

## INTEGRATION OF WMO OBSERVING SYSTEMS

### SUMMARY

**ISSUES TO BE DISCUSSED:**

Development and improvements of the WMO and co-sponsored observing systems and development of the WMO Integrated Global Observing System (WIGOS) Concept, including WIGOS Concept of Operations (CONOPS) and WIGOS Development and Implementation Strategy (WDIS).

**ADDITIONAL FINANCIAL IMPLICATION:**

None in the current financial period. Implementation of WIGOS in the next financial period (2012-2015) would require substantial Secretariat support amounting to CHF 1.9 million for staff and CHF 1.7 million for non-staff expenditure for operating the WIGOS Project Office.

**DECISIONS/ACTIONS REQUIRED:**

Approval of the revised terms of reference of the EC Panel on Polar Observations, Research and Services; to keep in force Resolution 3 (EC-LIX); to adopt the updated versions of the WIGOS Development and Implementation Plan and the WIGOS Concept of Operations, to endorse the further development of the "WIGOS Development and Implementation Strategy" with a view to presenting it to Cg-XVI for endorsement; to propose to Cg-XVI to include the Manual on WIGOS in the list of WMO Mandatory publications; and to propose to Cg-XVI the establishment of an Inter-commission Coordination Group on WIGOS

**REFERENCES:**

1. EC-LXII/INF. 3.4(1) WIGOS Development and Implementation Plan
2. EC-LXII/INF. 3.4(2) WIGOS Concept of Operations
3. EC-LXII/INF. 3.4(3) WIGOS Development and Implementation Strategy
4. EC-LXII/INF. 3.4(4) WIGOS Imperative
5. Final Report of the third session of the EC Working Group on WIGOS and WIS, Geneva, 24-26 March 2010, <http://www.wmo.int/pages/prog/www/WIGOS-WIS/reports.html>
6. Final Report of the second session of the EC Working Group on WIGOS and WIS - Subgroup on WIGOS, Geneva, 19-23 October 2009, <http://www.wmo.int/pages/prog/www/WIGOS-WIS/reports.html>
7. Final Report of the first session of the EC Panel of Experts on Polar Observations, Research and Services, Ottawa, Canada, 13-15 October 2009, <http://www.wmo.int/pages/prog/www/CBS-Reports/ECWGAM-index.html>
8. Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (2010 Update), GCOS 138 (final draft August 2010), <http://gcos.wmo.int>
9. Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004-2008, GCOS-129 (WMO/TD-No. 1489, GOOS-173, GTOS-70), August 2009
10. GRUAN Implementation Plan 2009-2013, GCOS-134 (WMO/TD-No. 1506), July 2009
11. Report of the Seventeenth Session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS - Paris, France, 27-30 October 2009 (GCOS-137)
12. Final report of the tenth session of the WMO Consultative meetings on High-level Policy on Satellite Matters, Geneva, Switzerland, 28-29 January 2010

**CONTENT OF DOCUMENT:****Appendices for inclusion in the final report:**

- A. Draft text for inclusion in the general summary of EC-LXII
- B. Draft Resolution 3.4/1 (EC-LXII) – Executive Council Panel of Experts on Polar Observations, Research and Services
- C. Draft Resolution 3.4/2 (EC-LXII) – Global Climate Observing System
- D. Draft Resolution 3.4/3 (EC-LXII) – Implementation of WIGOS

**Appendix for information:**

**EC-LXII/Rep. 3.4:** Progress/Activity Report

## DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF EC-LXII

### 3.4 INTEGRATION OF WMO OBSERVING SYSTEMS (*agenda item 3.4*)

3.4.1 The Council discussed and agreed with the proposed actions on observing systems improvements to support WMO Members' activities in weather, climate and water, and their enhanced integration towards a WMO Integrated Global Observing System (WIGOS).

#### **Atmospheric Observations**

#### ***Regional Basic Synoptic Network (RBSN) and Regional Basic Climatological Network (RBCN)***

3.4.2 The Council noted the leveling out in the global implementation of the Regional Basic Synoptic Networks (RBSN) and the Regional Basic Climatological Networks (RBCN) although the implementation of RBSN/RBCN and the availability of data varied from Region to Region. The Council also noted that the sustainability of basic networks in RA I and RA III and the low availability of data from those networks continue to remain an issue of concern and re-emphasized the need to further strengthen basic networks, especially in developing and least developed countries with the assistance of developed countries that could assist in mobilizing resources to support improved sustainability of observations.

3.4.3 The Council noted the Draft of the 2010 Update of the GCOS Implementation Plan, to be submitted in its final form to UNFCCC SBSTA-33/COP-16 in December 2010, and urged Members to pursue the actions in the atmospheric domain.

3.4.4 With a view to improving the quality of data from all RBCN stations, the Council appreciated that the nine CBS Lead Centres for GCOS had accepted to extend their terms of reference to include all RBCN stations within their areas of responsibility, in addition to their current subset of GSN and GUAN stations. The Council encouraged Members to collaborate actively with these Centres to ensure the availability and quality of climate datasets within all Regions.

3.4.5 The Council welcomed the official designation of eight initial GCOS Reference Upper-Air Network (GRUAN) sites and commended Members hosting those sites for their commitment, and encouraged them to continue their support. The Council noted progress in the development of guidance material for GRUAN sites aiming at full description of their operations and commended the close collaboration of the GRUAN community with CIMO, CBS and WIGOS project in developing a "GRUAN Guide of Operations" and relevant updates to the *Manual on the GOS* (WMO-No. 544), the *Guide to the GOS* (WMO-No. 488) and the *WMO Guide to Instruments and Methods of Observations* (WMO-No. 8).

3.4.6 The Council also noted with appreciation the support given by the Deutscher Wetterdienst to host the GRUAN Lead Centre and was particularly satisfied with the prospect for a one-year visiting scientist position at the Centre.

#### ***Aircraft observations***

3.4.7 The Council noted with interest the progress to date on the development of suitable aircraft based water vapour sensor. It requested CBS and CIMO to further promote the inclusion of a suitable humidity sensor with a generic software and hardware solution for all major aircraft types and models.

**3.4.8** Taking into account the cost-effectiveness of AMDAR observations and the potential to provide a better distribution of profile data, the Council requested Members to collect AMDAR data also from outside their national territories, in compliance with national laws and regulations, and to exchange these on the GTS. The Council further requested Members to enhance the cost-effectiveness of AMDAR observations by implementing a data optimization system.

#### ***Aerodrome observations***

**3.4.9** The Council noted the request by the European Air Navigation Planning Group of ICAO for increased resolution of wind observations in the wider terminal area of around 150 km around high-traffic airports. Similarly, the Council noted that the continued drive to automate aerodrome observations would require enhanced merging of data and measurements from different sources to be able to meet the stated requirements. This could include the use of weather radar, lightning detection and satellite data to complement existing present weather sensors at aerodromes for the reliable detection and reporting of phenomena such as thunderstorms, hail and other hazardous weather impacting on the safety of aviation.

#### ***Atmospheric Chemical Composition and UV Measurements***

**3.4.10** The Council noted that in 2009, WMO-GAW and the International Ozone Commission of the International Association of Meteorology and Atmospheric Sciences established an ad-hoc expert team to lead a project to standardize use of absorption cross sections in global ozone observations. The Council urged this important work to continue and for the various communities to agree on common cross sections.

**3.4.11** Considering the importance of surface-based and balloon-sonde networks as sources of long-term data sets and the value of these data for satellite validation and trend analysis to support the WMO/UNEP Scientific Assessments of Ozone Depletion, and taking note of Resolution 15 (Cg-XV), the Council strongly recommended that the Dobson, Brewer and ozonesonde networks be maintained and that the data quality be assured through standards and regular intercomparisons.

**3.4.12** The Council recognized that expanding UV monitoring, particularly in developing regions, requires greater access to calibration facilities to maintain data quality and long-term stability. Due to the lack of GAW UV calibration centres, the Council asked Members to identify potential regional calibration centres in under-represented areas and further urged Members to identify a world calibration centre (possibly through an upgrade of an existing regional centre).

**3.4.13** The Council also reminded the Members about the need to submit all quality assured ozone and UV data on a regular basis to the GAW World Ozone and UV Data Centre (WOUDC) to enable their use.

**3.4.14** The Council appreciated the current efforts of the GAW Scientific Advisory Group on Reactive Gases and national partners in building a global reactive gas observational network making high quality measurements, currently concentrating on reactive nitrogen and volatile organic compounds (VOCs). It encouraged Members to undertake measurements and for the Secretariat to continue work with the Bureau of International Weights and Measures (BIPM) in making standards available.

#### ***Climate Observations – CCI and WCP***

**3.4.15** The Council, noting Resolution 13/1 (CCI-XV), welcomed the inclusion of several deliverables related to climate observations, including:

- (a) The finalization of the ongoing work on climate observations requirements, including in particular the provision of peer-reviewed guidelines on the use of AWS in climatology and capacity building status and requirements on climate observations for developing countries;
- (b) Undertaking, in cooperation with CIMO, the establishment of standards related to the measurement of snowfall, snow depth and solid precipitation and the performance of AWS and alternate standards for climate observations in mountainous regions;
- (c) Providing guidance on minimum set of requirements for NMHSs to benefit from space-based data, radar data and data from other remote sensing platforms for climate studies and applications;
- (d) Improving collaboration and working arrangements with other WMO Programmes and co-sponsored programmes such as Space programme, WIGOS, WIS, GCOS, ETRP, IPY and WCRP, which would benefit in developing climate observations and related climate data aspects as well as developing climate monitoring knowledge, user requirements and standards;

**3.4.16** The Council urged CCI, CBS, CIMO and CAS to develop a joint mechanism to address these activities based on the corresponding structures and requested the Secretary-General to provide support for this joint collaboration within the existing regular budget.

