



# General Assembly

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**Committee on the Peaceful  
Uses of Outer Space**  
**Scientific and Technical Subcommittee**  
**Forty-ninth session**  
Vienna, 6-17 February 2012

## Draft report

### Addendum

## VII. Recent developments in global navigation satellite systems

1. In accordance with General Assembly resolution 66/71, the Subcommittee considered agenda item 10, "Recent developments in global navigation satellite systems".
2. The representatives of China, India, Italy, Japan and the United States made statements under agenda item 10. During the general exchange of views, statements relating to the item were also made by representatives of other member States.
3. The Subcommittee heard the following scientific and technical presentations:
  - (a) "Sixth Meeting of the International Committee on Global Navigation Satellite Systems (ICG)", by the representative of Japan;
  - (b) "Global navigation satellite systems continuously operating reference stations of Indonesia (Ina-CORS)", by the representative of Indonesia.
4. The Subcommittee had before it the following documents:
  - (a) Report on the United Nations/United Arab Emirates/United States Workshop on Applications of Global Navigation Satellite Systems (GNSS) (A/AC.105/988);
  - (b) Note by the Secretariat on the Sixth Meeting of ICG (A/AC.105/1000);
  - (c) Report of the Secretariat on activities carried out in 2011 in the framework of the workplan of ICG (A/AC.105/1013).
5. The Subcommittee noted that the United Nations/United Arab Emirates/United States Workshop on Applications of Global Navigation Satellite Systems had been



held in Dubai from 16 to 20 January 2011. The Emirates Institution for Advanced Science and Technology had hosted the Workshop on behalf of the Government of the United Arab Emirates. The Workshop was aimed at increasing awareness among decision makers and policymakers of the benefits of satellite navigation technology and establishing a broad framework for regional and international cooperation.

6. The Subcommittee noted that the United Nations International Meeting on the Applications of Global Navigation Satellite Systems, co-sponsored by the United States, had been hosted by the Office for Outer Space Affairs from 12 to 16 December 2011 in Vienna to mark 10 years of achievement of the United Nations in the area of GNSS, with the Office taking an active role as the executive secretariat of ICG and a co-organizer of the meeting. It was also noted that the establishment of international centres for GNSS science, technology and education in already existing institutions of higher learning was recommended, and that such international centres should promote and offer education in science, engineering and the application of GNSS for peaceful uses for the benefit of member States.

7. The Subcommittee reviewed issues related to ICG and the latest developments in the field of GNSS technology and applications.

8. The Subcommittee noted with satisfaction that the Sixth Meeting of ICG and the seventh meeting of its Providers' Forum had been held in Tokyo from 5 to 9 September 2011, organized by the Government of Japan, and that the Seventh Meeting of ICG would be held in Beijing from 5 to 9 November 2012. The Subcommittee also noted that the United Arab Emirates would host the Eighth Meeting of ICG in 2013.

9. The Subcommittee noted that the Sixth Meeting of ICG had addressed GNSS technology applications to agriculture, fisheries, information technology construction (precision positioning), geographic information systems (GIS), disaster mitigation, intelligent transportation systems and location-based services. It was noted that experts from Indonesia, the Republic of Korea, Thailand and Viet Nam had participated in discussions with respect to user applications and GNSS technology.

10. The Subcommittee noted the progress made on the ICG workplan and the growing attention given by the international community to multi-GNSS system monitoring to improve performance and interoperability, as well as to interference detection and mitigation. It was noted that the ICG working groups focused on the following issues: compatibility and interoperability; enhancement of the performance of GNSS services; information dissemination and capacity-building; and reference frames, timing and applications.

11. The Subcommittee commended the Office for Outer Space Affairs for its work as the executive secretariat of ICG and its Providers' Forum, and for its efforts to create synergy among global players in satellite navigation.

12. The Subcommittee expressed its appreciation to the Office for Outer Space Affairs for its efforts in promoting the use of GNSS through its capacity-building initiatives in developing countries.

