

WORLD METEOROLOGICAL ORGANIZATION
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CONSULTATIVE MEETINGS ON HIGH-LEVEL POLICY ON SATELLITE MATTERS

THIRD SESSION

GENEVA, SWITZERLAND

3-4 FEBRUARY 2003

FINAL REPORT





1. ORGANIZATION OF THE SESSION

1.1 Opening of the session (*agenda item 1.1*)

The third session of the Consultative Meetings on High-Level Policy on Satellite Matters was held at the World Meteorological Organization (WMO) Headquarters in Geneva, Switzerland from 3 to 4 February 2003 under the chairmanship of the President of WMO, Dr J.W. Zillman.

The session observed a minute of silence in memory of the astronauts who died onboard Space Shuttle Columbia and expressed condolences to their families. The WMO flag was flown at half-mast.

The session was opened at 09:30 hours on Monday 3 February by the Secretary-General of WMO, Prof. G.O.P. Obasi. He recalled some of the notable achievements during the very short period since the start of the sessions of the Consultative Meetings, including the expansion of the space-based component of the Global Observing System (GOS) and associated commitments by NASA, ESA, NASDA and Rosaviakosmos in the establishment of the Research and Development (R&D) constellation. He informed the session of the agreement by the fifty-fourth session of the WMO Executive Council to establish a WMO Space Programme as a matter of priority. He noted that the session would discuss a WMO Space Programme Long-Term Strategy within the context of the WMO Sixth Long-Term Plan (6LTP) and Programme and Budget for 2004-2007. He also recalled the decision by the Coordination Group for Meteorological Satellites (CGMS) at its thirtieth session to expand its membership to include those environmental space agencies contributing to WMO programmes and WMO supported programmes. He also encouraged the session to give priority to the needs of developing countries for access to remotely sensed data and education and training for their personnel as the session developed its guidance and made recommendations to the Executive Council. In closing, he thanked the participants and their organizations for the contributions they had made over the years in support of the objectives of the World Meteorological Organization.

The Chairman recalled for the session the origins and purpose of the Consultative Meetings on High Level Policy on Satellite Matters including the role the Thirteenth Congress and subsequent Executive Council session had played in its formation. He noted that the agenda for the present session would allow for discussions in order that the Fourteenth Congress could receive appropriate proposals as to its future. He was of the opinion that the Consultative Meetings to date had been very effective and that an appropriate high level mechanism was now in place. He also noted that there were many demands for coordination throughout the United Nations system and some placed undue strain on the limited resources available. Thus, it was appropriate for the third session to propose to Congress how best to institutionalize the important ongoing dialogue between the meteorological and hydrology user communities and Directors of space agencies under the auspices of WMO. He felt that Congress would greatly appreciate guidance from the session as to how to best contribute to the progressive development of an integrated global observing system.

1.2 Adoption of the agenda (*agenda item 1.2*)

The agenda for the session was adopted and is reproduced in Annex I.

1.3 Working arrangements for the session (*Agenda item 1.3*)

The working arrangements for the session were agreed upon. It was also agreed that the work of the session would be conducted mainly in Plenary. The working languages of the session were English, French, and Russian, and the documentation and report were in English only.

The list of participants is attached as Annex II.

2. ACTIONS DERIVING FROM CM-2, EC-LIV AND CBS EXT. (2002)

Actions derived from CM-2

2.1 The session reviewed twelve action items generated at the second session of the Consultative Meetings on High-Level Policy on Satellite Matters (CM-2) and noted that all action items were either completed or appropriate activities were in progress.

2.2 With regard to the *Report on the Utility of Existing R&D Satellite Data from the Operational User Community*, the session noted that the fifty-fourth session of the WMO Executive Council (EC-LIV) had agreed that the reports be prepared on a biennial basis to be phased with the Application of Satellite Technology Progress Report series. This would provide for a report on the operational use of R&D satellite data and products every second year, with reports from the Application of Satellite Technology Progress Report series in the intervening years.

WCRP Working Group Report

2.3 The session reviewed a report prepared by the WCRP Working Group on Satellites on an "Update of Space Mission Requirements for WCRP". The findings and recommendations of the Working Group were given in terms of priorities for future space missions, requirements regarding data management and enhanced interaction with space agencies. The Working Group concluded, in noting that space observations from current and planned missions would offer an unprecedented potential for climate research, if joint coordination efforts could be made to integrate separate sensor/satellite data into globally integrated products for climate research. This potential would be further enhanced by the approval of new priority space missions as recommended by the Working Group. The Working Group also noted that the transition from research to operational systems should be considered by space agencies as high priority and mechanisms be reinforced to ensure data continuity essential for meeting WCRP's objectives.