**3.4.17** The Council welcomed conclusions of the Technical Conference on Changing Climate and Demands for Sustainable Development (Antalya, Turkey, 16-18 February 2010) with reference to the agreement amongst participating experts at the special joint session of CCI and the Joint Scientific Committee (JSC) for WCRP to closely collaborate, through appropriate mechanisms, to address, inter alia, strengthening research observations to serve as prototypes for future climate observing systems, in cooperation with existing observing systems and cooperation mechanisms, e.g., Global Climate Observing System and WMO Integrated Global Observing System.

### **Marine and Oceanographic Observations**

**3.4.18** The Council endorsed the priority activities proposed by JCOMM-III for the next JCOMM interessional period for the JCOMM Observations Programme Area [see also *EC-LXII/Doc. 2.5(02)*]. The Council urged Members to commit additional resources to eventually ensure full implementation and sustainability of the observing components of GOOS and support the integration of in situ and space-based ocean observations.

**3.4.19** In order to improve marine safety services through issuing of better forecasts and warnings of important wave variables in developing countries participating in JCOMM, the Council requested Members to assist, through the VCP, in the development of coastal wave observing capabilities in those countries for use in satellite products and ocean models validation.

**3.4.20** The Council recognized the usefulness of developing partnerships between developed countries and developing countries in terms of ocean data use, and implementation of the ocean observing system, as outlined in the Partnership for New GEOSS Applications (PANGEA) concept proposed by JCOMM. The Council requested developed countries to consider committing resources in support of PANGEA Capacity Building workshops through the VCP.

**3.4.21** The Council noted the actions in the ocean domain suggested in the draft 2010 Update of the GCOS Implementation Plan in Support of the UNFCCC and urged Members to pursue these actions.

## **Terrestrial Observations**

### ***Water Cycle***

**3.4.22** The Council was pleased to note the WHYCOS contribution in strengthening LDCs national capacity related to their hydrological observation systems. It also noted the current collaboration between WMO's various programmes and technical commissions to support development of new HYCOS projects. The Council requested the Secretary-General to extend his support to the WHYCOS projects to address the need of the transboundary basins in WMO's Regions.

**3.4.23** The Council urged its Members to sustain hydrological networks with a relevance for climate applications, and to increase the availability of datasets from those networks at international data centres, by working with the relevant national and international agencies (e.g., FAO), taking into account CHy-XIII Resolution 4 and recommendations by the UN Inter-agency mechanism - UN Water, the expert segment of World Climate Conference-3 and the Global Terrestrial Network - Hydrology (GTN-H).

**3.4.24** The Council noted the actions in the terrestrial domain suggested in the draft 2010 Update of the GCOS Implementation Plan in Support of the UNFCCC and urged Members to pursue these actions.

## **Polar and Cryosphere Observations**

### ***Polar Observations***

**3.4.25** The Council recalled that its Panel of Experts on Polar Observations, Research and Services (EC-PORS) should deal with the operational dimension of Antarctic activities, including the review of relevant resolutions of Congress and the Executive Council, update of standard regulatory material relevant to the Antarctic, seeking updates on monitoring networks, and developing modalities for communicating these resolutions to the Antarctic Treaty Consultative Meeting (ATCM).

**3.4.26** Recognizing that sustainability of polar observing networks is critical, the Council supported EC-PORS's efforts to acquire information on deficiencies in the implementation and operation of these networks and to define possible measures to close gaps by identifying priorities. It supported the collaborative efforts with the Sustaining Arctic Observing Networks (SAON), an IPY legacy initiative in this regard and requested Members to contribute to this process.

**3.4.27** The Council was informed that the International Arctic Science Committee (IASC) and the Scientific Committee for Antarctic Research (SCAR) are in the process of establishing a Joint Bipolar Group on IPY Legacy. The Council agreed that it would be highly desirable, if the international organizations concerned coordinated their efforts to secure and develop an IPY legacy process potentially in the form of an International Polar Decade (IPD) proposed by WMO at EC-LX. The Council recognized the need to inform and engage a broad partnership for IPD for successful implementation and requested EC-PORS to continue to seek Members' ideas for an IPD, such as those recently submitted by the Russian Federation, discuss IPD at its second meeting, and organize a workshop to further scope IPD with other relevant scientific bodies and international organizations by early 2011.

**3.4.28** The Council noted activities and plans of EC-PORS in support of Polar observations, research and services and adopted its revised terms of reference in draft Resolution 3.4/1 (EC-LXII).

### ***Global Cryosphere Watch***

**3.4.29** Given the ever increasing interest in the cryosphere, and the requirement for authoritative information, the Council agreed that the GCW initiative was even more timely and that there was an urgency to move forward with an implementation strategy to be developed under the auspices of EC-PORS and to be discussed at its second meeting in Hobart, Australia, 18-20 October 2010 before submitting it to Cg-XVI for consideration. The Council strongly urged Members to support GCW activities, including development of reference sites, establishment of a CGW portal and virtual network, provision of support for meetings and workshops, and contributions to the GCW Trust Fund to provide secretariat support for the development of GCW.

### **Cross-cutting Aspects**

#### ***Space-based observation***

**3.4.30** The Council expressed its appreciation to all the Members operating satellite systems. It noted that operational geostationary coverage was provided by China with FY-2D and 2E, by Europe with Meteosat-7, -8 and -9, by India with Kalpana, by Japan with MTSAT-1R, and by the United States with GOES-11, -12 and -13. It noted with appreciation NOAA's efforts to relocate GOES-12 to 60°W for South America coverage in replacement of GOES-10, in response to the expectations of EC-LXI. It welcomed the launch of COMS by the Republic of Korea in April (TBC). The Council further recalled that operational meteorological coverage from Low-Earth orbit was provided by China with FY-3A, Europe with Metop-A, and the United States with NOAA-19, supplemented by several secondary spacecraft. It welcomed the launch of the first Meteor-M satellite by the Russian Federation. It looked forward to the consolidation of follow-on satellite plans in polar orbit. The Council also noted the joint Jason-2 ocean surface topography mission of EUMETSAT, France and the United States, and wished that the follow-on mission would soon be confirmed. The Council furthermore reaffirmed the strong contribution of Research and Development satellite missions to the Global Observing System.

**3.4.31** The Council also noted the planned collaboration between Canada and the Russian Federation regarding their respective missions on Highly Elliptical Orbits (HEOs), and encouraged the international community with interests in the polar regions to support this collaboration.

**3.4.32** The Council welcomed the establishment of an Inter-Programme Coordination Team for Space Weather (ICTSW), co-chaired by representatives from CAeM and CBS, and thanked all the Members who had named points of contact for Space Weather and nominated representatives to serve on the ICTSW. The Council also noted the recommendation from CM-10 to consider funding Space Weather coordination activities on the regular budget in the sixteenth financial period.

**3.4.33** Noting the increasing impact of space-based observations on WMO activities, and particularly the GFCS, the Council extended its appreciation to CMA, DWD, EUMETSAT, JAXA and NASA for their proposed contributions in terms of either financial and/or in-kind resources to the WMO Space Programme Office in 2010. The Council went on to recommend that other Members similarly increase their support to these activities so that international coordination and collaboration for monitoring the Earth's environment from space can be leveraged to the greatest extent possible.

**3.4.34** The Council noted that a collaborative effort by all Members supporting Earth observation space agencies was needed to address the requirements of monitoring the Earth's climate from space, and welcomed prospects of further discussions among all relevant programmes and coordination bodies in that regard.

### ***Instrument Standards and Best Practices***

**3.4.35** The Council was pleased to note that CIMO had developed generic terms of reference for CIMO Testbeds and CIMO Lead Centres, operated by Members, providing an outstanding contribution to CIMO in specific fields. The Council encouraged Members to submit proposals to CIMO-XV on the designation of CIMO Testbeds and Lead Centres.

**3.4.36** The Council welcomed the development of siting and maintenance performance classifications for surface observing stations on land and requested CIMO to seek the concurrence of its members to consider further developing these classifications as common WMO-ISO standards as they would help in assessing and improving the quality of data originating from WMO-own, cosponsored and non-WMO observing networks.

**3.4.37** The Council was pleased to note that with a view of getting better quality of weather radars, data and products to improve severe weather forecasting and warning, CIMO had decided to address the calibration of weather radars. By embarking on a series of inter-comparison workshops CIMO should understand, evaluate and document the various quality control and adjustment algorithms for quantitative precipitation estimation that would be a precondition of obtaining comparable data from different radar technologies. The Council requested Members to participate in the radar “data and algorithms comparison” to cover the widest possible range of technology.

**3.4.38** The Council welcomed efforts made towards improving observation quality through various activities, such as the Regional Instruments Centres (RICs) evaluation scheme, the siting classification, instrument intercomparisons and updates of the *WMO Guide to Meteorological Instruments and Methods of Observations* (WMO-No. 8) (CIMO Guide). The Council recommended to Members with RICs to ensure they use the evaluation scheme to check, and if needed improve, RICs capabilities to meet regional needs. However, the Council was concerned that the translation of the CIMO Guide into the required WMO languages was not secured and noted that under such circumstances, it was not realistic to expect that observations would meet the user requirements, especially GFCS and DRR, and might even jeopardize their expected benefits of WIGOS. The Council therefore requested that Congress be informed accordingly of the situation.