13. The Subcommittee noted with appreciation the achievements of providers and users of positioning, navigation and timing services in promoting GNSS, as

reflected in the publication “10 years of achievement of the United Nations on Global Navigation Satellite Systems” (ST/SPACE/55).

14. The Subcommittee noted that the United States Global Positioning System (GPS) continued to set a high standard of reliability, accuracy and service to the international community. It was noted that GPS had 31 operational satellites in orbit to ensure a baseline constellation of 24+3 satellites. The entire GPS constellation continued performing at exceptional levels of accuracy, averaging a user range error of less than one metre. The commitment of the United States to maintaining GPS as a central pillar of an emerging international system of GNSS was also noted.

15. The Subcommittee noted with appreciation the financial contributions made by the United States, which enabled the Office for Outer Space Affairs to undertake a number of activities relating to GNSS and ICG and its Providers’ Forum, including the organization of regional workshops on the GNSS applications.

16. The Subcommittee noted that the Russian Federation’s Global Navigation Satellite System (GLONASS) constellation had been completed and currently consisted of 24 operational satellites in orbit to provide global coverage. It was also noted that a new generation of GLONASS-K satellites was scheduled to be launched to increase precision and operational capabilities.

17. The Subcommittee noted the successful launch of the first two Galileo in-orbit validation satellites of the European Union.

18. The Subcommittee noted that Italy continued to be an active member of ICG, having been one of the founders of the European EGNOS and Galileo satellite navigation system, and was developing national application projects aimed at fostering the use of satellite navigation and harmonizing them with European projects.

19. The Subcommittee noted that there had been a series of successful launches of China’s Beidou satellite navigation system and that the system had started providing initial positioning, navigation and timing services to China and surrounding areas.

20. The Subcommittee noted that India was currently implementing the GPS-aided GEO-Augmented Navigation System (GAGAN), a space-based augmentation system for delivering increased position accuracy for civil aviation applications. It was noted that GAGAN was compatible and interoperable with other satellite-based augmentation systems (SBAS) and that it would provide seamless navigation services together with other systems. The Indian Regional Navigation Satellite System (IRNSS), with seven satellites in geostationary equatorial orbit and geosynchronous orbit, was in the implementation phase, and the full constellation was expected to be completed in 2015.

21. The Subcommittee noted that the Quasi-Zenith Satellite System (QZSS) of Japan would be expanded and upgraded to an operational and regional satellite-based GNSS for the benefit of the countries in the Asia-Pacific region, and that a seven-satellite constellation should be completed to enable sustainable positioning. It was noted that satellite positioning systems were used for rescue, rehabilitation and reconstruction during the earthquake in Japan in 2011, and it was recognized that such space-based systems contributed to human security.

22. The Subcommittee noted that the third Asia-Oceania Regional Workshop on GNSS had been held in Jeju, Republic of Korea, on 2 and 3 November 2011 and that five multi-GNSS application experiments had been endorsed in that workshop as part of the multi-GNSS demonstration campaign.

23. The Subcommittee noted that the Czech Republic would host the European GNSS Agency and was participating in the GNSS Evolution Programme of ESA, which prepares technologies associated with future generations of EGNOS and Galileo systems.

## **IX. Near-Earth objects**

24. In accordance with General Assembly resolution 66/71, the Scientific and Technical Subcommittee considered agenda item 12, "Near-Earth objects".

25. The representatives of Germany, Japan, Romania and the United States made statements under agenda item 12. During the general exchange of views, statements relating to the item were also made by representatives of other member States and by the representative of Ecuador on behalf of the Group of Latin American and Caribbean States. The observer for IAU also made a statement.

26. The Subcommittee heard the following scientific and technical presentations:

(a) "CNES activities in the area of near-Earth objects: the case of Apophis", by the representative of France;

(b) "Near-Earth Objects Observation Program: close approaches of 2011", by the representative of the United States;

(c) "NEOs, the media and risk communications: report on a workshop", by the observer for SWF.