2.4 With regard to interaction with space agencies, WCRP noted the present interaction mechanisms between WCRP and the space agencies achieved through the WMO, CEOS and the IGOS Partnership. WCRP recommended that this interaction be reinforced and proposed a three-level structure consisting of:

- A high level coordinating body that would consider joint strategy, policy and plans and to which the WCRP Joint Scientific Committee presented its assessment of the current systems and requirements for new activities/space missions;
- Routine contacts between WCRP projects and space agencies' programme management to review on-going research activities; and
- Working contacts where space agencies' scientists/data specialists could participate in WCRP-organised data analysis projects to produce merged, global climate products.

Systematic cross-participation of space agencies and WCRP members in respective advisory committees, whenever feasible, was strongly recommended by the WCRP.

2.5 The session discussed the WCRP report in depth. It felt that it would not be appropriate to seek to establish a new high level coordinating body that would consider joint strategy, policy and plans but rather make use of existing bodies. The session also felt strongly that many of the requirements articulated in the report could be dealt with through the Integrated Global Observing Strategy (IGOS) Partnership and encouraged WCRP to initiate proposals along this line. In addition, it did suggest that it would be appropriate to strengthen the links at the working level between WCRP Projects and associated space agencies' programmes. The session encouraged space agencies represented at the third session to seek ways to increase such links. The session also noted that it could also be appropriate for WCRP to participate in relevant Rolling Review of Requirements activities within CBS. Such participation would ensure the sovereignty of the WCRP

requirements while allowing benefiting from the considerable expertise within the CBS OPAG IOS Expert Team on Observational Data Requirements and Redesign of the GOS.

2.6 The session was convinced that the WCRP concerns for data management issues were important. It encouraged WCRP to develop an overall strategy on how to further engage the broader community in the development, benchmarking and use of research products. This effort should be conducted in close cooperation and with the involvement of space agencies. The session also recalled that CEOS had a related Working Group, WGISS, that could help to address the WCRP concerns.

2.7 The session also noted that the WCRP report did not mention either global carbon cycle or greenhouse trace gas observational requirements. It suggested that WCRP liaise with IGBP to ensure the availability of a coordinated statement of observational requirements.

2.8 In summary, the session welcomed the Report from WCRP in that it highlighted important issues and had identified areas where linkages could be strengthened. It also noted with satisfaction the course of action proposed by the Report, including the widening of the consultation to other countries active in the use of space data for climate research.

GCOS Climate Monitoring Principles

2.9 The session then reviewed the latest set of GCOS principles for climate monitoring. It recalled that, at CM-2, a draft set of GCOS principles for climate monitoring, including those related to satellite systems, was presented and discussed. CM-2 welcomed those principles and noted that it would be beneficial to obtain formal recognition of such principles by WMO, specifically the WMO Executive Council and Congress. GCOS further refined the principles discussed at CM-2 and subsequently submitted them - 'GCOS Climate Monitoring Principles' for *in situ* and satellite-based observations - to the fifty-fourth session of the WMO Executive Council (EC-LIV) (June 2002). EC-LIV had endorsed the principles and requested that they be submitted to the Fourteenth World Meteorological Congress for support through a resolution. In preparation for that submission, the draft principles were provided to the thirtieth session of the Coordination Group for Meteorological Satellites (CGMS) held in Bangalore, India in November 2002, which suggested some modifications that were subsequently included. The session noted that the GCOS Climate Monitoring Principles also formed part of the "Second Report on the Adequacy of the Global Observing Systems for Climate", prepared by GCOS for submission to the Ninth Session of the Conference of the Parties (COP-9) to the UN Framework Convention on Climate Change (UNFCCC) in December 2003.

2.10 The session welcomed the GCOS Climate Monitoring Principles while noting that few, if any, planned satellite missions would be able to fully meet them in all respects. It encouraged GCOS to take the principles forward for approval by WMO Congress and other GCOS supporting agencies, as well as the UNFCCC/COP, but to note explicitly that missions not specifically dedicated to long-term climate monitoring would be expected only to strive towards their achievement to the extent feasible.

Results from EC-LIV

2.11 The session was informed of relevant discussions that occurred at EC-LIV. In particular, it noted that EC-LIV had discussed the expansion of the space-based component of the Global Observing System (GOS) of the World Weather Watch. EC-LIV recalled that several R&D space agencies had already made firm commitments to participate in the space-based component of the GOS. The National Aeronautics and Space Administration (NASA) of the USA had confirmed its commitment to WMO and to the world community to make observations available without restriction. The European Space Agency (ESA) had confirmed that it was establishing a dialogue towards the development of information for WMO Members concerning the availability of specific data and products from ESA's EO satellite missions, and in particular from the ENVISAT mission

launched in March 2002. Between CM-2 and EC-LIV, the National Space Development Agency of Japan (NASDA) had indicated that its future satellite missions including ADEOS II and the GCOM series were candidate systems to contribute to the new R&D constellation for the space-based component of the GOS. Finally, the Russian Aviation and Space Agency (Rosaviakosmos) had confirmed that experimental and R&D instruments on board its operational METEOR 3M N1 satellite, as well as on its future Ocean series and other missions, could be considered as a potential contribution to the space-based component of the GOS.