### ***Radio-Frequency Coordination***

**3.4.39** Recalling the continuing threat to radio frequency bands allocated to meteorological systems and environmental satellites, the Council urged all Members to ensure continuous coordination with their national radio communication administrations and to participate actively in the national, regional and international activities involving radio communication regulatory issues for meteorological and related activities, using as a reference the new joint ITU-WMO Handbook *Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction*.

**3.4.40** The Council noted that a joint WMO/ITU seminar on the Use of Radio Spectrum for Meteorology had been held at the WMO Headquarters from 16-18 September 2009. The seminar was very successful and constituted an excellent open forum for exchange of views and information between representatives of meteorological and radio communication communities. Discussions focused on the use of radio spectrum, space orbits and radio-based meteorological tools and systems for weather monitoring and monitoring, mitigation and adaptation to climate change. Several WMO Members and experts from ITU National Administrations attended the seminar.

## ***Evolution of the GOS***

**3.4.41** The Council recognized a need to identify gaps in the current global observing system and to guide Members in the evolution of the observing systems. It welcomed that CBS, through the Rolling Review of Requirements process, regularly review Statements of Guidance (SoGs) for 11 application areas.

**3.4.42** The Council noted that steps have been taken towards a new Implementation Plan for Evolution of global observing systems, as a response to the new Vision for the GOS in 2025 and WIGOS, and requested technical commissions and regional associations to cooperate with CBS in its preparation.

## ***Observing System Experiments (OSEs)***

**3.4.43** The Council noted that actions have been initiated to prepare for the 5<sup>th</sup> WMO Workshop on "The impact of various observing systems on numerical weather prediction" due in 2012.

## **Coordination of Observations for Climate**

### ***Global Climate Observing System***

**3.4.44** The Council welcomed the draft 2010 update of the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, which takes into account recent progress in science and technology, increased focus on adaptation, enhanced efforts to optimize mitigation measures, and the need for improved predictions of climate change. It welcomed in particular an update to the list of GCOS Essential Climate Variables and noted that a final version of the Plan would be available by August 2010.

**3.4.45** The Council noted with appreciation the final *Progress Report on the Implementation of GCOS 2004-2008*, which assesses progress by Members and other "agents of implementation" in improving global observing systems, networks and associated infrastructure in support of climate applications. It urged attention to the priorities identified in the Progress Report, which had been endorsed by the UNFCCC COP-15 in December 2009, and to address identified gaps, in particular to support developing countries in financing sustained operation of networks in line with the GCOS Climate Monitoring Principles.

**3.4.46** The Council noted with appreciation the nomination of additional GCOS National Coordinators to a total of currently 23, in response to a 2009 letter by the Executive Heads of all GCOS sponsoring organizations. It urged Members to establish GCOS National Committees and to identify GCOS National Coordinators who have not yet done so in order to facilitate coordinated national action on observing systems for climate.

**3.4.47** Because of the potential role of greenhouse gas (GHG) observations in the future of emissions control and emissions trading, the Council agreed that accurate measurements will be critical in support of carbon mitigation actions. It recognized the key role played in ensuring mergeability of data by NOAA for GAW in maintaining the WMO World Reference Scales for greenhouse gases CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, as well as for CO, and in providing the World Calibration Centre for CO<sub>2</sub> focussing on round-robins. The Council further agreed that strengthening the link to National Metrology Institutes through the WMO/BIPM Mutual Recognition Agreement is important. The Council recommended that all Members ensure that their measurements are traceable to international standards, are accompanied by adequate statements of uncertainty, and meet the data quality objectives that are reviewed every two years by the GAW community.

**3.4.48** The Council decided to replace current Resolution 3 (EC-LVII) by an amended Resolution 3.4/2 (EC-LXII) - Global Climate Observing System, which takes into account the relevant guidance of Cg-XV, a new UNFCCC SBSTA conclusion in 2009, the COP decision in 2009, as well as a link to the future Global Framework for Climate Services (GFCS).

#### ***World Climate Research Programme***

**3.4.49** The Council recognized that the research-based observations continue to provide a key contribution to the monitoring of climate, detection of climate change, attribution of its causes, improved understanding of processes and model calibration, validation and verification. It noted with appreciation the efforts of WCRP aimed at the development of new observing systems and networks with a view of gradually introducing them into the “quasi-operational” domain. The Council noted with appreciation the significant outcomes of the OceanObs’09 Conference (Venice, 21-25 September 2009), which proposed a way forward for the future development of ocean observing systems.

**3.4.50** The Council agreed that reanalyses will constitute an essential part of the future climate services. It shared the concern of WCRP that funding for the reanalysis work comes almost entirely from the research sources and is therefore not sustained. The Council encouraged major funding agencies to invest into the support of the reanalysis continuity and announce research funding opportunities aimed at evaluation and diagnostics of the reanalysis products. The Council encouraged research groups and centres to continue reprocessing of in situ and satellite records.

#### ***Other Climate Observations***

**3.4.51** The Council noted with appreciation the continued involvement of CMA, EUMETSAT, JMA and NOAA in the Sustained Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) activity. The Council also extended its appreciation to the following Stakeholders for their continued involvement and support in SCOPE-CM: CEOS, GCOS, GEO, Global Space-based Inter-Calibration System (GSICS) and WCRP. The Council encouraged Members with space-based capabilities to propose other pilot projects which address ECVs from the oceanic and terrestrial domains.

**3.4.52** The Council noted the early efforts of the CBS Expert Team on Satellite Systems (ET-SAT) and the Space Programme Office to develop a concept paper for a space-based architecture for climate monitoring. Building on the work done for the five-volume Dossier of the Space-based Global Observing System (GOS) in 2010, the Vision for the GOS in 2025, and working with other international coordination mechanisms to better leverage contributions beyond the WMO community are encouraged.

#### **WMO Integrated Global Observing System (WIGOS)**

##### ***Status of development of the WIGOS concept***

**3.4.53** The Council noted with appreciation that the Executive Council Working Group on the WMO Integrated Global Observing System and the WMO Information System (EC-WG/WIGOS-WIS) and its Subgroup on WIGOS had reviewed the status of implementation of the WIGOS concept in response to the request by EC-LXI. The Council considered the views and recommendations of EC-WG/WIGOS-WIS and summarized its decisions in the following paragraphs.

**3.4.54** The Council adopted the updated versions of the WIGOS Development and Implementation Plan (WDIP) [see EC-LXII/INF. 3.4(1)] and the WIGOS Concept of Operations

(CONOPS) [see EC-LXII/INF. 3.4(2)], respectively, with the understanding that that they might be further refined in view of the lesson learned from the WIGOS Test of Concept Phase.

**3.4.55** In this regard, the Council noted with appreciation the successful completion of most of the tasks specified in WDIP for the individual phases and thanked Members, regional associations and technical commissions for their active collaboration in testing and developing the WIGOS concept, and providing their inputs to WDIP. The Council also noted that the current version of CONOPS more adequately covered operational aspects of WIGOS and therefore, more fully met user expectations.

**3.4.56** The Council noted the progress in the WIGOS Projects. It appreciated the role and input of the relevant technical commissions and the AMDAR Panel in initiating and implementing WIGOS Pilot Projects (WPP). The Council also expressed its appreciation for the efforts of Kenya, Morocco and Namibia (RA I), Republic of Korea (RA II), Brazil (RA III), the United States of America (RA IV), Australia (RA V) and the Russian Federation (RA VI) in the implementation of their WIGOS Demonstration Projects (WDP).

**3.4.57** The Council noted that some Pilot and Demonstration Projects had not yet been completed. It recalled that some projects were designed to be ongoing while some others were unable to be completed because of the need for additional guidance material and standards still to be developed. However, in all cases there were a significant number of lessons learned. In this regard, the Council underlined that these pilot and demonstration projects should continue to be an important activity in the later WIGOS implementation stages, especially in assisting LDCs and SIDS countries to more fully benefit from WIGOS.

**3.4.58** The Council agreed that WDPs and WPPs provided lessons learned, feedbacks and perspectives on the potential benefits, value and impacts of the WIGOS implementation process at the national and regional levels which were necessary for the finalization of CONOPS and WDIS. The Council reaffirmed that the success of the WIGOS process would strongly depend on the collaboration and cooperation among WMO Members as well as among WMO and its partner organizations.

### ***WIGOS Development and Implementation Strategy***

**3.4.59** The Council endorsed the draft WIGOS Development and Implementation Strategy (WDIS) [see EC-LXII/INF. 3.4(3)] with a view to presenting it to Cg-XVI for consideration. WDIS is based on the WMO Strategic Plan, taking into account lessons learned from WIGOS projects and other activities carried out during the WIGOS Test of Concept phase. It emphasized the importance of this document that describes the steps to be followed by WMO to improve governance, management, and integration of observing systems. WDIS also includes capacity-building requirements and clearly specifies responsibilities across the WMO system for the further development and implementation of WIGOS, addressing coordination and technical challenges of the implementation process.

**3.4.60** The Council underscored that in implementing WIGOS, it was imperative that the current management, governance and support activities be reviewed and aligned with WMO strategic planning and results-based management. This alignment should enable collaboration and promote cooperation and coordination at the technical, operational and administrative levels.

**3.4.61** The Council agreed that centralized coordination through the WMO Secretariat was important for successful WIGOS implementation. In addition, the long-term commitment and effort of WMO Members, greater international cooperation, and sustained technological capacity building and financial support for developing and least developed countries was essential.

**3.4.62** The Council requested regional associations and technical commissions to incorporate WIGOS implementation activities into their operating plans and work programmes. Further, the Council encouraged regional associations to develop their regional WIGOS implementation plans and coordinate WIGOS implementation activities, as well as to establish WIGOS-related Task Teams and to initiate regionally focused WIGOS-WIS activities.

