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Committee on the Peaceful Uses of Outer Space

Report on the Eighth United Nations/International Academy of Astronautics Workshop on Small Satellites in the Service of Developing Countries

(Hyderabad, India, 25 September 2007)

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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 for developing indigenous space industries should be undertaken as a suitable project for enabling space research, technology demonstrations and related applications in communications and Earth observation.¹ Additional recommendations emanated from the activities of the Technical Forum held during UNISPACE III.² 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).

2. At its forty-ninth session, in 2006, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned for 2007 as proposed in the report of the Expert on Space Applications (A/AC.105/874). Subsequently, the General Assembly, in its resolution 61/111 of 14 December 2006, endorsed the United Nations Programme on Space Applications for 2007.

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, the fifth in Vancouver, Canada, on 5 October 2004, the sixth in Fukuoka, Japan, on 19 October 2005 and the seventh in Valencia, Spain, on 3 October 2006. The corresponding reports (A/AC.105/772, A/AC.105/799, A/AC.105/813, A/AC.105/835, A/AC.105/855 and A/AC.105/884) have been submitted to the Scientific and Technical Subcommittee at its annual session every year since its thirty-ninth session, in 2002.

4. Pursuant to General Assembly resolution 61/111 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 was held in Hyderabad, India, on 25 September 2007. It was the eighth 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, dealing with space policies, law and economics.

B. Attendance

5. The Workshop was an integral part of the International Astronautical Congress and was attended by some 60 registered Congress participants. Many of those

¹ *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).

² *Ibid.*, annex III.

attending had also attended the United Nations/International Astronautical Federation Workshop on the Use of Space Technology for Sustainable Development Towards Food Security, held in Hyderabad, India, from 21 to 23 September 2007 (A/AC.105/905). The sponsors of that Workshop had provided financial support to selected participants from developing countries.

6. One of the main objectives of the Workshop on Small Satellites in the Service of Developing Countries 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. Among those attending the Workshop were several participants of previous workshops, who provided valuable continuity and were able to assess the progress that had been made in the course of the workshop series.

II. Summary of presentations

7. The co-chairmen of the Workshop presented an overview of the series of workshops. Six papers dealing with the use of space technology for the benefit of developing countries were then presented and discussed. The first few papers also dealt with experience gained in developing countries with satellites.

8. The first presentation included a review of the user requirements underlying the African resource management constellation (ARM) of small satellites, which was described as fulfilling the need for regular high-resolution data on Africa for resource management applications. The widespread use of high- and medium-resolution images clearly demonstrated the urgent need for such data to be made available in a timely manner. The user requirements of ARM had evolved to include, in addition to the high-resolution imagery provided by the first constellation, medium- (20 m) and very-high-resolution imagery. In the future, data sets of synthetic aperture radar and thermal infrared images would be needed. Reference was made to the user requirements for data on Africa obtained using remote sensing. A description was made of a solution provided by a constellation of satellites that would dramatically increase the amount of data needed to meet African priorities. The satellite technology in South Africa had the potential to collect high- and medium-resolution data by satellite that would be suitable as a baseline for the solution.

9. In the second presentation, the Nigeriasat-2 programme was described as the next stage in the Nigerian contribution to the Disaster Monitoring Constellation (DMC) programme. Nigeriasat-2 was a 300 kg satellite with a ground track resolution of 2.5 m and 5 m in four multi-spectral bands. The satellite would also carry a 32-metre resolution four spectral band system with a swath of 300 km, which was compatible with the first DMC satellite capabilities. The main satellite bus could work in stereo mode or wide area mode. The launch was scheduled for 2009. As part of the programme, 25 engineers from Nigeria were being hosted by the Surrey Satellite Technology Ltd. (United Kingdom) to work on the project.

