

WMO SPACE PROGRAMME

(Submitted by WMO)

Summary and purpose of document

To inform CGMS Members of the establishment and status of the WMO Space Programme

ACTION PROPOSED

CGMS Members to note the status in the development of the WMO Space Programme and comment as appropriate.

- Appendices:**
- A. Res. 3.1.6/1 (Cg-XIV) - WMO Space Programme
 - B. Res. 3.1.6/2 (Cg-XIV) - WMO Consultative Meetings on High-level Policy on Satellite Matters
 - C. Extract from the WMO Sixth Long-Term Plan relevant to the WMO Space Programme
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DISCUSSION

1. The Fourteenth WMO Congress (Cg-XIV), held in Geneva, Switzerland in May 2003, noted in response to the momentous expansion in the availability of satellite data, products and services and in recognition of the increase in responsibilities for WMO, that the fifty-fourth session of the Executive Council (EC-LIV) had agreed to establish a WMO Space Programme as a matter of priority. EC-LIV felt that the scope, goals and objectives of the new WMO Space Programme should respond to the tremendous growth in the utilization of environmental satellite data, product and services within the expanded space-based component of the GOS that now included appropriate R&D environmental satellite missions. Cg-XIV also supported the WMO Space Programme Long-term Strategy reviewed at the third session of the Consultative Meetings on High-level Policy on Satellite Matters. Cg-XIV agreed that the WMO Space Programme Long-term Strategy provided an excellent balance to the 6LTP and the programme and budget for 2004-2007. Thus Cg-XIV adopted Resolution 3.1.6/1 (Cg-XIV) as contained in Appendix A.

2. Cg-XIV agreed that the main thrust of the WMO Space Programme Long-term Strategy should be:

“To make an increasing contribution to the development of the WWW GOS, as well as to the other WMO-supported Programmes and associated observing systems (such as AREP’s GAW, GCOS, WCRP, HWR’s WHYCOS and JCOMM’s implementation of GOOS) through the provision of continuously improved data, products and services, from both operational and R&D satellites, and to facilitate and promote their wider availability and meaningful utilization around the globe.”

3. The main elements of the WMO Space Programme Long-term Strategy were agreed as follows:

- (a) Increased involvement of space agencies contributing, or with the potential to contribute to, the space-based component of the GOS;
- (b) Promotion of a wider awareness of the availability and utilization of data, products – and their importance at levels 1, 2, 3 or 4 - and services, including those from R & D satellites;
- (c) Considerably more attention to be paid to the crucial problems connected with the assimilation of R&D and new operational data streams in nowcasting, numerical weather prediction systems, reanalysis projects, monitoring climate change, chemical composition of the atmosphere, as well as the dominance of satellite data in some cases;
- (d) Closer and more effective cooperation with relevant international bodies;
- (e) Additional and continuing emphasis on education and training;
- (f) Facilitation of the transition from research to operational systems;
- (g) Improved integration of the space component of the various observing systems throughout WMO Programmes and WMO-supported Programmes;
- (h) Increased cooperation amongst WMO Members to develop common basic tools for utilization of research, development and operational remote sensing systems.

4. Cg-XIV considered the progress and results from the sessions of the Consultative Meetings on High-level Policy on Satellite Matters. Congress recalled that it had agreed to build a new and closer partnership under the auspices of WMO between the meteorological and hydrological services and environmental satellite communities. It had agreed that a mechanism for

such discussions should be provided through the convening of Consultative Meetings on High-level Policy on Satellite Matters. Congress was convinced that the now established dialogue between WMO and the environmental satellite communities in the sessions of the Consultative Meetings had matured rapidly to the great benefit of all and that they should be continued and institutionalized. Thus Congress considered it appropriate to institutionalize the sessions as WMO Consultative Meetings on High-level Policy on Satellite Matters in order to establish more formally the dialogue and participation of environmental satellite agencies in WMO matters. It urged close cooperation with the IOC and other related international organizations to ensure a coordinated and integrated approach to space-based Earth observations.

5. Congress was unanimous that the WMO user community should be represented at the highest level at the sessions and that the space agencies should also be represented by their Directors. Future sessions of the Consultative Meetings on High-level Policy on Satellite Matters should be chaired by the President of WMO as had been the case for the first three sessions. The Consultative Meetings would continue to provide advice and guidance on policy-related matters and would maintain a high level overview of the WMO Space Programme. Congress agreed that CBS should continue the lead role in full consultation with the other technical commissions for the new WMO Space Programme. Thus Congress adopted Resolution 3.1.6/2 (Cg-XIV) as contained in Appendix B.