**3.4.63** The Council agreed that, following the approval of Congress, the WIGOS Implementation Plan (WIP) would be developed in line with WDIS. The Secretariat would take a leading role by providing a focal point for these activities.

**3.4.64** The Council endorsed “WIGOS Imperative”, the comprehensive background information related to WIGOS development and implementation [see EC-LXII/INF. 3.4(4)], and requested the Secretary-General to make it available to Members in English.

### ***Guidance for the future development and implementation of WIGOS***

**3.4.65** The Council reaffirmed that meeting the quality requirements and expectations of users was critical to the success of WIGOS. This would require an in-depth examination of current practices used by WMO observing programmes, specific mission-related requirements that were already in place, and available technological opportunities. WIGOS QMF implementation strategy would specify all processes of QMS for observational networks. Attention should also be paid to the guidance on how to manage observational networks and observing sub-systems to more fully meet QMF requirements.

**3.4.66** The Council considered resources needed for development of two WIGOS Databases (DB), i.e. the WIGOS Operational DB and the WIGOS Standardization DB, as specified in CONOPS, as well as for significant update of the current User Requirements and Operational Capabilities DB as critical WIGOS framework support tools that would have to be realized during the WIGOS Implementation phase.

**3.4.67** The Council agreed that the timely completion of the WIGOS Implementation phase in the sixteenth financial period 2012-2015 directly depended on the available resources. The investment for fully implementing WIGOS should be also a significant component of WIGOS development and implementation plans of individual NMHSs.

**3.4.68** The Council noted that to provide the essential Secretariat support during the implementation phase of WIGOS in the sixteenth financial period, CHF 1.9 million for staff and CHF 1.7 million for non-staff expenditures would be needed to support the WIGOS Project Office. The additional cost of translation and publication would need to be determined based on changes to technical regulations yet to be developed. If a lower level of resources was approved for 2012-2015, WIGOS implementation would have to proceed at a slower pace and with a narrower focus. In this regard, the Council felt that availability of resources needed for the WIGOS Implementation phase would require careful consideration. In addition, the Council urged Members to provide resources in the form of contributions to the WIGOS Trust Fund and/or secondment(s).

**3.4.69** The Council agreed that since the flexibility for the additional staff requirements was limited within budgetary resources for 2012-2015, the full staffing requirement would need to be met through the secondment of experts from NMHSs. In this connection, the Council urged Members to provide secondment services to the Secretariat during the WIGOS Implementation phase to ensure successful WIGOS implementation. Additional emphasis in the proposed budget for the sixteenth financial period should be placed on the implementation of WIGOS.

**3.4.70** The Council noted the significance of active cooperation and enhanced coordination among the technical commissions, regional associations, and WMO partner organizations. It

underlined that integration activities be included in the work programmes and implementation plans of these entities. The Council decided that an Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) be established for this purpose immediately after Cg-XVI (see draft Resolution 3.4/3 (EC-LXII)).

**3.4.71** The Council stressed the importance of close alignment of WIGOS and WIS planning and implementation with the development and implementation of the other observing components of the future GFCS to ensure consistency, effectiveness and to avoid any duplication.

**3.4.72** The Council underlined that improving coordination within the WIGOS framework should be the high-priority activity at policy, technical, and Secretariat levels. This would need to be supported by the development of a high-level mechanism for coordination with the cosponsored observing systems, such as through the various Memoranda of Understanding among partner organizations, in order to resolve possible problems in data policy, product delivery, and other governance issues. The existing Interagency Coordination and Planning Committee for Earth Observations (ICPC) could be strengthened and used as a high-level coordination mechanism.

**3.4.73** The Council also underlined that WIGOS should ensure a coordinated WMO contribution to the cosponsored GOOS and GTOS and would be key to the successful implementation of GCOS in support of UNFCCC, and in the development and implementation of the future GFCS. Through WIGOS and WIS, and their support for GOOS, GTOS and GCOS, WMO would make a fundamental contribution to the success of the Global Earth Observation System of Systems (GEOSS).

**3.4.74** The Council agreed that the revised structure of WMO Technical Regulations must document the structure and requirements of WIGOS operations, adequately reflecting contributions of all component systems. The Council agreed that upon the approval by Cg-XVI, the WIGOS Implementation Plan should include the development of a Manual on WIGOS as a priority activity. The Council endorsed the inclusion of the Manual on WIGOS in the list of mandatory publications for consideration by Sixteenth Congress.

**3.4.75** The Council noted that the development of an effective and efficient system of governance would require adequate scientific and technical advisory mechanisms to develop, monitor, and evaluate the WIGOS implementation process. The Council decided to maintain its EC-WG/WIGOS-WIS to steer and monitor WIGOS activities to ensure the broadest possible collaboration and cooperation and to keep in force Resolution 3 (EC-LIX) - Executive Council Working Group on the WMO Integrated Global Observing System and the WMO Information System.

**3.4.76** The Council requested the Secretary-General, in close coordination with the chairperson of the EC WG/WIGOS-WIS, to ensure that the necessary follow-up actions on WIGOS-WIS implementation were taken, including preparation of the comprehensive report for consideration by Sixteenth Congress.

**3.4.77** The Council adopted Resolution 3.4/3 (EC-LXII) - Implementation of WIGOS.

## DRAFT RESOLUTION

### **Res. 3.4/1 (EC-LXII) - EXECUTIVE COUNCIL PANEL OF EXPERTS ON POLAR OBSERVATIONS, RESEARCH AND SERVICES**

#### **THE EXECUTIVE COUNCIL,**

##### **Noting:**

- (1) Resolution 36 (Cg-XV) - International Polar Year 2007-2008,
- (2) Resolution 7 (Cg-XV) – WMO Antarctic Activities,
- (3) Resolution 3 (Cg-XV) - Global Observing System,
- (4) Resolution 30 (Cg-XV) - Towards Enhanced Integration between WMO Observing Systems,
- (5) Resolution 9 (EC-LX) – Executive Council Panel of Experts on Polar Observations, Research and Services,
- (6) That Fifteenth Congress welcomed the proposal to create a Global Cryosphere Watch as an important part of the IPY legacy,

##### **Considering:**

- (1) That there is a need for meteorological and other environmental data from the Polar Regions for the full implementation of the World Weather Watch, for research, monitoring and prediction of climate change and of the ozone layer over the Polar Regions,
- (2) That successful implementation of the IPY 2007-2008 has resulted in a legacy of enhanced polar observing systems and research of polar environment,
- (3) That arrangements ensuring the legacy of the IPY-enhanced observational networks are crosscutting and should be closely coordinated with the implementation of WIGOS designed to improve in a most efficient way the capability of Members to provide the widening range of operational services and to better serve research programme requirements,
- (4) That there is a need to coordinate WMO activities related to the International Polar Decade,
- (5) The importance of the polar regions in terms of their global impacts on weather and climate,
- (6) That there is a need to update and formalize responsibilities for the Antarctic as a region not covered by any of the WMO Regional Associations.

##### **Decides:**

- (1) To maintain the Executive Council Panel of Experts on Polar Observations, Research and Services;

- (2) That the Panel will be composed of members nominated by the Permanent Representatives of Members, including Parties to the Antarctic Treaty, that have active meteorological, hydrological and cryospheric programmes in the Polar Regions;
- (3) That observers from other groups may be invited to attend meetings of the Panel;
- (4) That the Panel make recommendations to the Executive Council within its terms of reference, including recommended Antarctic Basic Network and standard practices applied for them, especially recommendations for updates of the *Manual on the GOS* (WMO-No. 544), Volume II, Chapter 7 "The Antarctic" and the *Manual on the GTS* (WMO-No. 386), Volume II, Chapter 7 "The Antarctic";
- (5) That the Panel will undertake the following:

**For both Polar Regions:**

- (a) To provide a high-level WMO partnership in the activities aimed to secure the IPY observing system legacy in close communication with operational agencies in Member countries and international organizations that have a great interest in Polar Regions;
- (b) To provide guidance in the development of the relevant parts of the WMO Strategic Plan related to the Polar Regions;
- (c) To facilitate acquisition, exchange and archiving of observational data from Polar Regions in compliance with WIGOS requirements related to instruments, data exchange (WIS) and QMF, and to underpin the provision of services required for safe operations in the polar regions;
- (d) To facilitate the exchange and assessment of data and products generated by IPY projects and to stimulate the development and regular updating of national databases of non-real time meteorological, hydrological and cryospheric data for the Polar Regions including IPY data;
- (e) To provide a forum for discussion of relevant scientific issues and to make recommendations on meteorological, hydrological and cryospheric research and operations related to the Polar Regions;
- (f) To cooperate, as necessary, with the international programmes related to climate change research and prediction, such as the World Climate Research Programme, the Global Climate Observing System, the Global Ocean Observing System and the Global Cryosphere Watch on aspects related to the Polar Regions;
- (g) To provide regular input on issues related to polar meteorology, hydrology and glaciology to the activities of relevant groups or bodies, such as the Joint Scientific Committee for WCRP, the International Arctic Science Council, the Scientific Committee on Antarctic Research, the Council of Managers of National Antarctic Programmes, the Intergovernmental Oceanographic Commission of UNESCO, and WMO Technical Commissions;
- (h) To provide, as necessary, through its chairperson or other representatives, information on meteorological, hydrological and cryospheric activities in the Polar Regions to the Arctic Council and the Antarctic Treaty Consultative Meeting, including its Committee for Environmental Protection, as well as to the Scientific Committee for Antarctic Research and the International Arctic Science Committee;
- (i) To promote the development of prediction systems and services focussed on the unique aspects, processes, and requirements of the Polar Regions, in collaboration with relevant bodies;

**For the Antarctic:**

The Panel should cooperate, as appropriate, with other relevant international and regional entities:

- (a) To promote the execution of the resolutions of Congress and the Executive Council in the area from 60°S to 90°S;
- (b) To coordinate programmes of surface and upper-air meteorological observations in the Antarctic, working with relevant international scientific organizations, and liaise with Regional Associations I, III and V in relation to sub-Antarctic observations;
- (c) To coordinate design of the Antarctic Observing Network (AON), based on Antarctic Basic Synoptic Network (ABSN), Antarctic Basic Climatological Network ABCN, GCOS Surface Network (GSN), GCOS Upper-Air Network (GUAN) and other relevant observing components;
- (d) To coordinate standardization of observing, coding, data exchange and data management practices applied for the Antarctic;

**For the Arctic:**

While appropriate functions are covered by respective regional associations, the Panel may liaise with them in defining appropriate components of Arctic observing systems and services;

**Further decides** to designate Mr G. Ayers and Mr D. Grimes as Co-Chairs of the Panel;

**Authorizes** the Panel to establish sub-groups and task teams as and when required;

**Requests the Secretary-General:**

- (1) To maintain the membership of the Panel in accordance with the relevant Regulations in consultation with the Co-Chairs and Members concerned;
- (2) To provide the necessary support to activities and sessions of the Panel.