Results from CBS Ext. 2002

2.12 The session was also informed of relevant discussions and decision made at the Extraordinary Session of the Commission for Basic Systems held in 2002 (CBS Ext. 2002). CBS Ext. 2002 had discussed the redesign of the GOS. Recommendations for the evolution of space- and surface-based components of the GOS were proposed which summarized the most pressing observational needs and recommendations for the most cost-effective actions for meeting them in the near term and the next 10-15 years. Based on those recommendations, a vision for the GOS in 2015 and beyond was approved by CBS Ext.2002.

2.13 The session noted that it would discuss the redesign of the GOS in more detail under agenda item 3.

People's Republic of China Plans

2.14 The session was informed by the Chinese National Space Administration (CNSA) that China has developed its own series of meteorological satellites which has been integrated into the operational meteorological satellite system of WMO. The Chinese government promulgated a White Paper on China's Space Activities in November 2000 that elaborated the country's fundamental policies and development plans for the peaceful uses of space technologies. The development objectives included a stable long-term space-based earth observation system consisting of meteorological satellites, resource satellites, oceanic satellites and environment and disaster monitoring satellites. CNSA was fully aware of the importance of international cooperation and coordination in space technology and applications and was willing to participate in policy coordination of relevant international organizations related to satellite applications and in particular for operational meteorological satellites.

CEOS Plans

2.15 The session was informed by the current CEOS Chairman, Mr G. Withee, of the major objectives for CEOS during 2003. A major thrust will be with IGOS and associated Themes. Another priority area will be to increase the focus on data utilization, for example in the IGOS Global Water Cycle Theme, with NASDA's upcoming Awaji Symposium 13-14 March 2003 being an important step in this direction. CEOS has initiated a Follow-up Programme to the World Summit on Sustainable Development and will initially focus on the WSSD education and training, water and global mapping modules. In closing, the CEOS Chairman noted that next year's Chairman would be from the People's Republic of China, Dr Xu Guanhua (Minister of MOST).

3. REVIEW EXPANSION OF THE SPACE-BASED COMPONENT OF THE GLOBAL OBSERVING SYSTEM

Expanded space-based component of the World Weather Watch's Global Observing System (GOS)

3.1 The session noted the commitments by four R&D space agencies and that the space-based component of the GOS was now comprised of three constellations: operational geostationary; operational polar-orbiting; and R&D satellites as shown in Figure 1. The session

agreed that this was an important milestone in the history of the World Weather Watch and its GOS.

