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**Summary Report and Recommendations  
from the  
Sixteenth Session of the GCOS/WCRP  
Atmospheric Observation Panel for Climate  
(AOPC-XVI)**

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**AOPC-XVI**  
**7-11 February 2011**

**Summary Report and Recommendations**

**1 Opening of the Meeting**

The Chair of the GCOS / WCRP Atmospheric Observation Panel for Climate (AOPC), Prof Adrian Simmons, opened the meeting on 7 February 2011, 13.45 hrs, at WMO Headquarters in Geneva. The participants (Annex I) were welcomed by the WMO Secretary-General, Mr Michel Jarraud, who stressed that climate observations are key contributions to the Global Framework for Climate Services (GFCS) and that the up-coming WMO Congress will lead to greater clarification about the role of the GFCS and of the WMO Technical Commission for Climatology (CCI). The Secretary-General also expressed his great appreciation for the engagement of GCOS in the process of the United National Framework for Convention of Climate Change (UNFCCC) and the recent success achieved at the 16th Conference of the Parties (COP 16), December 2010, in Cancún.

The Chair reviewed the proposed agenda, inviting any changes or additions. The adopted agenda can be found in Annex II.

**2 Report from the AOPC Chair**

The AOPC members were pleased to see the summary report by the Panel Chair in which he reported on the activities since AOPC-XV in April 2009. The planned sixteenth session in 2010 had to be cancelled due to travel interruptions caused by the volcanic eruption in Iceland. The Chair in particular gave an outlook of the future work plan for the GCOS Secretariat with special focus on involvement in future GFCS activities. The Chair envisaged the development of a document on data requirements for adaptation in 2012 / 2013, and a review and update of the 2010 Implementation Plan over the 2014 - 2016 period.

The Chair then reviewed the actions from AOPC-XV.

**3 Report of the GCOS Director and Secretariat**

The Director of the GCOS Secretariat, Dr Carolin Richter, reviewed the activities of the GCOS programme and its panels since the last meeting of AOPC. She noted in particular the upcoming 15<sup>th</sup> meeting of the Ocean Observation Panel for Climate (OOPC), 2- 3 April 2011, co-sponsored by the Global Ocean Observing System (GOOS), the World Climate Research Programme (WCRP) and GCOS, in Paris, to be preceded by a "Deep Ocean" workshop and the final discussions on the new framework for ocean observations. She also noted that the 13th session of the Terrestrial Observation Panel for Climate (TOPC), co-sponsored by the Global Terrestrial Observing System (GTOS), GCOS and WCRP will be held 10-11 March 2011, at WMO Headquarters in Geneva. She further highlighted that the GTOS Steering Committee appointed a new Chair in 2009, Professor Riccardo Valentini, and that it approved a new strategy for 2010-2015. The Director pointed out that as a follow-up activity for the call to conduct peer reviews for products based on Essential Climate Variables (ECVs) made by the Director of the WCRP and herself, the WCRP Observation and Assimilation Panel (WOAP), which is co-sponsored by GCOS, will organise a workshop from 18-20 April 2011, hosted by the European Space Agency (ESA)'s Centre for Earth observation (ESRIN), Frascati, Italy. The objectives will be to evaluate satellite-related global climate data sets and to promote inter-comparisons.

The Director mentioned the active participation of the GCOS Secretariat and Chair at the Executive Bodies of its sponsors, WMO, the International Oceanographic Commission (IOC) and the

International Council for Science (ICSU), but also noted that as of today, no invitation to attend the Council of the United Nations Environment Programme (UNEP) had been received.

The panel participants were informed that the 33rd session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) of the UNFCCC had encouraged GCOS to keep under review the adequacy of the observing systems for climate, and to update the GCOS Implementation Plan on a regular basis.

The Director further informed the attendees on the various outreach activities of the Secretariat and on further plans for publications about “GCOS and the UNFCCC” and about “GCOS and observations for adaptation”.