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**Note:** This resolution replaces Resolution 9 (EC-LX), which is no longer in force.

## DRAFT RESOLUTION

### Res. 3.4/2 (EC-LXII) - GLOBAL CLIMATE OBSERVING SYSTEM

#### THE EXECUTIVE COUNCIL,

#### Noting:

- (1) Resolution 3 (EC-LVII) – Global Climate Observing System,
- (2) Resolution 11 (Cg-XV) – Global Climate Observing System,
- (3) Resolutions 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities, and 25 (Cg-XIII) – Exchange of hydrological data and products,
- (4) Report of the World Climate Conference–3, Working together towards a Global Framework for Climate Services (WMO-No. 1048) 2009
- (5) The GRUAN Implementation Plan 2009-2013, (GCOS-134, WMO/TD-No. 1506), July 2009;
- (6) The Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC (GCOS-82, WMO/TD-No. 1143),
- (7) The Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (GCOS-92, WMO/TD-No. 1219),
- (8) Progress Report on the Implementation of the Global Observing System for Climate in support of the UNFCCC 2004-2008 - August, 2009 (GCOS-129, WMO/TD-No. 1498, GOOS-173, GTOS-70),
- (9) The Global Climate Observing System implementation plan: a provisional update including cost estimates, FCCC/SBSTA/2009/MISC.12, GE.09-64475, 31st Session of SBSTA, Copenhagen, 7-18 December 2009,
- (10) Decision 11/CP.9 – Global observing systems for climate of the ninth session of the Conference of the Parties to the UNFCCC, 1-12 December 2003, Milan, Italy, and Decision 5/CP.10 – Implementation of the global observing system for climate, at the tenth session of the UNFCCC, Buenos Aires, 6-18 December 2004,
- (11) Conclusion on Research and Systematic Observations, FCCC/SBSTA/L.6 and Add.1, 30th Session of SBSTA, Bonn, 1-10 June 2009,
- (12) Decision COP-15 (-/CP.15) on Systematic Climate Observations, Copenhagen, 7-18 December 2009,
- (13) GEOSS 10 Year Implementation Plan as adopted at 16 February 2005 and the GEO 2009-2011 Workplan, 10 December 2009,

#### Recognizing:

- (1) The major contribution provided by the Implementation Plan as an action framework for implementing an integrated global observing system for climate,

- (2) The need for the direct involvement of WMO Members, technical commissions and Programmes in implementing many of the actions in the Plan,
- (3) The importance of the Conference of the Parties to the UNFCCC as a mechanism whereby Members can address deficiencies in the observing systems required to meet their commitments to the Convention,

**Urges** Members to:

- (1) Fully support and participate in the implementation of the relevant actions in the Implementation Plan, including coordination at the national level to ensure balanced development of national observing systems for climate;
- (2) Assist other Members in improving their systems contributing to global coverage of the GCOS Surface Network (GSN) and GCOS Upper-Air Network (GUAN), GCOS Reference Upper-Air Network (GRUAN) and, as appropriate, systems contributing to the GCOS oceanic and terrestrial domain, and in implementing priority projects in their Regional Action Plans;
- (3) Enhance their work and collaboration on observation of the Essential Climate Variables (ECVs) and on development of climate products as an important contribution to the WMO observing programmes and the needs of climate information's users, and as appropriate on the future Global Framework for Climate Services (GFCS);
- (4) Assist in improving basic systems for the observation of all three domains (atmosphere, ocean and land) in developing countries through participation in the GCOS Cooperation Mechanism;
- (5) Take the steps needed to provide historical data and metadata from their respective GSN stations to the GSN archive at the National Climatic Data Center in accordance with Resolutions 40 (Cg-XII) and 25 (Cg-XIII) and the GCOS Climate Monitoring Principles, in order to improve the data set needed for global analysis by Parties to the UNFCCC and the international climate science community;
- (6) Work with the WMO Space Programme and the Strategic Implementation Team of the Committee on Earth Observation Satellites to further coordinate the response to the needs expressed in the GCOS Implementation Plan (for Members and Space Agencies participating in the space-based component of the GOS);
- (7) Support the efforts of the GCOS Secretariat to facilitate, monitor, and report on the actions of Parties and international organizations in response to the Implementation Plan;
- (8) Enhance their support to the GCOS Secretariat to the extent possible, through the secondment of experts or through contributions to the Climate Observing System Fund;

**Requests** the GCOS Secretariat to:

- (1) Collaborate fully with GEO in carrying out the implementation of their respective Implementation Plans;
- (2) Provide assistance to Members in mobilizing resources needed to implement relevant action plans;

- (3) Provide information to the SBSTA as required, at subsequent sessions, on how the actions identified in the Implementation Plan are being implemented;
- (4) Continue close interaction with the Conference of the Parties to the UNFCCC as a high priority activity to maintain the UNFCCC's strong support for implementation and maintenance of the global observing system for climate and to ensure that the Parties' needs for systematic observation are met;

**Requests** the presidents of technical commissions to ensure that the relevant actions identified in the Implementation Plan are incorporated, as appropriate, in the work plans of their Commissions;

**Requests** the Secretary-General to:

- (1) Make every effort to identify the resources needed to maintain basic operations of the GCOS Secretariat and to monitor and report on the actions in the Implementation Plan;
- (2) Incorporate the relevant actions within the Implementation Plan into the WMO Programmes and coordinate with the presidents of technical commissions on their work plans.

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Note: This resolution replaces Resolution 3 (EC-LVII), which is no longer in force.

## DRAFT RESOLUTION

### Res. 3.4/3 (EC-LXII) - IMPLEMENTATION OF WIGOS

#### THE EXECUTIVE COUNCIL,

#### Noting:

- (1) Resolution 3 (Cg-XV) – Global Observing System,
- (2) Resolution 30 (Cg-XV) – Towards enhanced integration between WMO observing systems,
- (3) Resolution 3 (EC-LIX) – Executive Council Working Group on the WMO Integrated Global Observing System and the WMO Information System,
- (4) The report of the third session of the EC-WG/WIGOS-WIS,

**Reaffirming** that an integration process would be a complex undertaking that would stretch over several years through WIGOS Implementation and Operational phases and require the full support of all Members to be successful,

**Considering** the continuing need for the activities of the EC-WG on WIGOS-WIS to:

- (1) Guide and monitor the development and implementation of WIGOS and WIS as defined by Cg-XV,
- (2) Provide advice and guidance on the development of a WIGOS Implementation Plan,
- (3) Refine the WIS Development and Implementation Plan and ensure coordination between WIGOS and WIS activities to allow for an integrated WMO end-to-end system,
- (4) Monitor and evaluate the further progress of WIGOS/WIS Projects to help in elaborating the WIGOS Implementation Plan,

**Further noting** that resources are needed to ensure:

- (1) The development and publishing of WIGOS documentation,
- (2) The timely completion of the WIGOS Implementation Plan,
- (3) The development of WIGOS operational and standardization databases,
- (4) The essential support to the WMO Secretariat to effectively foster the full implementation of WIGOS in the sixteenth financial period (2012-2015),

#### Decides:

- (1) To keep in force Resolution 3 (EC-LIX);
- (2) To propose to Cg-XVI to include the Manual on WIGOS in the list of WMO Mandatory publications;

- (3) To propose to Cg-XVI the establishment of an Inter-commission Coordination Group on WIGOS with the Terms of Reference specified in the Annex to this resolution;

**Requests** regional associations and technical commissions to incorporate WIGOS implementation activities in their operating plans and work programmes;

**Encourages** regional associations:

- (1) To continue their WIGOS implementation planning as guided by the WIGOS Development and Implementation Strategy;
- (2) To establish WIGOS related Task Teams and to undertake regionally focused WIGOS activities;

**Urges** Members to provide resources in the form of contributions to the WIGOS Trust Fund and/or secondment(s);

**Requests** the Secretary-General:

- (1) To provide the necessary assistance and Secretariat support for the EC-WG/WIGOS-WIS;
- (2) To prepare, in close cooperation with the chairperson of the EC-WG/WIGOS-WIS, the comprehensive EC Report on the integration between WMO observing systems for submission to Cg-XVI.