6. Cg-XIV also agreed upon the WMO Sixth Long Term Plan (6LTP). Relevant portions of the 6LTP are included in Appendix C.

7. In preparation for the WMO Space Programme, the WMO Space Programme Office is developing an associated Implementation Plan that will be reviewed by the Fourth Session of the WMO Consultative Meetings on High Level Policy on Satellite Matters that is scheduled to be held in Geneva, 26-27 January 2004.

APPENDIX A

Resolution

Res. 3.1.6/1 (Cg-XIV) - WMO SPACE PROGRAMME

THE CONGRESS,

NOTING:

- (1) The *Abridged Final Report with Resolutions of the Fifty-third Session of the Executive Council* (WMO-No. 929) agenda item 3.3,
- (2) The *Abridged Final Report with Resolutions of the Fifty-fourth Session of the Executive Council* (WMO-No. 945) agenda item 3.3,
- (3) The *Final Report of the Third Session of the WMO Consultative Meetings on High Level Policy on Satellite Matters*, agenda item 4,

CONSIDERING:

- (1) The agreement by the Executive Council at its fifty-third session to expand the space-based component of the GOS to include appropriate R&D environmental satellite missions,
- (2) The agreement by the Executive Council at its fifty-fourth session to establish a WMO Space Programme as a matter of priority,
- (3) The recommendation by the Third Session of the Consultative Meetings on High Level Policy on Satellite Matters that the new WMO Space Programme have the status of a Major WMO Programme,

RECOGNIZING the critical importance for data, product and services provided by the World Weather Watch's expanded space-based component of the GOS to WMO Programmes and supported Programmes and that such importance would continue to expand rapidly,

DECIDES:

- (1) To initiate a new major WMO Space Programme as a crosscutting programme to increase the effectiveness and contributions from satellite systems to WMO Programmes;
- (2) To approve the WMO Space Programme as indicated in Chapter 6, Section 6.10 of the Sixth WMO Long-term Plan, adopted under Resolution 6.2/1 (Cg-XIV);
- (3) That the activities under the WMO Space Programme for the fourteenth financial period be as indicated in the Consolidated Programme and Budget (2004-2007), as approved by Fourteenth Congress, and supplemented by extra-budgetary funds as they become available;

URGES Members to collaborate actively in, and give all possible support to, the implementation of the WMO Space Programme;

INVITES participating international and intergovernmental organizations also to collaborate actively in, and give all possible support to, the implementation of the WMO Space Programme;

REQUESTS the Executive Council and the Consultative Meetings on High-level Policy on Satellite Matters, with the assistance from all technical commissions and with CBS providing lead responsibility, to promote the implementation of the WMO Space Programme;

REQUESTS the Secretary-General within the available budgetary resources:

- (1) To assist in the implementation of the Programme;
 - (2) To collaborate in the implementation of the Programme with other interested international and intergovernmental organizations and programmes.
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APPENDIX B

Resolution

Res. 3.1.6/2 (Cg-XIV) - WMO CONSULTATIVE MEETINGS ON HIGH LEVEL POLICY ON SATELLITE MATTERS

THE CONGRESS,

NOTING:

- (1) The *Abridged Final Report with Resolutions of the Fifty-second Session of the Executive Council* (WMO-No. 915) agenda item 3.3,
- (2) The *Final Report of the Third Session of the WMO Consultative Meetings on High Level Policy on Satellite Matters*, agenda item 4,

CONSIDERING:

- (1) The agreement by the Executive Council at its fifty-second session that a mechanism for discussions between the Meteorological and Hydrological Services and the environmental satellite communities should be provided in the form of Consultative Meetings on High Level Policy on Satellite Matters,
- (2) The recommendation by the Third Session of the Consultative Meetings on High Level Policy on Satellite Matters that the Meetings be continued and “institutionalized”,

RECOGNIZING the now established dialogue between the environmental satellite communities and the wide range of user communities under the auspices of WMO through the Consultative Meetings had matured rapidly to the great benefit of all and that they should be continued and institutionalized,

DECIDES To establish the WMO Consultative Meetings on High-level Policy on Satellite Matters as described in the annex to this Resolution;

REQUESTS the Executive Council to consider the advice and recommendations from the annual Consultative Meetings and take actions as appropriate;

REQUESTS the Secretary-General to provide the necessary Secretariat support for the meetings.

