **II. Summary of presentations**

8. In a brief introduction, the co-chairman of the workshop stressed the importance of the series of workshops. Six papers and two additional contributions were then presented and discussed, most of which dealt with the use of outer space for developing countries.

9. In the first paper, the co-chairmen of the previous workshops gave a summary presentation of the results of those workshops, in particular, the programmes that had been proposed and initiated over the last few years. During that time, several satellites had been launched and had achieved results in applications such as data collection, Earth observation and education. The importance of international cooperation and of the technology transfer programmes and on-the-job training was evident from the review of the past few years of activity. The first paper also included a summary of the conclusions and recommendations of the previous workshops, to serve as a basis for discussion at the Sixth Workshop.

10. The second paper, from Portugal, discussed the benefits of small satellites for countries just beginning to pursue activities in space and drew a comparison between developing countries. The cases of Portugal and Nigeria were considered. The compatibility of small satellite development with sustainable development and scientific and technological strategies of countries was stressed as a necessary condition for the success of the implementation of such programmes.

11. The third paper described a new South African satellite programme, which had been announced two weeks before the Workshop, aimed at demonstrating the next generation of indigenous satellite technology and that high-resolution remote

sensing could be operational with a satellite as small as 70 kilograms. In the programme, the funding of activities related to education and capacity-building was equal to that of the satellite hardware element. The key areas that were expected to benefit from the pathfinder mission were management of agricultural resources; monitoring of health hazards; regulatory monitoring; food security; settlement management and infrastructure development; and disaster mitigation, response and recovery. The satellite, to be launched in 2006, will provide hands-on experience with readily available multispectral imaging data and will help formulate a national space policy.

12. The United Kingdom of Great Britain and Northern Ireland outlined the contribution of the Disaster Monitoring Constellation (DMC) to the monitoring of some recent natural disasters. In 2004, the first four member States of DMC, Algeria, Nigeria, Turkey and the United Kingdom, coordinated their spacecraft in a 90° phased Sun-synchronous orbit and began to work together to respond to international disasters. The presentation covered, in particular, the use of the NigeriaSat-1 satellite to monitor the tsunami that struck the Indian Ocean at the end of 2004. Images of the wide area of devastated coastline had been supplied to humanitarian aid agencies, enabling the full extent of the destruction to be mapped.

13. It was emphasized that the DMC Consortium had agreed to contribute that capability to the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (International Charter “Space and Major Disasters”), which coordinated the efforts of various space agencies. The paper outlined the experience gained in working with the Charter in the tsunami and other disasters.

14. Apart from its contribution to disaster monitoring, the paper indicated that Nigeria had been able to sell images from NigeriaSat-1, thus providing a revenue from the investment in the satellite. As for Algeria, its AISAT-1 satellite, also part of DMC, was used for national needs. Unlike Nigeria, Algeria did not sell its images, but used them widely to cover the needs of all its ministries and for education. It was stressed that such wide dissemination of data was only possible because the satellite was a national one; indeed, the country could not afford to buy images from other suppliers for such wide distribution.

15. The last paper presented the Science and Technology Satellite (STSAT) programme of the Republic of Korea. The first STSAT mission had been launched in September 2003 to investigate the evolution and spatial distribution of the hot interstellar medium. The paper described the scientific mission, the far-ultraviolet diffuse imaging spectrometer and the four other instruments of the payload compartment, as well as some of the most significant scientific results. The second satellite in the programme, STSAT-2, which would be devoted to Earth surface and atmosphere monitoring using dual channel radiometers, was also mentioned. The payload was to be developed by Korean laboratories in collaboration with a Chinese research centre. The second satellite was due to be launched in 2007, while STSAT-3 would be launched in 2010, according to the Republic of Korea’s national mid- and long-term plans for space development.

16. In addition to the five papers mentioned above, other contributions were made during the discussion. A Brazilian participant mentioned current work on two small scientific satellites, the Equatorial Atmosphere Research Satellite (EQUARS),

which would study dynamical, photochemical and ionospheric processes in the equatorial low, middle and upper atmosphere, and the MIRAX X-ray astronomy satellite, which was expected to carry out X-ray observations in the central galactic plane region. MIRAX was an international collaborative project with contributions from universities and research centres in Germany, the Netherlands and the United States. The Data Collection Satellites (SCD) already launched were reported to be the most useful application for Brazil.