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Annex: 1

**Annex to draft Resolution 3.4/3 (EC-LXII)**

**TERMS OF REFERENCE FOR INTER-COMMISSION COORDINATION GROUP ON WIGOS  
(ICG-WIGOS)**

- To coordinate and evaluate WIGOS related activities carried out by relevant technical commissions;
  - To provide technical guidance and assistance for the planning, implementation and further development of GOS, GAW and WHYCOS as core components of WIGOS, including standardization of instruments and methods of observation, WIS information exchange and discovery and Quality Management Framework;
  - To advise the regional associations on the technical aspects of WIGOS implementation activities in the respective Regions;
  - To maintain close cooperation at a technical level with WMO's partner organizations such as UNESCO and its IOC, UNEP, FAO, and ICSU and co-sponsored observing systems GCOS, GOOS and GTOS;
  - To address major issues identified by the EC Working Group on WIGOS and WIS and provide technical advice on the further development and implementation of WIGOS;
  - Report to the EC Working Group on WIGOS and WIS.
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**World Meteorological Organization**

**EC-LXII/Rep. 3.4**

**EXECUTIVE COUNCIL**

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## **INTEGRATION OF WMO OBSERVING SYSTEMS**

### **PROGRESS/ACTIVITY REPORT**

#### **SUMMARY**

**Reference:** EC-LXII/Doc. 3.4

**CONTENT OF DOCUMENT:**

**Appendix:**

- Progress/activity report for the period since EC-LXI

## PROGRESS/ACTIVITY REPORT FOR THE PERIOD SINCE EC-LXI

### INTEGRATION OF WMO OBSERVING SYSTEMS

#### A. Atmospheric Observations

##### *Regional Basic Synoptic Network (RBSN) and Regional Basic Climatological Network (RBCN)*

1. The Annual Global Monitoring (AGM) of the operation of the WWW, carried out in October each year provides information on the performance level of the observing systems. Overall in 2009, the implementation of Surface, Upper-air and Climatological observational programmes in WMO Regions has remained stable. While varied from Region to Region, the globally averaged availability of surface (SYNOP), upper-air (TEMP) and CLIMAT reports on the Main Telecommunication Network (MTN) against those expected from RBSN and RBCN stations remained unchanged over the last two years at 80, 71 and 72 per cent respectively. Detailed results are presented in Table I.

**Table I**  
Availability of SYNOP, TEMP and CLIMAT data at MTN centres  
AGM: 1 to 15 October 2008–2009

| WMO Region    | Surface (SYNOP)                           |                   | Upper-air (TEMP) |                  | CLIMAT            |                   |
|---------------|---|-------------------|------------------|------------------|-------------------|-------------------|
|               | Number of stations / Reports received (%) |                   |                  |                  |                   |                   |
|               | 2008                                      | 2009              | 2008             | 2009             | 2008              | 2009              |
| RA I          | 744 (56%)                                 | 744 (59%)         | 94 (31%)         | 94 (28%)         | 730 (36%)         | 730 (29%)         |
| RA II         | 1309 (91%)                                | 1355 (90%)        | 280 (79%)        | 275 (81%)        | 659 (86%)         | 669 (88%)         |
| RA III        | 407 (64%)                                 | 407 (61%)         | 55 (46%)         | 54 (49%)         | 306 (73%)         | 308 (74%)         |
| RA IV         | 535 (83%)                                 | 539 (84%)         | 136 (89%)        | 135 (90%)        | 316 (88%)         | 318 (84%)         |
| RA V          | 390 (72%)                                 | 389 (74%)         | 93 (62%)         | 93 (61%)         | 250 (78%)         | 249 (82%)         |
| RA VI         | 813 (95%)                                 | 811 (96%)         | 128 (82%)        | 128 (78%)        | 577 (93%)         | 577 (94%)         |
| Antarctic     | 92 (80%)                                  | 94 (68%)          | 15 (60%)         | 15 (52%)         | 55 (49%)          | 53 (77%)          |
| <b>Global</b> | <b>4290 (80%)</b>                         | <b>4339 (80%)</b> | <b>801 (71%)</b> | <b>794 (71%)</b> | <b>2893 (72%)</b> | <b>2904 (72%)</b> |

Note: Results based on the lists of stations in the RBSN and RBCN of each Region.

2. In November 2009, representatives from the CBS Lead Centres for GCOS agreed to extend their responsibility for diagnosing and rectifying issues in station performance (i.e., availability of CLIMAT messages) from the GCOS Surface Network (GSN) and GCOS Upper-Air Network (GUAN) to the wider RBCN. However, Members need to recognize that the GSN and GUAN stations are more valuable globally and must meet higher quality standards, and that the Lead Centres will therefore continue to put higher priority on the functioning of GSN and GUAN stations.

3. A subset of RBCN stations of highest value for global climate monitoring receives particular attention as GSN and GUAN stations. Global performance of the GSN has improved over the past year as evidenced by the receipt in 2009 of 90 per cent of monthly CLIMAT messages at the GSN monitoring centres from all 1,025 stations globally (compared to 88 per cent in 2008). Major regional performance differences remain, e.g., 99 per cent of CLIMAT messages received in RAs IV and VI and only 71 per cent in RA I throughout 2009. In 2009, the number of GUAN stations meeting the minimum performance requirements had remained stable, with

approximately 5-6 out of 166 stations not reporting at all at any given time. This progress is due to Members contributing to the GCOS system improvement programme and the GCOS Technical Support Projects, and thanks to the CBS Lead Centres for GCOS, and the WWW and GCOS Network Monitoring activities.

4. The GCOS Reference Upper-Air Network (GRUAN) is being implemented with the objective to provide long-term upper-air climate records for trend analysis and to constrain and calibrate data from more spatially-comprehensive global observing systems (including satellites and current radiosonde networks). GRUAN builds on a wide range of in-situ as well as ground-based remote sensing techniques at an initial set of 15 sites worldwide, most of which are part of existing global networks such as GUAN, BSRN and GAW. A GRUAN Implementation Plan has been developed for the initial phase 2009-2013, after which the network should be expanded to its full envisaged size of 30-40 sites globally.

5. The second GRUAN Implementation–Coordination Meeting (2-4 March 2010) led to agreement on a Guide to uncertainty estimation at all GRUAN sites, on an initial data management model and on the formation of dedicated task teams for specific network issues, including site assessment and certification. Through WIGOS Pilot Project support, a work plan for developing a GRUAN Guide has been agreed, relevant parts of which will be incorporated into existing WMO regulatory material.

### ***Aircraft Observations***

6. The global AMDAR programme continues to expand into new areas and there are more NMHSs considering developing their own AMDAR programmes. After a significant correction at the end of 2008, in early 2009 the volume of AMDAR reports disseminated on the GTS had stabilized to approximately 220,000 to 230,000 observations per day, with over 3,000 aircraft world wide contributing to the Global AMDAR programme. The number of AMDAR profiles available in many of the identified data sparse regions of Southern Africa, Eastern Europe, South and East Asia and South America has continued to increase over the past 12 months. Minimizing the communication costs associated with the collection of AMDAR reports is one of the major critical factors in implementing and maintaining an AMDAR programme. It has been demonstrated that the use of an AMDAR data optimization system to better manage costs and operational requirements is an essential component to an operational AMDAR programme.

7. The AMDAR Water Vapour sensor, WVSS-IIv3, is currently being trialled on a number of USA based aircraft. The European AMDAR Programme (E-AMDAR) has completed initial testing of the WVSS-IIv3 sensor in its Climate Chamber with promising results. Therefore, the E-AMDAR Programme intends on undertaking trials of the latest version of the water vapour sensor on three aircraft in the E-AMDAR fleet in the first half 2010. It is expected the results from these two trials will be made available in the second quarter of 2010.

### ***Aerodrome Observations***

8. WMO cooperates with ICAO in the relevant ICAO Aerodrome Meteorological Observations and Forecast Study Group (AMOFSG) that requested WMO, in particular to:

- (a) Develop guidance material on the calculation of crosswind and tailwind components including gusts and propose suitable algorithms for use in guidance material;
- (b) Provide guidance on the use of the term “Representative” concerning meteorological reports;

- (c) Develop criteria to be used to distinguish between moderate and heavy sandstorms/dust storms;
- (d) Develop criteria to be used to distinguish between sandstorms/dust storms and blowing sand/dust.

9. Sand and dust storms, which have been a hazard to aviation in arid and semi-arid regions for a long time, are having an impact on the regularity and safety of operations at many aerodromes. While the new WMO Sand and Dust Storm Warning Advisory Service promises to improve the ability to identify and forecast such events, aviation also requires clear guidance on the severity of such events to be reported in aerodrome observations in METAR code form. In this regard, consultations with Members are going on to define a set of thresholds to characterize the severity of sand and dust storms.

### ***Atmospheric Chemical Composition and UV Measurements***

10. Several international workshops have been held on ozone activities. As a result of these workshops it has become apparent that the use of different ozone absorption cross sections by satellite and surface-based observational communities is an impediment to satellite validation and also might be the cause for discrepancies between different surface-based observational techniques.

11. GAW Regional Calibration Centres for UV exist in NOAA, Boulder, Colorado (USA) and in PMOD/WRC, Davos (Switzerland). While the US and European facilities can be linked through intercomparisons there is not yet a world calibration centre for UV measurements.

12. Reactive gases are relevant to air quality and climate. Chemical transformation of these compounds leads to formation of tropospheric ozone from precursor gases (nitrogen oxides and volatile organic compounds (VOCs)) defining the oxidative capacity of the atmosphere. They have impacts on health and ecosystems, and provide additional indirect radiative forcing. Precursor transformation also leads to formation of aerosols impacting the radiative balance.