10. The third presentation included a review of the progress in space technology made in Malaysia. It was reported that, as part of the national plan for 2020,

Malaysia aimed to become a net supplier of technology instead of an importer. To achieve that goal, part of the plan involved creating an enabling environment for technology development. It was noted that Malaysian universities were eager to get involved in space activities. As part of that effort, a number of Russian professors had been invited to teach at Malaysian universities. The role model for Malaysia was the Republic of Korea, a country that had developed an independent capability in space technology. Universities in Malaysia had a number of programmes for teaching aeronautical engineering and astronautics and satellite technology. A nanosatellite programme was being implemented in at least one Malaysian university.

11. The fourth presentation focused on the Brazilian university satellite programme, which had started in 2000 and culminated in the launch of Pehuensat in 2007. A total of 17 professors and 44 students had contributed to that satellite programme. Support had also been provided to Colombia, where the University of Sergio Arboleda had launched a CubeSat in 2007. An undergraduate programme called Unosat had also started in 2000; it had continued, in 2004, with the 14 Bissat, which was ready for launch. As a result of those successful efforts, a national university programme called ItaSat had been initiated by the Brazilian Space Agency. The university satellite programme also supported a series of national workshops on small satellites for education.

12. For the fifth presentation, a representative of Argentina, provided information on the first month in orbit of a satellite constructed at the National University of Camahue. The objectives of the satellite programme included the creation of a space technology team that would cooperate with Indian universities. Such collaboration included launching space objects from an Indian launch vehicle. The satellite programme was pioneering a new scheme for piggy-back objects in which satellites were not separated from the final stage of the launch booster when they reached orbit. Many countries had received signals from the satellite despite the limited range of its communication link.

13. The sixth presentation included a review of Indian small satellite programmes. It was reported that a microsatellite with a mass of less than 100 kg, a potential payload capability of 30 kg with a power budget of 20 W and a data rate of 8 megabits per second had been proposed. Various remote sensing, astronomical and geoscience payloads could be carried by such a satellite. Two other satellite programmes were also described. The first concerned the Third World Satellite (TWSat), which supported an open communication channel through which data could be received by any university in the world. The 36-metre ground resolution payload with a 151-kilometre swath was augmented with a 64-channel hyper-spectral imager with 600 m resolution. The second satellite programme, which concerned YouthSat, was the result of cooperation between India and the Russian Federation. Furthermore, a new micro-satellite bus, with full three-axis control, a control accuracy of 0.1 degree and measurement accuracy of 30 arc seconds, was under development.

III. Conclusions and recommendations

14. At the Workshop, it was clearly demonstrated that developing countries could benefit greatly from promoting space activities through the development of small satellite programmes.

15. It was also demonstrated that the recommendations made at UNISPACE III and at previous workshops were being implemented. The series of workshops was considered an important contribution to raising awareness in developing countries.

16. The presentations made at the Workshop highlighted how effective small satellites could be in addressing national and regional problems in developing countries. Information was presented on programmes that were already providing benefits, especially in areas such as natural disaster mitigation, agriculture and infrastructure development.

17. It was noted that small satellite programmes were extremely beneficial for education and training, particularly at universities in developing countries.

18. Speakers and participants reconfirmed and complemented the recommendations made previously, in particular:

(a) They stressed the importance of focusing on applications, especially those related to remote sensing missions, that would provide sustainable economic benefits for developing countries. In order 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 programmes. Small satellite projects could result in fruitful cooperation between different countries in the planning, implementation and operation of scientific and application satellite missions, as well as in the effective utilization of the data acquired while sharing developmental and operational costs;

(c) The continuing and ever-growing interest in Earth observation programmes for developing countries and the benefits of international cooperation efforts, including those directed towards natural disaster management, were highlighted. The progress made within the framework of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) was acknowledged as useful in that regard;

(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) The role of universities in developing space capacity was highlighted as a potential tool for developing space assets in developing countries. It was therefore recommended that each country should recognize the important role that space assets could play in education, the need to incorporate space science and technology

in curricula and the key role that universities could play in implementing national space plans;

(f) Participants emphasized the need for greater awareness among the public and 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 space programmes.