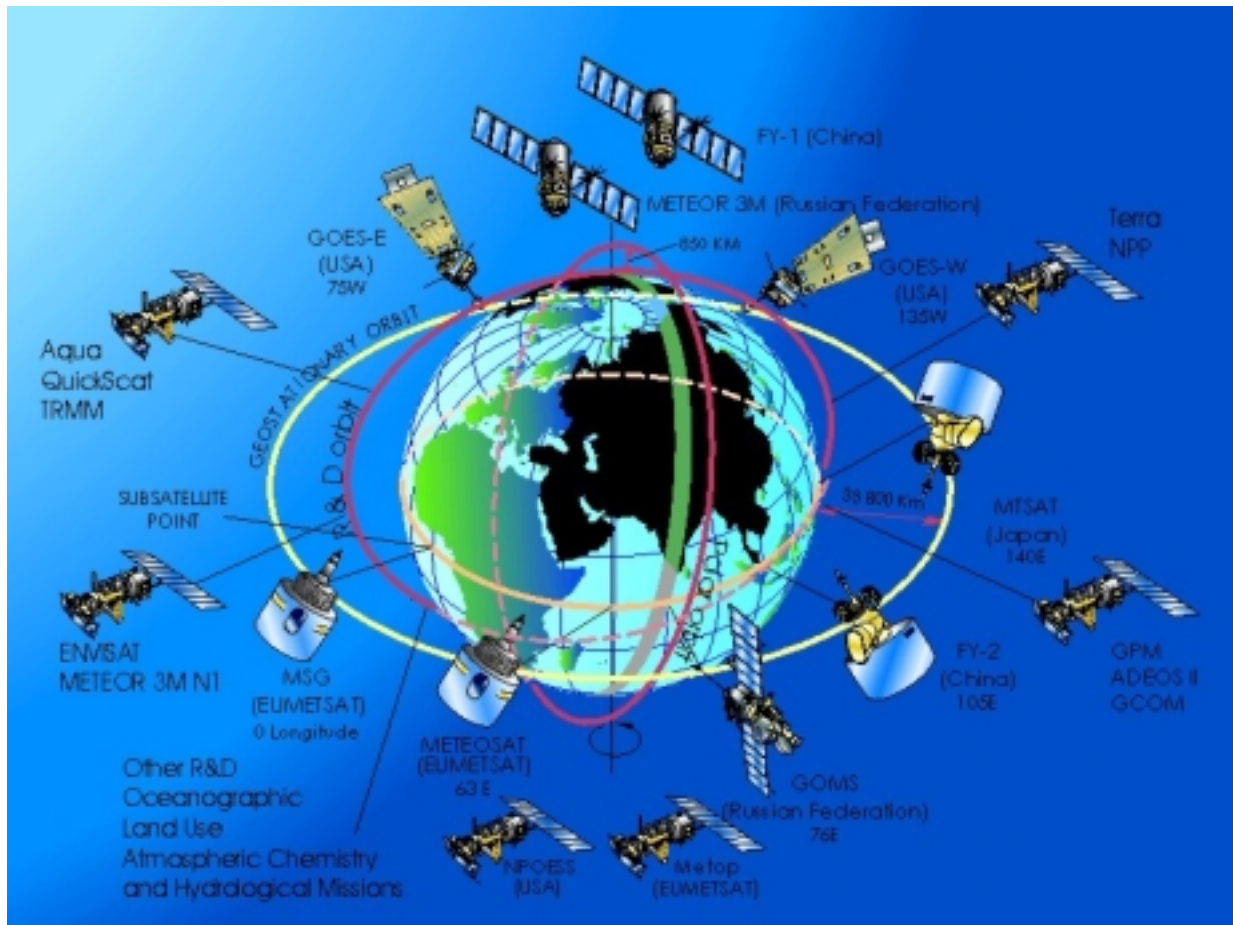


Figure 1 – New space-based component of the Global Observing System

CGMS Membership expansion

3.2 The session was informed that at CGMS-XXX, WMO discussed the expanded space-based component of the GOS. CGMS-XXX noted the recent expansion of the space-based component of the GOS to include appropriate R&D satellite missions, in particular, the confirmed commitments by NASA, ESA, NASDA and Rosaviakosmos. CGMS-XXX also recalled WMO's recommendation for increased external coordination. In particular, WMO felt that a means to improve cooperation with both operational meteorological and R&D satellite operators would be through an expanded CGMS. WMO felt that CGMS could act as a principal forum for the necessary dialogue between WMO and the satellite operators, as well as for discussions between satellite operators, especially for technical matters concerning data formats, work station configuration, commonality of satellite instruments and missions, coherent and coordinated mission planning, data dissemination systems, etc. WMO also noted that the expansion of the space-based component of the GOS, GAW, GCOS and WHYCOS would be step-wise, i.e., only those R&D satellite system operators that have the potential to contribute to WMO and supported programmes would be considered, and would have the option of following the guidelines. Thus, WMO recommended that NASA, ESA, NASDA and Rosaviakosmos be considered for full membership in CGMS.

3.3 All CGMS Members supported the expansion of its Membership to include research agencies as CGMS Members, and letters had been sent to the relevant organizations with the understanding that these agencies would contribute to the space-based component of the GOS by providing access to their R&D satellite mission data.

3.4 Having noted that WMO was seeking an expanded space-based component of the GOS, and that CGMS supported expanding its membership to include space agencies contributing to the space-based component of the GOS, CNSA expressed the wish to join CGMS. In doing so, it indicated that, as an initial step, it would inform WMO of the contributions it would make to the GOS with the expectation that WMO could then make a proposal to CGMS to include CNSA as a full CGMS Member. The session noted that the WMO Secretariat would send CNSA a copy of the *Guidelines for Requirements for Observational Data from Operational and R&D Satellite Missions* that described the availability for data, product and services from potential contributors to the space-based component of the GOS.

3.5 The session was informed by NASA that it had recently informed the CGMS Secretariat of its acceptance of the invitation to join CGMS as a full member. ESA indicated that it would shortly send a positive reply to the CGMS Secretariat. NASDA indicated that it would respond by 15 March 2003 and Rosaviakosmos indicated that it would respond to the invitation to join CGMS as a full member within the February 2003 timeframe. The session noted that this was another important milestone in increased coordination for the space-based component of the GOS.

Redesign of the Global Observing System

3.6 The session reviewed the results of the discussion held at CBS Ext. 2002 concerning the redesign of the GOS. It noted that recommendations for the evolution of space- and surface-based components of the GOS had been proposed which summarized the most pressing observational needs and recommendations for the most cost-effective actions for meeting them in the near-term and the next 10-15 years. Based on those recommendations, a vision for the GOS in 2015 and beyond was approved by CBS. The evolution of the GOS had been framed in 42 recommendations.

3.7 The session noted there were 22 recommendations for the surface-based component of the GOS that included more complete and timely data distribution; enhanced AMDAR especially over data sparse areas; optimized rawinsonde launches; targeted observations; inclusion of ground-based GPS, radars and wind profilers; increased oceanic coverage through expanded ASAP observations, drifting buoys and ARGOS; and possible use of unmanned aeronautical vehicles (UAVs).

3.8 The session also reviewed the 20 recommendations for the space-based component of the GOS (nine for operational geostationary and polar orbiting, 11 for R&D satellites) that built upon the known plans of the operational and R&D satellite operators and called for rigorous calibration of remotely-sensed radiances, as well as improved spatial, spectral, temporal and radiometric accuracies. The session noted with interest that wind profiling and global precipitation measurement missions were singled out for their importance to the GOS.