### ***Climate Observations – CCI and WCP***

13. CCI-XV (Antalya, Turkey, February 2010) established an Open Panel of CCI Experts on Climate Data Management (OPACE 1), with a work plan including Climate Data Management, Data Rescue as well as deliverables relevant to Climate Observations.

14. WMO World Climate Data and Monitoring Programme (WCDMP) produced in 2009 a CD-ROM (WMO/TD-No. 1481, WCDMP-No. 68) enclosing seven previously published CCI guidelines covering climate observations, climate data management and data rescue; as well as a CD-ROM (WMO/TD-No. 1484, WCDMP-No. 70) providing guidelines on plant phenological observations. These publications complement the existing WMO reference documents and the Guide to Climatological Practices (WMO-No. 100).

## **B. Marine and Oceanographic Observations**

15. Sixty-one percent of the overall ocean observing system is now completed, and the drifting buoy and Argo float arrays have achieved their initial implementation targets. The preliminary target for VOS Climate (VOSCLim) recruitment has also been achieved and VOSCLim being integrated in the wider VOS as a new class of vessel. However, progress with regard to the further completion of the observing system has slowed in recent years and efforts remain to be made to achieve sustainability for those components that reached their design goal, including

broadening support for some observing components beyond the traditional research-based funding to include operational support.

16. At its third session, Marrakech, Morocco, 4-11 November 2009, JCOMM endorsed the future priority activities for the next JCOMM intersessional period for the Observations Programme Area (OPA) as described below, with no particular order:

- (a) Completion and sustainability of the initial observing system (target 100% completion), and updating of the OPA implementations goals to take into account input from OceanObs'09 conference (Venice, Italy, September 2009);
- (b) Integration in the WMO Integrated Global Observing System (WIGOS), including the review and update of appropriate WMO and UNESCO/IOC Technical Publications (four WMO Publications, and two UNESCO/IOC Publications), and the establishment of Regional Marine Instrument Centres (RMIC) in the Regions (target: six regions);
- (c) Enhancement of in situ global wave observing capability and quality in support of satellite products and ocean models through evaluation of wave measurements, and development of new cost-effective technology (target: improved quality, and new technology available);
- (d) Increased use of high data rate satellite data telecommunication (target: relevant platforms using high data rate);
- (e) Implementation of the Partnership for New GEOSS Applications Concept (PANGEA) – i.e. developing partnership with developing countries regarding the use of ocean observations and products, and their participation in the maintenance of the observing networks (target: one workshop per year);
- (f) Exploration of mechanisms, including funding, by which JCOMM *in situ* Observing Programme Support Centre (JCOMMOPS) can partner with other agencies (e.g. space agencies) and programmes for the benefit of JCOMM (target: new funding and expanded JCOMMOPS);
- (g) Coordinate with the Data Management Coordination Group the completion of the JCOMM Cookbook for the submission of ocean data in real time and delayed mode (target: cookbook completed and published as a JCOMM Technical Report).

## **C. Terrestrial Observation**

### ***Water cycle***

17. The WHYCOS programme is continuing progress in the development and implementation of various projects in different Regions. The programme has continued with the development of new components, mainly in Africa and Asia. Currently seven projects are under implementation in RA I, RA II, RA IV and RA V involving 52 Member countries, out of which more than 20 are Least Development Countries and 23 Small Island Developing States. The Secretariat is supporting the development of another four projects in RA I. Further information on the WHYCOS projects is included in EC-LXII/Rep. 3.3.

## **D. Polar and Cryosphere Observations**

### ***Polar Observations***

18. The First Meeting of the EC Panel of Experts on Polar Observations, Research and Services (EC-PORS) was held in Ottawa, Canada, 13-15 October 2009. Its activities, documents and final report are available at <http://www.wmo.int/pages/prog/www/Antarctica/antarctic.html>. The Panel established task plans for: (a) Antarctic responsibilities; (b) building a framework for its work in observations, research and services; (c) advancing the concept for an International Polar Decade; (d) providing leadership for development of a Polar Prediction System; and (e) building partnerships. All will require Members' support in order to deliver WMO activities in Polar Regions. The second meeting of EC-PORS will be held in Hobart, Australia, 18-20 October 2010.

19. The Panel emphasized that polar observations do not only support Polar research and services but are also required for mid-latitude forecasts. Sustainability of networks is a critical issue for both Polar Regions. The Panel noted that Pan-Arctic observing networks on hydrology, including all components of the cryosphere, are a major priority. The relevance of supersites for integrated, multidisciplinary monitoring to provide standardized data, not only to WIS and WIGOS, but also for satellite product development and calibration and validation of space based observations, was noted. Action has been initiated to have a Space Task Group with an updated mandate formally established within EC-PORS, building on the very successful IPY Space Task Group.

20. EC-PORS supported launching the International Polar Decade (IPD) and recognized the need to inform and engage a broad partnership. There is need to further scope IPD with other relevant scientific bodies and international organizations, with a workshop considered viable in early 2011. One possibility for a "rallying" agenda for IPY follow-on is the elaboration of an Arctic and Antarctic polar prediction capacity.

### ***Global Cryosphere Watch***

21. EC-PORS provides oversight and support to the development of the WMO Global Cryosphere Watch (GCW) initiative. The Panel recognized the importance of, and strongly endorsed GCW, which would extend from observation through research to prediction and services. GCW is recognized as an integrator between water, weather, climate and the cryosphere (e.g. snow, ice, glaciers, permafrost) within the framework of WIGOS.

22. An EC-PORS GCW Task Team was established to work within the Panel's observation framework to support development of the GCW implementation strategy. The draft of this implementation strategy will be finalized by EC-PORS at its second meeting in Hobart and submitted to Cg-XVI for consideration. It is to determine which IGOS Cryosphere Theme ("CryOS") recommendations can be implemented in GCW and how. With the support of Members, it would test the GCW concept of operations through selected pilot projects and regional/national demonstration projects. A key task will be to identify GCW partnerships, including government agencies, institutions and international bodies (such as International Permafrost Association and World Glacier Monitoring Service) that measure/observe/monitor/archive cryosphere data and information from in-situ, space-based and modelled sources, including research and operational sources, and who would contribute to GCW.

23. EC-PORS noted the importance of supersites/reference sites for integrated, multidisciplinary monitoring; its Task Team will identify candidate GCW reference sites. Establishing or expanding a standardized cryospheric measurement programme at cold climate GAW sites is a suggested first step. Development of an inventory of candidate cryospheric satellite products for GCW will be undertaken, including identification of the need for scientific

intercomparison of products. These efforts require collaborative compilation of existing guidelines and standards for cryospheric measurements and products from a variety of sources.

24. GCW will require a robust portal to meet a variety of user needs for cryospheric information. There are several IPY data centres/portals which could be suitable contributors in the development of a virtual portal. Members' engagement in the process to develop/host a prototype portal is necessary to determine long-term resource requirements.

25. GCW will require on-going secretariat support to oversee development of GCW, in addition to in-kind support from Members, organizations, agencies and institutes.

## **E. Cross-cutting Aspects**

### ***Space-based observation***

26. The space-based component of the GOS includes operational missions of CMA, EUMETSAT, IMD, JMA, KMA, NOAA and ROSHYDROMET. Other agencies with Research and Development (R&D) satellites contributing to the GOS are CNES, CNSA, DLR, ESA, INPE, ISRO; JAXA, NASA, ROSCOSMOS and USGS

27. Since the last Executive Council session, several satellites contributing to the GOS have been successfully launched. Information on satellite status and plans is available on: <http://www.wmo.int/pages/prog/sat/Satellites.html>.

28. In January 2010, WMO/TD-No. 1513 (WMO Space Programme SP-7) titled *The Space-based Global Observing System in 2010 (GOS-2010)* was published. Volume 1 of the five-volume Dossier was printed, with the remaining four volumes being available online at: <ftp://ftp.wmo.int/Documents/PublicWeb/sat/DossierGOS/>. The entire set updates and significantly enhances the information previously contained in WMO Publication No. 411, *Information on Meteorological and other Environmental Satellites*, the last edition of which appeared in 1994.

29. The tenth session of the Consultative Meetings on High-level Policy on Satellite Matters (CM-10) held in Geneva, Switzerland from 28-29 January 2010 made several recommendations to Space Agencies and participants. The following recommendations pertain to Executive Council deliberations:

- (a) Having regard to the importance of Earth Observation satellites for WMO Programmes and the major investment they represent for WMO Members, CM-10 recommended that satellite matters be given greater visibility in the meetings and deliberations of WMO bodies, including the Executive Council and Congress;
- (b) CM-10 recommends to the Executive Council to consider including Space Weather in the Space Programme activities for the 2012-2015 WMO budget.

30. Upon EC-LXI approval of the Inter-programme Coordination Team for Space Weather (ICTSW), CAeM appointed a Co-chair of the Team, and CBS appointed an interim chair in advance of the 2010 CBS Meeting in Namibia. Interested WMO Members have named points-of-contact for Space Weather within their respective organizations, and/or nominated representatives for the ICTSW. The WMO Space Programme Office met with officers and representatives of the International Space Environment Service (ISES) to coordinate plans and activities of both organizations. The Committee on the Peaceful Uses of Outer Space was informed of emerging Space Weather coordination activities by WMO.

### ***Instrument Standards and Best Practices***

31. CIMO collaborated with CBS to finalize a siting classification and further develop a maintenance performance classification for surface observing station on land. The required quality of observations cannot be ensured only by the use of high-quality instrumentation supplied by manufacturers, but rely at least as much on the standard siting of the instruments and on their maintenance. These classifications are the first step towards providing a measure of the data quality to users of meteorological observations to allow them to assess whether specific observations meet the quality requirements for their applications. This is of crucial importance especially for climate change and climate variability monitoring.