27. The Subcommittee had before it the following documents:

(a) Information on research in the field of near-Earth objects carried out by Member States, international organizations and other entities (A/AC.105/C.1/100 and A/AC.105/C.1/2012/CRP.9);

(b) Interim report of the Action Team on Near-Earth Objects (2011-2012) (A/AC.105/C.1/L.316);

(c) Draft recommendations of the Action Team on Near-Earth Objects for an international response to the near-Earth object impact threat (A/AC.105/C.1/L.317).

28. The Subcommittee noted the increased awareness of the global threat posed by near-Earth objects and the importance of coordinated international efforts to mitigate such threats.

29. The Subcommittee noted with appreciation the international efforts undertaken by member States to detect, catalogue and characterize near-Earth objects, such as the Minor Planet Center; the Arecibo and Goldstone radio telescope facilities; the NEO Program Office of NASA; NEOShield, which involved 13 governmental and non-governmental partners and would be coordinated by the German Aerospace Centre (DLR); and the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS).

30. The Subcommittee noted the significant progress achieved by the United States in detecting 93 per cent (910 out of approximately 980) of near-Earth objects larger than one kilometre in diameter, which exceeded the initial target of 90 per cent detection. The Subcommittee also noted the objective of the United States NEO Survey Program to detect, track, catalogue and characterize 90 per cent of all near-Earth objects that are at least 140 metres in size by 2020.
31. The Subcommittee noted the successful completion in February 2011 of the Wide-field Infrared Survey Explorer (WISE) mission of the United States, which since its launch in December 2009 had observed more than 157,000 solar system objects, including 120 comets and more than 585 near-Earth objects.
32. The Subcommittee noted with satisfaction the successful conclusion of the first sample-return mission from a near-Earth object by the asteroid explorer Hayabusa of Japan, which had returned to Earth on 13 June 2010, and the importance of the results of that mission for scientific purposes, as well as for the future management of threats posed by near-Earth objects.
33. The Subcommittee welcomed upcoming sample-return missions, such as the Hayabusa-2 mission of Japan, to be launched in 2014 to arrive at the target near-Earth object in 2018, and the OSIRIS-REx sample-return mission of the United States, to be launched in 2016 and return to Earth in 2023.
34. The Subcommittee also welcomed the past and upcoming missions investigating near-Earth objects, including the Dawn mission of the United States, in which for the first time a spacecraft had entered orbit around an object in a main asteroid belt, a densely populated belt that is the source of most near-Earth objects.
35. The Subcommittee noted the launch of a Goliath nanosatellite of Romania on board the new European launcher Vega on 13 February 2012. The nanosatellite carried three scientific experiments on board, including one to measure the meteorite flux.
36. The Subcommittee noted with satisfaction that the 2011 IAA Planetary Defense Conference “From Threat to Action”, co-organized by the Romanian Space Agency (ROSA), had been held in Bucharest from 9 to 12 May 2011. The Subcommittee further noted that the Conference had resulted in a white paper summarizing the recommendations made by international experts to world space agencies and relevant institutions around the world to establish a framework for international decisions and coordinated actions to respond to an NEO threat, as well as to examine legal and policy issues that might affect the decision-making process. The Subcommittee further noted that progress on those issues would be discussed at the 2013 IAA Planetary Defense Conference, to be held in Flagstaff, Arizona, United States, in April 2013, hosted by the Planetary Science Division of NASA.
37. The Subcommittee noted that a number of international meetings to discuss international collaborative efforts on near-Earth objects had been held in Pasadena, California, United States, in August 2011, such as the second meeting of the International Primitive Body Exploration Working Group, a meeting of the United States Small Bodies Assessment Group and the Workshop on International Recommendations for NEO Threat Mitigation, organized by the Action Team on Near-Earth Objects.

38. The Subcommittee further noted that IAU had established in its Division III, on Planetary System Sciences, a Working Group on Near-Earth Objects, which would report to the XXVIII IAU General Assembly, to be held in Beijing in August 2012, to further promote support for near-Earth object surveys among IAU member States.

39. In accordance with General Assembly resolution 66/71, the Working Group on Near-Earth Objects was reconvened under the chairmanship of Sergio Camacho (Mexico). The Working Group held [...] meetings.