17. Another contribution dealt with the development of small remote sensing satellites in Indonesia and Malaysia. Indonesia had recently embarked upon the development of the National Institute of Aeronautics and Space of Indonesia-Technical University of Berlin satellite (LAPAN-TUBSAT) in cooperation with Germany, while Malaysia had already launched its TiungSAT-1 microsatellite, developed in cooperation with the United Kingdom. Both countries considered that the development of its own satellite would contribute to capacity-building and the development of knowledge in satellite technology suited to research and education purposes. Universities were very responsive to such objectives and had played a significant role in national efforts.

### III. Conclusions and recommendations

18. The Workshop clearly demonstrated that there were major benefits to be gained from introducing space activities by means of a small satellite programme.

19. The presentations made showed that practical results had already demonstrated how effective small satellites were in addressing both national and regional problems. New programmes were presented that were expected to provide benefits such as those arising from remote sensing, especially in such fields as disaster mitigation, agriculture and infrastructure development. Scientific programmes had also been initiated.

20. The Workshop considered that the proposals made by UNISPACE III and at previous workshops were fully applicable. The series of workshops was considered an important contribution to the implementation of the recommendations of UNISPACE III and to the building of awareness among countries.

21. Participants considered it important to reconfirm and complement the proposals made previously, in particular:

(a) They recognized that small satellites were a useful tool for acquiring and developing technology and contributing to education and training. In addition, the importance of placing the main focus on applications that provided sustainable economic benefits for developing countries needed to be stressed. To provide maximum economic and social benefits to the populations of such countries, it was recommended that programmes be established in such a manner as to ensure continuity and sustainability;

(b) The presentations indicated that small satellite projects were promoting international cooperation within regions or worldwide by means of bilateral or multilateral agreements. Small satellite projects could result in fruitful cooperation between different countries in the planning, implementation and operation of scientific and application satellites, as well as in the effective utilization of the data

acquired while sharing developmental and operational costs. To that end, it was recommended that coordinated actions continue to identify significant problems that were common to different countries in a region and that could be addressed with the help of small satellite technology. It was also recommended that partnerships be developed between regions with common needs, such as the equatorial regions of different continents;

(c) The continued importance of Earth observation programmes for developing countries and the benefits of international cooperation efforts, including in natural disaster management, were highlighted. It was therefore recommended that long-term strategic programmes be developed to ensure the sustainable acquisition and processing of the data needed to monitor the environment and natural resources and to mitigate man-made and natural disasters, as well as for decision-making;

(d) Participants recognized the benefits of small satellite programmes in the acquisition, development and application of space science and technology and the associated development of a knowledge base and industrial capacity. It was therefore stressed that space activities should be an integral part of any national programme devoted to the acquisition and development of technology and capacity-building;

(e) Participants also noted with appreciation the contribution of students to the programme of the workshops and recognized that the interest of students and young professionals in the subject of small satellites was a clear sign of growing public awareness. The role of universities in developing space capacity was mentioned as a possible way to develop space assets in a country. It was therefore recommended that each country recognize the important role that space assets could play in education, the need to incorporate space science and technology into curricula and the key role that universities could play in implementing a national space plan;

(f) Participants emphasized the need for greater awareness among the public and among decision makers of the potential benefits of space technology applications. Every country or group of countries should consider the attainment of a minimum level of space capability, as that could be invaluable in enhancing socio-economic development as well as the health and quality of life of the population. In that respect, a dedicated organization or agency could play an important role in the definition and implementation of a space programme.

#### *Notes*

<sup>i</sup> *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1, annex, para. 32 (b).

<sup>ii</sup> *Ibid.*, annex III.

<sup>iii</sup> The purpose of the IAA Subcommittee on Small Satellites for Developing Nations is to assess the benefits of small satellites for developing countries and to develop awareness on the subject in both developed and developing countries. The IAA Subcommittee publishes its findings and disseminates information through workshops and symposiums. In order to realize its goals, the IAA Subcommittee cooperates with the United Nations and its Committee on the Peaceful Uses

of Outer Space; the International Astronautical Federation and its Committee for Liaison with International Organizations and Developing Nations; and the International Space University.

<sup>iv</sup> *Official Records of the General Assembly, Fifty-ninth Session, Supplement No. 20* and corrigenda (A/59/20 and Corr.1 and 2), para. 70.

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