32. An evaluation scheme for auditing of Regional Instrument Centres (RICs) was developed. It also provides RICs with a mean to check whether they meet the set requirements and help them to improve their capabilities.

33. The development of appropriate guidance on the optimal distribution of the deployment of new observing systems and the best mix of instruments is extremely complex. Such guidance can only be developed making best use of the national testbed activities by assessing the capabilities of various surface-based remote-sensing technologies. Similarly, major advances in instrument development and testing rely on the outstanding and continuous support provided by specific centres run by Members. In facilitating the coordination of these testbeds and centres CIMO has developed generic terms of reference for CIMO Testbeds and CIMO Lead Centres, which will be presented to CIMO-XV for approval. CIMO also invites proposals from Members to nominate their existing facilities to become CIMO Testbeds and CIMO Lead Centres.

### ***Evolution of the GOS***

34. Under the auspices of the CBS Expert Team on Evolution of the GOS, the Statements of Guidance (SoGs) has been reviewed for 12 application areas: global NWP, regional NWP, synoptic meteorology, nowcasting and very short-range forecasting, seasonal and inter-annual forecasting, aeronautical meteorology, climate monitoring, other climate applications (CCI), ocean applications, agrometeorology, hydrology and water resources, and atmospheric chemistry. (See: <http://www.wmo.int/pages/prog/sat/RRR-and-SOG.html>) Action has been initiated to establish user requirements and SoGs for two new application areas: Space Weather (through the Inter-programme Coordination Team on Space Weather) and GTOS (for those requirements not already considered under GCOS).

35. Progress against the current Implementation Plan for Evolution of the GOS (EGOS-IP) has been reviewed and documented, taking account of feedback from many sources including: AMDAR Panel, JCOMM, GCOS, other CBS OPAAG-IOE ETs, WMO regional representatives, and WMO Members via National Focal Points (NFPs) (See Annex VIII of the ET-EGOS-5 Final Report: <http://www.wmo.int/pages/prog/www/OSY/Reports/ET-EGOS-5-Final-Report.doc>).

36. Preparation has started towards a new version of EGOS-IP, as a response to the new Vision for the GOS in 2025. The new EGOS-IP will capture the material contained in the current version of the Implementation Plan and will extend it to address all areas covered by the new Vision and by WIGOS. Guidelines for the preparation of the new EGOS-IP have been drafted and will be submitted to CBS for consideration. The Met Office (UK) has provided funds to support consultancy effort required for the preparation of the new EGOS-IP.

### ***Observing System Experiments (OSEs)***

37. Results of impact studies conducted by major NWP Centres and by participants in THORPEX have been kept under review and will be taken into account in the preparations of the 5<sup>th</sup>

WMO Workshop on "The impact of various observing systems on numerical weather prediction" due in 2012.

## **F. Coordination of Observations for Climate**

### **GCOS**

38. The 2010 *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (IP-10) replaces a similarly titled 10-year Plan which was published in October 2004, with an updated set of actions required to implement and maintain a comprehensive global observing system for climate that will address the needs of the UNFCCC for climate observations. Focussing on the timeframe 2010-2015, implementation of the Plan will provide observations of the Essential Climate Variables (ECVs) needed to make significant progress in the generation of global climate products and derived information; and also provide support for the required research, modelling, analysis and capacity building activities.

39. The IP-10 underwent open review between November 2009 and January 2010 and is currently being finalized, for submission to the UNFCCC COP-16 in December 2010 and subsequent consideration by all Parties.

40. The *Progress Report on the Implementation of the GCOS in Support of the UNFCCC 2004-2008*, submitted to the UNFCCC SBSTA 30 in Bonn, Germany in June 2009, concluded that:

- (a) The increasing visibility of climate change has reinforced world-wide awareness of the importance of an effective Global Climate Observing System;
- (b) Developed countries have improved many of their climate observation capabilities, but national reports suggest little progress in ensuring long-term continuity for several important observing systems;
- (c) Developing countries have made only limited progress in filling gaps in their in situ observing networks, with some evidence of decline in some regions, and capacity building support remains small in relation to needs;
- (d) Both operational and research networks and systems, established principally for other purposes, are increasingly responsive to climate needs including the need for timely data exchange;
- (e) Space agencies have improved both mission continuity and observational capability, and are increasingly meeting the identified needs for data reprocessing, product generation, and access;
- (f) The Global Climate Observing System has progressed significantly over the last five years, but still falls short of meeting all the climate information needs of the UNFCCC and broader user communities.

41. The GAW GHG Scientific Advisory Group (SAG) has produced guidelines for measurements and technical reports on analysis methods and coordinating integrated global greenhouse gas observations, quality assurance and analyses.

42. The GHG total column programme performed by the Total Column Carbon Observing System (TCCON), of crucial importance for validation of satellite-based GHG measurements, has been added to the GAW programme as a complementary network of the surface GHG network.

Quality assurance and control activities regarding greenhouse gases are very important and need to be continued and expanded as required.

### **WCRP**

43. WCRP keeps high on its agenda the development of prototype observing systems and networks. Some of them, like the Baseline Surface Radiation Network, are being transitioned into a more operational mode of work and are now cosponsored by GCOS. In many cases research-based funding remains the only source of support that sustains certain observing systems. During the intersessional period, WCRP has actively participated in setting the stage for further observing system development that would enable not only the climate research but also future climate services. WCRP experts contributed their knowledge to the development of the update of the GCOS Implementation Plan.

44. WCRP pursues the development of meteorological and oceanographic reanalyses, and some regional reanalyses. Reanalysis will constitute an essential part of the future climate services and enable long-range climate prediction. WCRP is concerned that the funding for the reanalysis work is not sustained. WCRP would also like to facilitate more rigorous evaluation of the reanalysis products. WCRP supports reprocessing of in situ and satellite records that would serve as an input to reanalysis and will be able to corroborate the robustness of IPCC conclusions on the ongoing climate change. The WCRP work on the observations is led and coordinated by the WCRP Observations and Assimilation Panel (WOAP), which is cosponsored by GCOS. WOAP has two subgroups addressing data management and reanalysis. The above issues were included on the agenda of the Fourth Session of WOAP (Hamburg, Germany, 29-31 March 2010).

### **Other Climate Observations**

45. The Sustained Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) Executive Panel met jointly with WCRP/GEWEX to ensure stronger linkages with the climate research community, and after that meeting reviewed status and plans for each of the five ongoing pilot projects being conducted by EUMETSAT, JMA and NOAA, and reviewed the maturity matrix developed by NOAA for assessing products generated from satellite data. Each of the five pilot projects tested the maturity matrix using their projects, and provided comments back to the SCOPE-CM Executive Panel. SCOPE-CM stakeholders include CEOS, GCOS, GEO, GSICS, and WCRP.

46. Early discussions with the CBS Management Group including the OPAG-IOS Chair and Vice-chair, and ET-SAT at their 26-29 April 2010 Meeting in Geneva encouraged the WMO Space Programme Office to further develop a concept paper for Monitoring Climate from Space by leveraging the work done in the Vision of the GOS to 2025 and the WMO Dossier of the Space-based Observing System in 2010 (GOS in 2010). Results of the Expert Segment at the Third World Climate Conference (WCC-3) articulated the importance of observations as one of the pillars of a Global Framework for Climate Services (GFCS). The role that space-based observations will play in future monitoring of the Earth's climate is substantial, and there currently exists no sustained architecture or international agreements for monitoring climate. A concept paper articulating respective roles and responsibilities of involved parties would start to address these challenges.

### **G. WMO Integrated Global Observing System (WIGOS)**

47. The third session of the Executive Council Working Group on the WMO Integrated Global Observing System and the WMO Information System (EC-WG/WIGOS-WIS), 24-26 March 2010, reviewed major deliberations of its Subgroup on WIGOS (SG-WIGOS), 19-23 October 2009, and Intercommission Coordination Group on WIS (ICG-WIS), 22-26 February 2010.

48. EC-WG/WIGOS-WIS further considered: Report on the WIGOS Projects; WIGOS Concept of Operations (CONOPS); Implementation of the WIGOS Development and Implementation Plan (WDIP); WIGOS Development and Implementation Strategy (WDIS); WIGOS Imperative; and Report on the integration between the WMO observing systems.

49. EC-WG/WIGOS-WIS formulated recommendations on the further development and implementation of WIGOS, implementation of WIS, and enhanced coordination of WIS and WIGOS activities. EC-WG/WIGOS-WIS decided to submit the updated versions of CONOPS, WDIP and recently developed WDIS to EC-LXII for consideration and endorsement.

50. The Final Report of EC-WG/WIGOS-WIS-3 that contains CONOPS, WDIP and WDIS as well as all WIGOS relevant information is available on: [http://www.wmo.int/pages/prog/www/wigos/index\\_en.html](http://www.wmo.int/pages/prog/www/wigos/index_en.html).

### ***Regulatory Material***

51. The modification of the Mandatory WMO Publication No. 9, Weather Reporting, Volume A (Observing stations) to accommodate station coordinates with higher precision was developed following the adoption of Recommendation 1 (CBS-Ext.(06)) and approval of Resolution 10 (EC-LIX) to establish a standard reference system to be used for both horizontal and vertical position of weather observing stations. The Secretariat has notified the revised changes to Members with a request for updated information of their stations in accordance to the new specifications using the World Geodetic System 84 (WGS 84) as its reference datum system for horizontal positioning and the Earth Geodetic Model 96 (EGM-96) as reference for vertical positioning.

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