3.9 The session noted that the vision for the GOS to 2015 represented the consolidation of over four years work and provided excellent guidance to WMO Members as to expectations in that time period. The session was pleased to see that CBS had been able to provide an integrated vision for both the surface and space-based components of the GOS. With regard to the description of the different constellations, satellite missions and expected instruments, the session agreed that the vision provided a good first indication but that future technological developments could influence the actual implementation. The session suggested that the next iteration of the vision allow more flexibility in the description of required orbits, space missions and required instrumentation. The session was pleased to note that CBS had requested development of an Implementation Plan for the redesigned GOS as part of its work programme. The session agreed to send detailed comments on the vision to the WMO Space Office with the expectation that the comments would be used by CBS as it develops its Implementation Plan as well as the next iteration of the vision.

3.10 The session was strongly of the opinion that WMO should take a leading role in the coordination of Operational System Evaluations (OSEs). It encouraged Congress to request that CBS be tasked to develop an appropriate mechanism to provide for the optimization of those OSEs needed to identify the best mix of observing components that would lead to the most effective Global Observing System.

3.11 With regard to polar orbiting satellites, the session noted that CBS Ext. 2002 had agreed that four operational polar orbiting satellites were required, two in the AM and two in the PM. The session was informed that an appropriate change would be reflected in the update to the Manual on the GOS.

3.12 The session also suggested that WMO carry out a review of the various observing systems throughout WMO Programmes and WMO supported Programmes, e.g., WWW's GOS, AREP's GAW, HWR's WHyCOS, JCOMM's implementation of GOOS, etc., with a view to developing an integrated WMO global observing system that would encompass all present observing systems. This would be an important contribution to the IGOS Partnership.

4. REVIEW WMO SPACE PROGRAMME STRATEGY

4.1 The session was informed of activities since CM-2 that have led to the establishment of a new WMO Space Programme. The session noted that the new WMO Space Programme would officially become effective on 1 January 2004 with the initiation of the Fourteenth Financial Period based on the Sixth Long-Term Plan for which a draft would be reviewed and approved by the WMO Congress in May 2003.

4.2 The session recalled CM-2 had suggested that WMO conduct its own review of its internal coordination of Satellite Activities to ensure that it was optimum for the present and perceived future needs as well as providing an appropriate framework for efficient interaction with external mechanisms. This review must take into consideration the emphasis that WMO placed on the contribution satellite systems were making to WMO and supported programmes and the large expenditures by those space agencies contributing to the space-based component of the WMO GOS. CM-2 also agreed that the present structure was insufficient to respond to the new demands resulting from the expansion of the space-based component of the GOS to include the R&D constellation.

EC-LIV and the WMO Space Programme

4.3 The session was informed that EC-LIV had evaluated the review requested by CM-2 and agreed that it clearly demonstrated significant growth during the last decade in all areas for which WMO Satellite Activities had responsibilities. The agreement by the Executive Council at its fifty-third session to expand the space-based component of the GOS to include appropriate Research and Development environmental satellite missions was a landmark decision. The implications of the expansion were immense to WMO Members with a corresponding increase in responsibility for the WMO Satellite Activities.

4.4 EC-LIV agreed that the WMO Satellite Activities had grown and that it was appropriate to establish a WMO Space Programme as a matter of priority. The scope, goals and objectives of the new programme must respond to the tremendous growth in the utilization of environmental satellite data, products and services within the expanded space-based component of the GOS that now included appropriate Research and Development environmental satellite missions. Thus, EC-LIV asked the Secretary-General to make appropriate proposals in the 6LTP and Programme and Budget to be submitted for consideration by the WMO Congress. It also suggested that the WMO Congress consider ways to institutionalize the 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. In considering the important contributions made by

environmental satellite systems to WMO and its supported programmes as well as the large expenditures by the space agencies, EC-LIV felt it appropriate that the overall responsibility for the new WMO Space Programme should be assigned to CBS and the new "institutionalized" Consultative Meetings on High-Level Policy on Satellite Matters. Since the Consultative Meetings were attended by the Directors of agencies operating environmental satellites, EC-LIV felt that the assignment of joint lead responsibility could be conducive to support for the WMO Space Programme by the satellite operating agencies.

WMO Space Programme Long-Term Strategy

4.5 The session reviewed relevant sections of the draft Sixth Long-Term Plan (6LTP) and associated Programme and Budget for 2004-2007 as well as a draft WMO Space Programme Long-Term Strategy. The session noted that the 6LTP would serve to assist WMO Members in knowing the goals of the WMO Space Programme. However, the 6LTP only covered an eight year period and did not explicitly identify the role the satellite operators could undertake to better implement the WMO Space Programme. In this regard, the session suggested that the Main Long-Term Objectives for the WMO Space Programme as contained in the 6LTP should be expanded to reflect the objectives and plans of the space agencies of WMO Members with regard to meteorological and hydrological applications. The session noted that this broader approach could be elaborated through the WMO Space Programme Long-Term Strategy.