Annex to Resolution 3.1.6/2 (Cg-XIV)**WMO CONSULTATIVE MEETINGS ON HIGH-LEVEL POLICY ON SATELLITE MATTERS****(1) Background**

In the opening decade of the twenty-first century, a major opportunity to support and enhance WMO Programmes could be obtained through existing and planned satellite programmes. At the same time, there is a need to demonstrate the value of those satellite programmes to all concerned and to ensure that future plans take into account WMO needs. Within the above context, the satellite operators and WMO agree that regular meetings to discuss high-level policy matters would be beneficial to all parties concerned. Such meetings would build on the good relationships that already existed between satellite operators and WMO bodies, and would enhance the working relations already in place through existing mechanisms. Those meetings would promote the achievement of further efficiencies in the satellite observing system and would ensure a common understanding of objectives and lead to better harmonization of programmes, requirements, usage of satellite data products and services, and high-level policy matters.

High-level policy matters could have a substantial impact on satellite operators and on most, if not all, WMO Members as well as on the allocation of resources. For WMO, the relevant decision-making authorities are Congress and the Executive Council; for the satellite operators, the equivalent decision-making organ would be their relevant governing bodies.

(2) Purpose

The purpose of the Consultative Meetings on High-level Policy on Satellite Matters is to discuss matters of mutual interest between the satellite operators and the WMO user communities. One outcome of the meetings will be to ensure a better understanding of issues. A second, and more important objective, is to agree on advice and guidance to be forwarded to the WMO Executive Council and/or satellite operators.

(3) Membership, organization and resource implications

The Consultative Meetings will be attended by the Directors of satellite operating agencies either contributing, or with the potential to contribute, to the space-based component of the GOS, members of the WMO Bureau, the president of the WMO CBS (who would represent all WMO technical commissions and who would be accompanied by representatives of the other commissions, as appropriate), and sufficient members of the Executive Council to reflect adequately the broad interests of WMO Members (including consideration of regional balance, user representation and the role of the Permanent Representatives of those Members with satellite operating agencies). The satellite operators will attend meetings at their own expense and the timing will be harmonized, as far as possible, with WMO Bureau sessions. The President of WMO will serve as the Chairperson of the Consultative Meetings. Preparation for the meetings will be assured by the WMO Space Office staff as part of their normal duties, and the meetings will be convened by WMO. Additionally, the Chairpersons of the Joint Scientific Committee for WCRP and the Steering Committee for GCOS will serve as members.

(4) Terms of Reference

The meetings could focus on a list of topics including:

- (a) Coordination and implementation of the WMO Space Programme as described in the 6LTP, the WMO Space Programme Long-term Strategy and the programme and budget for 2004-2007;
- (b) Discussion with satellite operators on WMO Programmes and WMO-sponsored programmes, on meteorology (including climatology), oceanography and hydrology.

That would provide WMO with a forum to present its requirements for meteorological and environmental satellites (operational, research, and technology programmes) in a coordinated fashion;

- (c) Consideration of the evolutionary design of the space-based component of the GOS to take account of future technological developments and the evolution of the present day *in situ* networks. WMO would become more proactive in providing a vision on future state-of-the-art systems;
- (d) Preparation for the implementation of the transition between research and operational programmes through: (a) development of WMO recommendations identifying appropriate R&D instruments and missions based on the utility of their products and services in operational use; (b) demonstration of the use of new capabilities by WMO Members and work with satellite operators to evaluate the contributions towards meeting societal needs; and (c) WMO assessments of new satellite systems from a user perspective to provide formal evaluation results to the satellite operators;
- (e) Consideration of the ways and means to reduce costs, including standardization of equipment, taking into account the efficiency and effectiveness of the total observing system (including ground systems), as well as consideration of the needs for the compatibility among satellite systems, particularly ground stations and product requirements;
- (f) Maximizing the benefits to be derived from existing and planned satellite products and services in order to improve utilization of existing satellite data, products and services, and to provide for better coordination of these benefits for all WMO Members;
- (g) Evaluating satellite missions to ensure, *inter alia*, the better use of existing and planned R&D missions in support of WMO Programmes and provide an assessment on their operational utility;
- (h) Other relevant topics and issues as may be requested by Congress and the Executive Council.