40. At its [...] meeting, on 16 February, the Subcommittee endorsed the report of the Working Group on Near-Earth Objects, which is contained in annex III to the present report.

## **XI. Long-term sustainability of outer space activities**

41. In accordance with General Assembly resolution 66/71, the Scientific and Technical Subcommittee considered agenda item 14, “Long-term sustainability of outer space activities”, under the workplan contained in the report of the Committee on the Peaceful Uses of Outer Space on its fifty-second session.<sup>1</sup>

42. The representatives of Canada, China, Germany, Italy, Japan, the Russian Federation, the United States and Venezuela (Bolivarian Republic of) made statements under the item. During the general exchange of views, statements relating to the item were also made by representatives of other member States, as well as by the representative of Ecuador on behalf of the Group of Latin American and Caribbean States and by the representative of South Africa on behalf of the Group of African States.

43. The Subcommittee heard the following scientific and technical presentations:

(a) “Long-term monitoring of total solar irradiance”, by the representative of Switzerland;

(b) “Japan’s view on the ‘Long-term sustainability of outer space activities of the Scientific and Technical Subcommittee’”, by the representative of Japan;

(c) “CCSDS contribution to the long-term sustainability of outer space activities: German view”, by the representative of Germany;

(d) “Space situational awareness sharing agreements with governments and intergovernmental entities”, by the representative of the United States;

(e) “Active space debris removal: an essential mechanism for ensuring the sustainability of outer space”, by the observer for IAASS;

(f) “The global space situational awareness sensor database: a new tool for collaboration and cooperation”, by the observer for SWF.

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<sup>1</sup> *Official Records of the General Assembly, Sixty-fourth Session, Supplement No. 20 (A/64/20)*, para. 161.

44. The Subcommittee had before it the following:
- (a) Note by the Secretariat on experiences and practices related to the long-term sustainability of outer space activities (A/AC.105/C.1/103 and Add.1);
  - (b) Conference room paper containing a list of points of contact for the Working Group on the Long-term Sustainability of Outer Space Activities, and members of expert groups A through D (A/AC.105/C.1/2012/CRP.12);
  - (c) Conference room papers containing full reports on experiences and practices related to the long-term sustainability of outer space activities received from member States and permanent observers of the Committee, as well as other international organizations and bodies (A/AC.105/C.1/2012/CRP.13, A/AC.105/C.1/2012/CRP.14 and A/AC.105/C.1/2012/CRP.15);
  - (d) Conference room paper containing the report of the International Interdisciplinary Congress on Space Debris entitled “Active debris removal - an essential mechanism for ensuring the safety and sustainability of outer space” (A/AC.105/C.1/2012/CRP.16);
  - (e) Conference room paper containing a report received from Ecuador (A/AC.105/C.1/2012/CRP.18);
  - (f) Working paper submitted by the Russian Federation and Ukraine (A/AC.105/C.1/2012/CRP.21).
45. In accordance with General Assembly resolution 66/71, the Working Group on the Long-term Sustainability of Outer Space Activities was reconvened under the chairmanship of Peter Martinez (South Africa).
46. Some delegations expressed the view that the consideration of the long-term sustainability of outer space activities should not be used as a pretext for States that had been able to develop their space capabilities without control, resulting in the challenges faced today, to restrict or impose controls on other States wishing to exercise their legitimate right to use the same technology for their national benefit.
47. The view was expressed that States must ensure that outer space, as the heritage of mankind, was not used to favour commercial interests that undermined the social interests of humanity.
48. The view was expressed that all States, regardless of the level of their participation in space activities, and developing countries in particular, should participate actively in the work of the Working Group and its expert groups, in order for the Subcommittee to proceed with its deliberations pragmatically and effectively, while adhering to the principle of equality.
49. The view was expressed that the Subcommittee should align its work on the long-term sustainability of outer space activities with the objectives of maintaining the stability and safety of space activities, and that it was essential to take into consideration current political and strategic contexts, as well as the work done in other bodies on transparency and confidence-building measures in outer space.
50. The view was expressed that current practices, regulations and guidelines would not resolve some of the major problems relating to the sustainability of outer space activities facing all States today.