4.6 The session reviewed and endorsed a preliminary WMO Space Programme Long-Term Strategy as contained in Annex III. It also noted that, after finalization of the WMO Space Programme Long-Term Strategy, an associated Implementation Plan would be prepared. The focus of both the Long-Term Strategy and Implementation Plan would be the involvement of the space agencies in a coordinated fashion with WMO's 6LTP and Programme and Budget 2004-2007. The session suggested the desirability of appropriate amendments to the draft 6LTP during the Congress discussions in order to better reflect the WMO Space Programme Long-Term Strategy as given in Annex III.

4.7 The session felt that the WMO Space Programme Long-Term Strategy provided an excellent balance to WMO's Sixth Long-Term Plan and the next Programme and Budget covering the years 2004 to 2007. Since the beginning of the sessions of the Consultative Meetings, WMO had worked hard to develop the dialogue with the space agencies and the dialogue has already reaped great benefits for WMO Members. The session noted that almost all of the data, products and services provided by the space agencies had the potential to enhance capacity building within WMO Members' countries. The WMO Space Programme Long-Term Strategy would enhance and offer possibilities to further expand that potential because WMO had invited the space agencies to directly, and in a highly visible fashion, turn their space contributions into tangible results for WMO Members.

4.8 The session strongly urged that an increase in the available human resources for the WMO Space Office be considered. Some space agencies confirmed their commitment to provide resources to the WMO Space Programme to address specific projects such as was done by EUMETSAT to assist in the development of the WMO Space Programme Long-Term Strategy. The session strongly encouraged all space agencies participating in the space-based component of the GOS to provide support to the WMO Space Office. The session agreed that it would work during the inter-session period to help develop the Implementation Plan with the expectation that the Plan would commence on 1 January 2004. The session felt that the present level of resources committed to the Space Office was inadequate to respond to the new demands for the WMO Space Programme.

Consultative Meetings on High Level Policy on Satellite Matters

4.9 The session recalled that the fifty-second session of the WMO Executive Council (EC-LII) had agreed to build a new and closer partnership under the auspices of WMO between the meteorological and hydrological services and environmental satellite communities. EC-LII agreed that a mechanism for such discussions should be provided through the convening of "Consultative Meetings on High-Level Policy on Satellite Matters".

4.10 While stressing the need for and potential contributions from Consultative Meetings, EC-LII also noted the need to maintain the present close and ongoing coordination between WMO and the Coordination Group for Meteorological Satellites (CGMS), the Committee on Earth Observation Satellites (CEOS) and the Integrated Global Observing Strategy Partnership (IGOS-P). Such coordination would assist in the implementation of recommendations and decisions derived from Consultative Meetings.

4.11 The session recalled EC-LIV was convinced that the now established dialogue between WMO and the environmental satellite communities in the Consultative Meetings had matured rapidly to the great benefit of all and should be institutionalized. EC-LIV had also suggested that the WMO Congress consider ways to institutionalize the Consultative Meetings on High-Level Policy on Satellite Matters in order to more formally establish the dialogue and participation of environmental satellite agencies in WMO matters. In considering the important contributions made by environmental satellite systems to WMO and its supported programmes as well as the large expenditures by the space agencies, EC-LIV felt it appropriate that the overall responsibility for the new WMO Space Programme should be assigned to CBS and the new institutionalized Consultative Meetings on High-Level Policy on Satellite Matters.

4.12 The session reviewed various options that could "institutionalize" the Consultative Meetings on High Level Policy on Satellite Matters. It felt that the best approach to maintain the now established dialogue was to continue the Consultative Meetings. It further suggested that Fourteenth Congress consider establishing the "institutionalized" Consultative Meetings. The session was unanimous that the WMO user community should be represented at the highest level 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. However, the session did not feel it appropriate that the institutionalized Consultative Meetings assume formal responsibility for the WMO Space Programme and agreed that CBS should continue the lead role in full consultation with the other technical commissions and WMO Programmes.

4.13 The session stressed that the WMO Space Programme was an excellent example of a cross-cutting programme. The session noted that it was listed under a Major Programme, the World Weather Watch Programme, within the 6LTP. Although not wishing to change the structure of the 6LTP, the session felt strongly that the importance of the new WMO Space Programme required that it be afforded the status of a Major WMO Programme. In so doing, the session felt that the Space Programme would rapidly become an effective component of all WMO and supported Programmes.

4.14 The session approved draft terms of reference for the "institutionalized" Consultative Meetings on High-Level Policy on Satellite Matters as contained in Annex IV.

5. REVIEW WMO TECHNICAL DOCUMENT "THE ROLE OF SATELLITES IN WMO PROGRAMMES IN THE 2010s"

5.1 The session recalled that at CM-2 it had reviewed a preliminary draft of the WMO Technical Document on "The Role of Satellites in WMO Programmes in the 2010s" which was intended to update the last comparable technical document entitled "The Role of Satellites in WMO Programmes in the 1980s" by D.S. Johnson and I.P. Vetlov published in 1977. CM-2 noted that the update was being prepared by three primary authors: Dr G. Asrar, Dr T. Mohr and Mr G. Withee.