(5) Interests of developing countries

In all deliberations, the meetings should take into account the needs of developing countries to ensure that they keep up with advances in satellite products and services. In particular, attention should be given to the access to satellite data, products and services and appropriate education and training programmes, especially those at the WMO RMTCs.

APPENDIX C**EXTRACT FROM THE WMO SIXTH LONG-TERM PLAN RELEVANT TO THE WMO SPACE PROGRAMME****6.10- WMO SPACE PROGRAMME****Purpose and scope**

6.10.1. The main purpose of the WMO Space Programme is to coordinate environmental satellite matters and activities throughout all WMO Programmes and to give guidance to these and other multi-sponsored programmes on the potential of remote sensing techniques in meteorology, hydrology and related disciplines, as well as in their applications.

6.10.2. Through this coordination and guidance, the WMOSP will make an essential contribution to the implementation of the WMO's strategies as stated in the Sixth Long-term Plan, in particular to Strategy 6, with respect to the collection and exchange of satellite observations, and Strategy 8, by ensuring more effective cooperation with those numerous international partners and organizations dealing with satellite systems.

Overall objectives

6.10.3. The overall objectives of the WMO Space Programme are:

- (a) To contribute to the development of the World Weather Watch's GOS, through the full participation of WMO Members, as a composite system comprised of surface and space-based components, with a primary focus on matters related to both operational and R&D environmental satellites;
- (b) To encourage and facilitate the evolution of the World Weather Watch's GOS by taking advantage of advances and improvements made possible by WMO Members;
- (c) To promote high-quality satellite-related continuing education to keep the knowledge and skill of Members' operational and scientific staff up-to-date with the latest technological innovations, and to provide the competence and skills needed in related fields, such as communications with users.
- (d) To review the space-based components of the various observing systems throughout WMO Programmes and WMO supported Programmes, e.g., WWW's GOS, AREP's GAW, GCOS, HWR's WHyCOS, JCOMM's implementation of GOOS, etc., with a view towards the development of an integrated WMO global observing system that would encompass all present observing systems.

Programme structure

6.10.4. The lead responsibility for the WMO Space Programme is assigned to the Commission for Basic Systems (CBS), with the WMO Consultative Meetings on High-level Policy on Satellite Matters providing expert advice and guidance and maintaining a high level policy overview of the Programme.

6.10.5. Projects, financed both through the WMO regular budget, and through extra budgetary resources, are an essential part of WMO Space Programme. The extent to which they can be pursued depends, of course, on the availability of resources, but there is no shortage of topics which can assist significantly in promoting the agreed objectives of the WMO Space Programme. Areas such as the provision of information to WMO Members on the transition schedule for new digital broadcast services, and coordination with space agencies and international mechanisms such as

CEOS and IGOS Partnership are prime examples. Enhanced satellite training, and education and training for disaster prevention and mitigation support from R&D satellite data also represent important areas for project activity

6.10.6. The main thrust of the WMO Space Programme is encapsulated in the following mission statement:

“To make an increasing contribution to the development of the World Weather Watch GOS, as well as to the other WMO-supported programmes and associated observing systems (such as AREP’s GAW, GCOS, WCRP, HWR’s WHyCOS and JCOMM’s implementation of GOOS) through the provision of continuously improved data, products and services, from both operational and R&D satellites, and to facilitate and promote their wider availability and meaningful utilization around the globe.”

6.10.7. The main elements of the WMO Space Programme are as follows:

Increased involvement of space agencies contributing, or with the potential to contribute to, the space-based component of the GOS;

Promotion of a wider awareness of the availability and utilization of data, products – and their importance at levels 1, 2, 3 or 4 - and services, including those from R & D satellites;

Considerably more attention to be paid to the crucial problems connected with the assimilation of R&D and new operational data streams in nowcasting, numerical weather prediction systems, reanalysis projects, monitoring climate change, chemical composition of the atmosphere, as well as the dominance of satellite data in some cases;

Closer and more effective cooperation with relevant international bodies;

Additional and continuing emphasis on education and training;

Facilitation of the transition from research to operational systems;

Improved integration of the space component of the various observing systems throughout WMO Programmes and WMO-supported Programmes;

Increased cooperation amongst WMO Members to develop common basic tools for utilization of research, development and operational remote sensing systems.