51. The view was expressed that the Subcommittee should focus on formulating consensus-based and targeted solutions, as well as political and technical options, on the basis of best practices and experiences, including standards, rather than considering national regulations of individual States as models to be recommended.
52. Some delegations expressed the view that the Subcommittee should strive to reach consensus on voluntary best practices, guidelines and principles for space activities that could be implemented by spacefaring nations to reduce the risk to space operations for the benefit of all States.
53. The view was expressed that in order to achieve sustainability of outer space activities, the development of binding norms should be promoted. It was further stressed that any measures or sets of guidelines that might be recommended should be consistent with international law, that the regulation of space activities remained the responsibility of States, and that this responsibility was not transferable.
54. Some delegations expressed the view that special attention should be given to the space debris issue because of the need to advance international cooperation on such a sensitive question.
55. The view was expressed that the Subcommittee should not, in the context of space debris, focus on creating standards for space technology, but rather, at this stage, on the analysis of space debris as a phenomenon, as well as on ways and means to decrease the existing population of space debris.
56. The view was expressed that the Subcommittee should consider questions relating to the last phase of the de-orbiting of non-functional space objects, such as re-entry notifications, at both the national and the international level.
57. The view was expressed that further analysis of non-functional space objects and fragments or pieces of space debris, and of the possibility of making a distinction between them, should be conducted.
58. The view was expressed that sovereign rights over space objects, whether functional or non-functional, including the right to make decisions on removal, should be continuously retained by a launching State or a State of registration.
59. The view was expressed that quality and reliability assurance, including mission assurance, should be further emphasized, as well as avoidance of in-orbit collision during orbital operation and during the ascent phase of launch vehicles for manned space systems; increasing ground safety with regard to re-entering objects; sharing knowledge on debris removal; promoting networks for monitoring, modelling and forecasting the space environment; and the development of design technologies.
60. The Subcommittee welcomed the adoption of the terms of reference and methods of work of the Working Group on the Long-term Sustainability of Outer Space Activities at the meeting of the Committee on the Peaceful Uses of Outer Space in June 2011<sup>2</sup> and noted with appreciation that expert groups of the Working Group to address specific topics had been established and had initiated their work.
61. The Subcommittee noted the joint initiative of the Russian Federation and Ukraine in the field of the transfer and use of space technologies, as described in

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<sup>2</sup> Ibid., *Sixty-sixth Session, Supplement No. 20 (A/66/20)*, annex II.

A/AC.105/C.1/2012/CRP.21, and that it had been presented for consideration by expert groups A and D.

62. The view was expressed that in order to enhance the possibility of making decisions based on consensus, the Working Group and its expert groups should adhere to a predictable framework for decision-making and follow the terms of reference and methods of work, as agreed by the Committee on the Peaceful Uses of Outer Space.

63. The view was expressed that the views of civil society and other social groups should be taken into consideration in the work of the Working Group and its expert groups.

64. The view was expressed that the expert groups should take into consideration in their deliberations the work done under existing mandates and ongoing operations of other subsidiary bodies of the Subcommittee, as well as in the context of other bodies.

65. At its [...] meeting, on [...] February, the Chair of the Working Group on the Long-term Sustainability of Outer Space reported on the work conducted by the Working Group during the present session.

66. The Subcommittee noted that expert groups B (space debris, space operations), C (space weather) and D (regulatory regimes) had agreed to meet on the margins of the fifty-fifth session of the Committee, to be held in Vienna in June 2012, and the 63rd International Astronautical Congress, to be held in Naples, Italy, in October 2012. The Subcommittee noted that expert group A (sustainable space utilization) had agreed to meet on the margins of the fifty-fifth session of the Committee and that it would at that time make a decision on whether to also meet during the 63rd International Astronautical Congress.

67. At its [...] meeting, on [...] February, the Subcommittee endorsed the report of the Working Group, which is contained in annex [...] to the present report.

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