5.2 CM-2 had felt strongly that the new technical document would be of great importance to WMO Members, not only to the NMHSs but also the larger communities found within Members. Such users would include policy decision makers or those involved with the IPCC assessment process for example.

Vision for the evolution of the space-based component of the GOS in 2020

5.3 The session noted that Chapter 5 of the new technical document contained a "Vision for the Future: A 2020 Perspective". It not only contained a vision for the space-based component of the Global Observing System (GOS) in 2020, but also an indication of WMO's role in that epoch as well as associated challenges. The session provided several comments on the vision and the challenges for WMO. During the discussion, attention was drawn to the importance of the need for increased skill for shorter-term forecasts including Nowcasting, as well as for Monsoon forecasting. It requested the Secretariat to consolidate the comments and present them to the three authors. The session further expressed the wish that the comments be considered by the three authors and incorporated into the present draft technical document, as appropriate. It was anticipated that any required revision would be small and should not impede the publication process. The session agreed that the forthcoming WMO Congress should be informed of the availability of the new TD if it were completed. The session also suggested that an appropriate event be scheduled when the new TD is finally distributed to WMO Members. The session also suggested that other comments could be provided within 15 days and they also should be provided to the three authors for consideration. It was anticipated that the additional comments would only require small modifications to the existing text.

6. ANY OTHER BUSINESS

6.1 The session was informed of a USA initiative to host an Earth Observation Summit in July 2003 with White House involvement. The summit would bring together senior national and international officials and other leaders to promote the value of, and participation in, a global Earth observation system and provide an opportunity to gain a high level declaration of support for integrated space-based and in situ observations to understand, predict and address global environmental and climate issues, such as those related to energy, water, climate, food and sustainable development. It was anticipated that the Summit would encourage other countries as well as multi-lateral development banks to increase current commitments to help improve observing systems in developing countries and contribute to capacity building in these countries.

6.2 The session was also informed of NASDA's initiative for the Awaji Symposium on Space Platforms for Water and Climate Observation to be held in Japan in March 2003 and at the 3rd World Water Forum, a joint NASA/NASDA session on "Observing Global Rain from Space". The Awaji Symposium would review current status reports from the space agencies and international research projects and discuss the IGOS Water Cycle Theme as well as the utilization of space platform data.

7. CLOSURE OF THE SESSION

The session noted that this would be the last time that Dr J. Zillman would serve as Chairman. The session thanked Dr Zillman for his excellent chairmanship, in noting his personal contributions to the success of the Consultative Meetings. The Chairman closed the session at 14:45 on Tuesday, 4 February 2003.

ANNEX I

PROVISIONAL AGENDA

1. ORGANIZATION OF THE SESSION
 - 1.1 Opening of the session
 - 1.2 Adoption of the agenda
 2. ACTIONS DERIVING FROM CM-2, EC-LIV AND CBS EXT. (2002)
 3. REVIEW EXPANSION OF THE SPACE-BASED COMPONENT OF THE GLOBAL OBSERVING SYSTEM
 4. REVIEW WMO SPACE PROGRAMME STRATEGY
 5. REVIEW WMO TECHNICAL DOCUMENT "THE ROLE OF SATELLITES IN WMO PROGRAMMES IN THE 2010s"
 6. ANY OTHER BUSINESS
 7. CLOSURE OF THE SESSION
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ANNEX II

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ANNEX III

WMO SPACE PROGRAMME LONG-TERM STRATEGY

Background

The fifty third session of the Executive Council agreed to expand the space-based component of the Global Observing System (GOS) of the World Weather Watch to include appropriate Research and Development (R&D) environmental satellite missions. WMO recognized the differences between operational and R&D agencies, and developed a set of guidelines aimed at maximizing the impact of using data from both sources. These guidelines were approved both by the WMO Executive Council and by those R&D agencies which made a commitment to participate in the space-related component of the GOS.

This expansion will result in a tremendous growth in the utilization of environmental satellite data, products and services and the fifty-fourth session of the WMO Executive Council accordingly agreed to establish, as a matter of priority, an appropriate WMO Space Programme (WMOSP). Proposals are thus being included in the Sixth Long-Term Plan and Programme and Budget to be submitted to the WMO Fourteenth Congress in May 2003.

WMOSP is one of five Programmes which complement and enhance the core elements of the World Weather Watch (WWW), as well as providing significant input and support to other WMO and WMO-supported Programmes. It is intended that WMOSP will coordinate space-related activities in WMO-supported programmes, e.g., GCOS and WCRP. In addition, WMOSP coordinates the WMO requirements for environmental satellite data and products, facilitates cooperation between WMO and the satellite operators, and strengthens Members' capabilities to receive and effectively use satellite data. There is an overarching connectivity among the Programmes.