6.10.8. The strategy for pursuing each of those elements is described in more detail below.

Involvement of space agencies

6.10.9. Space agencies will continue to be encouraged to make their observations available to the World Weather Watch’s Global Observing System (GOS) without restriction. This will include data from R&D satellites which are deemed to be relevant to the GOS.

6.10.10. This close association of the space agencies to the GOS will be of mutual advantage. The contributions will greatly enrich the GOS, and the space agencies will benefit from participating in an intergovernmental observing system. Moreover, they will receive operational feed-back on the utility of their R&D, and the relevance of their instruments to projected operational systems.

6.10.11. It will be appropriate for space agencies to continue as members of the WMO Consultative Meetings on High-level Policy on Satellite Matters. In this way they will have full visibility of the development of the WMO Space Programme, as well as the evolving observational and system requirements of the GOS.

6.10.12. The support of space agencies will complement the WMO commitment in establishing the WMO Space Programme, and will provide opportunities to assist the new Space Office with specific projects and initiatives.

6.10.13. By 2011 it is intended that this increased involvement of space agencies will have resulted in a more complete GOS: one which can regularly renew itself as well as take advantage of technological advances.

Wider awareness of availability of data and increased utilization

6.10.14. Continuing attention will be given to describing on appropriate web sites the availability of data, products and services which are being made available by the various contributors. This task takes on mounting importance in view of the near ten-fold increase of data which will become available over the next years, and the significantly increased range of available instruments. Diffusion of the meta-data clearly indicating what is available, and how it can be accessed, will be a continuing priority action.

6.10.15. The aim is to bring about a very significant increase in the availability and utilization of data, products and services, not only in terms of volume and variety, but also in the geographical spread of the users. The increases which are already promised by the upcoming satellite systems in terms, for example, of higher spatial resolution, more frequent observations and the availability of more spectral bands, are not simply minor improvements, but represent in many cases step changes. Making these significantly improved data, products and services available and at the same time aiming to increase the number and geographical spread of the users, will represent the major challenge for the WMO Space Programme in the next decade.

6.10.16. New generation of satellites will offer excellent and expanded opportunities for monitoring urban pollutants, greenhouse gases, aerosols, ozone depletion, UV-radiation, as well as changes in global snow and ice cover and the expected sea level rise.

Assimilation

6.10.17. It is essential that significantly more attention be paid to overcoming the present obstacles to assimilating new satellite data streams both operational and R&D. The aim is to work with the various WMO Programmes and supported Programmes (WWRP, WWW's DPS, WCRP, etc.) to increase the impact of satellite data in the assimilation cycles at NWP and climate prediction centres.

External Cooperation

6.10.18. The common factor in all these external activities is the need to exploit more fully both that which is available through the WMO, together with the specialized capabilities of the international organisations, for the benefit of both. Additionally, the WMO intends to explain to its partners the objectives and priorities of its Space Programme, and to use its influence in these bodies to arrive at compatible and mutually acceptable courses of action.

6.10.19. In addition to the need for coordination between WMO user communities and R&D space agencies, WMO will also encourage closer coordination between operational and R&D space agencies in such areas as radio frequency coordination, orbit coordination, standardization of data formats and standardization of user stations. The same need for coordination will exist in the area of research, both related to future instruments as well as to reception facilities on the ground.

6.10.20. WMO will continue its membership of the Coordination Group for Meteorological Satellites (CGMS), and to sponsor appropriate projects with CGMS such as has been done with the Virtual Laboratory (VL) Focus Group formed to ensure efficient and effective operation of the VL.

6.10.21. Similarly, WMO, as an Associate of the Committee on Earth Observation Satellites (CEOS), will make the maximum use of relevant CEOS activities, such as the Working Group on Calibration and Validation, and the Working Group on Information Systems and Services. WMO will continue to contribute to CEOS activities by making available relevant services already established by WMO.

6.10.22. As agreed by Congress and the Executive Council, WMO will continue to be an active partner in the IGOS Partnership. Its role, and that of its sponsored and co-sponsored observing systems and programmes will be through the development of IGOS Themes and ultimately in the establishment of a coherent synthesis of these Themes with existing programmes and activities.

