



General Assembly

Distr.: General
3 December 2009

Original: English

Committee on the Peaceful Uses of Outer Space

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

(Daejeon, Republic of Korea, 13 October 2009)

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.¹ Additional recommendations emanated from the activities of the Technical Forum held at 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 the meeting of the IAA Subcommittee held in 1999, it was agreed that the 51st 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

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.



satellites and that that topic should form the core of the discussion. After the first United Nations/International Academy of Astronautics Workshop on Small Satellites at the Service of Developing Countries: the Latin American Experience (A/AC.105/745), held in Rio de Janeiro, Brazil, on 5 October 2000, and based on the positive response from participants and from States members of the Committee on the Peaceful Uses of Outer Space, 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. At its fifty-first session, in 2008, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences of the United Nations Programme on Space Applications for 2009.³ Subsequently, the General Assembly, in its resolution 63/90, endorsed the Programme for 2009.

4. Pursuant to General Assembly resolution 63/90 and in accordance with the recommendation of UNISPACE III, the Tenth United Nations/International Academy of Astronautics Workshop on Small Satellites in the Service of Developing Countries was held in Daejeon, Republic of Korea, on 13 October 2009. The Workshop was organized jointly by the Office for Outer Space Affairs and IAA within the framework of the 60th International Astronautical Congress.

B. Attendance

5. The Workshop was an integral part of the Congress and was attended by some 70 registered Congress participants. Many of those attending had also attended the United Nations/International Astronautical Federation Workshop on Integrated Space Technologies and Space-based Information for Analysis and Prediction of Climate Change, held in Daejeon, Republic of Korea, from 9 to 11 October 2009 (A/AC.105/970). The sponsors of the United Nations/International Astronautical Federation Workshop provided financial support to selected participants from developing countries.

6. One of the main 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 scientific, Earth observation and telecommunication missions. Emphasis was placed on international cooperation, education and training, and on 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

7. Seven papers dealing with the use of space technology for the benefit of developing countries were then presented and discussed. Those papers covered the following subjects: the success of relatively new space programmes in developing

³ *Official Records of the General Assembly, Sixty-third Session, Supplement No. 20 (A/63/20)*, para. 77.

countries that became suppliers to other developing countries (Republic of Korea and South Africa), a review of the economic impact of small satellite programmes, a framework for the evolution of satellites for developing countries, the integration of small satellite mission data into production applications, new small satellite technology options and an overview of the small satellite programme in Viet Nam and the recent success of the Malaysian RasakSAT satellite.

8. The first presentation was about the development of small satellite programmes. Over 20 years, the small satellite programme in the Republic of Korea had acquired the competence to build satellites not only for national use, but also for export to other countries. The concerns for developing countries include enjoying sufficient political support and retaining manpower. The following steps were taken to acquire technology: first, a partner was selected with the involvement of the engineers from the country running the programme, who had to be highly motivated and enthusiastic; second, the technology was verified and enhanced, and the new satellite engineering team built a satellite with minimal support from the partner; third, the team then designed a mission and built a satellite independently.

9. The second presentation was about how to ensure the sustainability of a satellite programme. The long-term benefits resulting from the acquisition of satellite technology had to be balanced against the short- and medium-term economic benefits. The Global Competitiveness Index of the World Economic Forum was used to assess economic performance. Success in the short term would mean ensuring access for more people to education, health care and the infrastructure, enabling them to be effective in a factor-driven economy. In the medium term, that would mean improving people's ability to increase their income potential (using technology to improve efficiency). Long-term success would mean an economy that also participated effectively in and contributed to innovation, with the design of new products with a global appeal. The success of the recent SumbandilaSat programme and the technology developed under the Sunsat programme in South Africa were used to illustrate the long-term impact of investment in long-term small satellite programmes by developing countries. Both programmes had proved to have shortcomings with regard to utilizing satellite capacity for short-term benefits in the context of improving the economy as measured using the Global Competitiveness Index.

10. The third presentation reviewed the evolution of small satellite programmes in a number of developing countries to determine what lessons could be derived for countries wishing to pursue such programmes. New language (including such terms as "space technology ladder" and "graphical timeline") and three levels of strategic decisions could be used to describe and compare any number of different developing satellite programmes. The comprehensiveness of the language used to cover all aspects of space programmes meant that existing plans for possible improvements could be reviewed very effectively.

11. The fourth presentation compared the use of medium-resolution images from the Land Remote Sensing Satellite and NigeriaSat-1 to answer a specific question in relation to a change in land cover in a province of particular interest in Nigeria. What was of particular note was the usefulness of the small satellite data in comparison with archived Land Remote Sensing Satellite data. The review covered the period 1975-2006 and clearly showed a change in economic activity over that

period. For Nigeria, that use of remote sensing data was important for identifying and regulating emerging mining activity.

12. The fifth presentation demonstrated how small satellite technology had evolved through the CubeSat standard to provide a powerful platform for small satellite programmes to be launched at universities or be demonstrated at institutes. The three-unit CubeSat that was described in the paper included deployable solar panels and the capacity to carry an imaging payload with a ground resolution of 20 metres. As a tool for developing countries, it could help university programmes to progress towards providing hands-on experience in space engineering.

13. In the sixth presentation, the Vietnamese space effort was reviewed as an example of the actual steps taken by a country embarking on a small satellite programme. The programme consisted of three well-defined steps, starting with a pico-satellite, progressing to a micro-satellite in the context of a regional cooperation programme (the MicroSTAR programme) and culminating in a national satellite Earth observation programme. The programme had consistently benefited from good technical support from international partners and a strong focus on applications. A seven-year programme including the building of satellite facilities had been developed with the aim of initiating a small satellite Earth observation mission on the basis of a satellite of 400 kg with either a synthetic aperture radar or an optical payload, depending on national priorities.

14. The final paper described the lessons learned by Malaysia, which had launched a small satellite onto the near equatorial Earth orbit, opening up an Earth observation resource with a revisit period that enabled the imaging of areas that were otherwise mostly covered with cloud when polar Earth observation satellite imaging was available. One of the challenges for the Malaysian engineering team involved having to wait for several years before the launch could finally take place. The benefits of building, launching and using small satellites were clearly acquired with much perseverance.

III. Conclusions and recommendations

15. The Workshop clearly demonstrated that there are tremendous benefits to be gained by developing countries from introducing space activities through small satellite programmes.

16. The Workshop also demonstrated how the recommendations made by UNISPACE III and by previous workshops were being implemented. The series of workshops was considered an important contribution to raising awareness in developing countries.

17. 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 such areas as natural disaster mitigation, mining and infrastructure development.

18. The Workshop also took note of the fact that small satellite programmes were extremely beneficial for education and training, particularly at universities in developing countries.

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

(a) Stressing 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) Noting that small satellite projects were promoting international cooperation within and among regions by means of bilateral or multilateral programmes. Small satellite projects could result in fruitful cooperation between countries with regard to planning, implementing and operating scientific and application satellite missions, as well as with regard to the effective utilization of the data acquired while sharing developmental and operational costs;

(c) Recognizing 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;

(d) Highlighting the role of universities in developing space capacity as a means of 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.