This WMO Space Programme Strategy, nominally covering the period 2004-2011, is intended to complement and elaborate the 6LTP, and in particular to identify the role the satellite operators could play in better implementing the WMO Space Programme. Because of the long lead-time required for initiating new operational satellite services, it is essential for the Strategy also to have regard to an extended period – up to 2015.

WMOSP - Purpose and scope

Like all WMO Programmes, WMOSP is based on the recognition that global weather and climate patterns are interdependent, and that no nation can be entirely self-sufficient in the provision of meteorological, hydrological and related environmental services. The Programmes are thus based heavily on the sharing of data, analyses, forecasts and warnings; the sharing of skills and methodology; the pooling of resources; collaborative research and development; technical assistance; and cooperation with other international agencies with common objectives.

The main purpose of the WMOSP 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.

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.

WMOSP - Long-term objectives

It is proposed that the Sixth Long-term Plan (6LTP) define the WMOSP main long-term objectives for the period 2004-2011 as follows:

- (a) To contribute to the development of the 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 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, 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.

WMOSP - Governance

The Consultative Meetings on High-Level Policy on Satellite Matters (CM) have proved very valuable, and it is considered appropriate to formalize the dialogue between the WMO user community and the environmental satellite agencies, under the auspices of WMO by institutionalizing the meetings. The WMO Congress should be invited to consider authorizing the continuation of the Consultative Meetings on High-Level Policy on Satellite Matters under the Chairmanship of the President of WMO until at least 2007 at which time Congress would have the possibility of considering longer term arrangements. The lead responsibility for the WMOSP should be assigned to the Commission for Basic Systems (CBS), with the Consultative Meetings providing expert advice and guidance and maintaining a high level policy overview of the Programme.

Projects, financed both through the WMO regular budget, and through extra budgetary resources, are an essential part of WMOSP. 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 WMOSP. 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

Elements of the Strategy

The main thrust of the WMOSP Strategy 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."

The main elements of the WMOSP Strategy are as follows:

- (1) Increased involvement of space agencies contributing, or with the potential to contribute to the space-based component of the GOS;
- (2) Promotion of a wider awareness of the availability and utilization of data, products and services, including those from R & D satellites;
- (3) Considerably more attention to be paid to the crucial problems connected with the assimilation of R&D and new operational data streams in numerical weather prediction systems;
- (4) Closer and more effective cooperation with relevant international bodies;
- (5) Additional and continuing emphasis on education and training;
- (6) Facilitation of the transition from research to operational systems;
- (7) Improved integration of the space component of the various observing system throughout WMO Programmes and WMO supported Programmes.

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

Involvement of space agencies

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

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.

It will be appropriate for space agencies to continue as members of the CM when it is institutionalized. In this way they will have full visibility of the development of the WMOSP as well as the evolving observational and system requirements of the GOS.

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

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

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.

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 WMOSP in the next decade.

Assimilation

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

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.

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.

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.

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.

As agreed by 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.

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 WMOSP.

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

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.

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 focussing 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

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.

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

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

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 WMOSP 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.

Summary of WMOSP Strategy

Consistently pursuing the WMOSP is intended to lead to a situation by 2011 and beyond where the GOS fully benefits from the satellite observations of both its members and the world's space agencies. R&D satellites will not only be regularly contributing to the GOS, but will supplement the expected improved operational data streams. This will result in a better service to WMO Members and provide a valuable feed-back to the space agencies.

At the same time the renewed emphasis on education and training will ensure that data, products and services are being used more effectively and more widely, with special benefit accruing to developing countries. WMOSP is designed to contribute to capacity building and to fostering sustainable development.

WMO, through its active participation with other international bodies, will during this decade come to be recognized as one of the leaders in the drive towards an integrated global observing system.

Looking beyond the 2011 time frame, it is clear that WMO Space Programme activities will be invaluable in leading to an even wider exploitation of satellite observations in an integrated global context.

ANNEX IV

PROPOSED CONSULTATIVE MEETINGS ON HIGH-LEVEL POLICY ON SATELLITE MATTERS

Consultative Meetings on High-Level Policy on Satellite Matters

(i) *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.

(ii) *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.

(iii) *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 Global Observing System, members of the WMO Bureau, the president of the WMO Commission for Basic Systems (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 adequately reflect 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 Chairman 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 Chairmen of the Joint Scientific Committee for WCRP and the Joint Steering Committee for GCOS will serve as members.

(iv) *Possible meeting topics*

The meetings could focus on a list of topics including:

- ◆ Coordination and implementation of the WMO Space Programme as described in the Sixth Long-term Plan, the WMO Space Programme Long-term Strategy and the Programme and Budget 2004-2007;

- ◆ 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;
- ◆ Consideration of the evolutionary design of the space-based component of the Global Observing System 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;
- ◆ 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;
- ◆ 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;
- ◆ 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;
- ◆ 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.

(v) *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 Regional Meteorological Training Centres (RMTCs).