6.10.23. In order to influence decisions important to meteorological satellite systems, WMO has either joined or facilitated the establishment of several interest groups including the Space Frequency Coordination Group, the International Winds Workshops, the International TOVS Working Group and the new International Precipitation Working Group. Participation in these bodies will be continued, within the limits of available resources, for as long as their work remains relevant to the WMO Space Programme.

6.10.24. During the coming decade, WMO intends to be one of the motors for developing an integrated global observing system, and to this end will use its influence in the various international bodies in order to encourage close and meaningful cooperation, as well as discouraging unnecessary duplication

Education and training

6.10.25. In conformity with the recommendation of the Executive Council, additional emphasis will be placed on education and training in satellite matters, especially for data and products from R&D satellites. The aim will be to assist capacity building such as to become an important element in achieving sustainable development.

6.10.26. Building on the WMO Strategy for Education and Training in Satellite Matters, and the success of the more recent Strategy to Improve Satellite System Utilization, it is intended to intensify efforts in this field. Increasing the ability of members to exploit the new data streams, products and services is a keystone of the WMOSP Strategy. To this end, and initially focusing on the six specialized "centres of excellence", close links will be maintained with the various national and international education and training initiatives.

Transitioning from research to operational systems

6.10.27. The closer cooperation with space agencies having launched R&D satellites will promote a more consistent dialogue aimed at identifying the elements of R&D satellites whose availability would be most welcomed on an operational basis.

6.10.28. This continued renewal and extension of operational space observations is of the utmost importance to the GOS, and will also assist in the quest for the flexibility to respond to new observational requirements. WMOSP will act as a catalyst for the development of international data and product dissemination and for improved processing systems. Development in these areas must go hand in hand with the already predictable increase in data availability.

Improved Observing System Integration

6.10.29. Closer integration of the space-based component of the various observing systems throughout WMO Programmes and WMO supported Programmes will increase the availability of data, products and services required by WMO Members. The aim will be to review the space components of the various observing systems in order to optimize the effectiveness of each, with

the goal towards the development of an integrated WMO global observing system that would encompass all present observing systems.

Publications

6.10.30. The availability of satellite related materials to WMO Members in official languages is pivotal in order to maximize the exploitation of satellite data and products. Efforts in the WMO Space Programme will focus on increasing the availability of materials through an expanded publication's programme using hard copy, CD ROM and Internet, as well as translating the materials into the various WMO languages as appropriate.

Implementation activities 2004-2007

6.10.31. Implementation of the programme relies upon Members' efforts to improve the utilization of satellite systems through the provision of information, advice and guidance on technological developments, as well as on changes in existing meteorological and hydrological observing systems. Members also will play the major role in the transition of low-resolution imagery satellite services from analogue to digital.

6.10.32. The approval and implementation of the JASON-2 programme by CNES, EUMETSAT, NASA and NOAA will be of major importance to the WMO Space Programme since it will represent the first operational oceanographic satellite and make major contributions to JCOMM's implementation of GOOS, as well as other WMO Programmes supported by the WMO Space Programme.

6.10.33. The Secretariat will assist Members in these activities. Specifically, in the transition of low-resolution imagery satellite services from analogue to digital the Secretariat will:

- (a) *Coordinate with space agencies to articulate the requirements of Members and to keep apprised of space agencies' plans;*
- (b) Ensure distribution of appropriate information to Members through various communication media (e.g., mail, Internet, constituent body meetings);
- (c) Coordinate the establishment of Members' satellite service requirements and workstation standards.

6.10.34. Additionally, the Secretariat will coordinate the organization of focused seminars and conferences to increase the knowledge base of Members in accordance with the new WMO Strategy to Improve Satellite System Utilization. The Secretariat will also assist Members to participate in enhanced high-quality education and training events in order to implement plans approved in the WMO Strategy for Education and Training in Satellite Matters.

6.10.35. It is expected that resulting from these activities:

- (a) A plan for the redesign of the space-based component of GOS will be proposed, including both operational, as well as research and development satellites;
- (b) Transition to the reception of the new digital direct broadcasting service by Members will be ensured;
- (c) The R&D mission data and products will be more widely used within the operational context of NMHSs;

- (d) Identification of candidate R&D instruments for operational status will be ensured, together with protection of frequency allocations, data dissemination methodologies, standards for codes and data formats, and common workstations and algorithms.
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