***Actions and recommendations:***

1. The AOPC noted the need to identify how the GCOS could support the GFCS and, in doing so, how it would also support the observations needed for adaptation.

#### **4 World Climate Research Programme Perspective**

The Director of the WCRP, Dr Ghassem Asrar, presented the needs for and contributions to climate observation of the WCRP and pointed to the WCRP Implementation Plan 2010-2015 and to the major topics of the 2010 session of the Joint Scientific Committee, which focused on the WCRP’s vision and long-term planning. The Director noted that observations are indispensable in climate research and prediction and the WCRP will need the sustained support of the AOPC. He called for maintenance and continuous improvement of existing networks. In particular, he asked to add new measurements for the improvement of seasonal and decadal predictions and stressed the importance of open and unrestricted data access.

***Actions and recommendations:***

2. The Panel expressed its appreciation for the close partnership between GCOS and the WCRP and welcomed WCRP efforts to highlight the importance of quality-controlled observational datasets and international peer review, pursued in tandem with GCOS.
3. The Panel identified the need for an initiative to facilitate the intercomparison of reanalysis datasets, analogous to the activity for cross-comparison of modelling results in the Coupled Model Intercomparison Project (CMIP) / Program for Climate Model Diagnosis Intercomparison (PCMDI) and the intercomparison of ECV datasets under auspices of the WCRP Observations and Assimilation Panel (WOAP).

#### **5 GSN, GUAN and RBCN**

##### **5.1 Monitoring of network performance**

Dr Bruno Rudolph from Deutscher Wetterdienst (DWD), Mr Nozomu Ohkawara from the Japan Meteorological Agency (JMA) and Dr Matthew Menne of the US National Climatic Data Center (NCDC), reported on performance monitoring of the GCOS Surface Network (GSN), the GCOS Upper-air Network GUAN and the WMO Regional Basic Climatological Networks (RBCN) networks.

***Actions and recommendations:***

4. The Panel expressed its thanks to the Deutscher Wetterdienst (DWD) and the Japan Meteorological Agency (JMA) for their services as GSN Monitoring Centres and their proactive role as Commission for Basic Systems (CBS) Lead Centres in their respective areas of responsibility. It was pleased to see numerous network improvements due to their ongoing effort.

5. The Panel encouraged the temporary use of email for the submission of CLIMAT data to DWD when other telecommunication means are deficient.
6. The Panel appreciated the kind offer by DWD to host the next CBS Lead Centre meeting.
7. It also suggested that the DWD and JMA consider changing their display software, as the performance reports are implemented using software that is no longer supported by the supplier and only works with the Internet Explorer browser. Users have expressed frustration when they are unable to display the reports.
8. The Panel was concerned to be informed of continuing problems with data transmission on the WMO Global Telecommunication System (GTS). These were partly due to coding problems and non-responsive Regional Telecommunication Hubs (RTHs). This was especially a concern for messages beginning to be coded in the Binary Universal Form for the Representation of Meteorological Data (BUFR) table-driven format. A recent test of BUFR formatted CLIMAT reports showed many were lost within the GTS. The Panel urged CBS to resolve this issue.
9. The Panel reiterated the need by WMO Members for guidance in using BUFR as a format to exchange CLIMAT messages, and for tools to help introduce its use. The monitoring centres have long been concerned that when the BUFR encoding is implemented a serious loss of CLIMAT reports is likely. The CCI representative pointed out the potential for Climate Data Management Systems (CDMs) to assist with BUFR encoding
10. The Panel was pleased to see the increase in the number of CLIMAT messages from Regional Basic Climatological Network (RBCN) and Regional Basic Synoptic Network (RBSN) stations (for example, from Spain and Germany) and reminded countries that they should seek to fulfil their obligation to submit CLIMATs from their RBCN stations, and encouraged them also to submit CLIMATs from as many RBSN station as possible.
11. The Panel welcomed the offer of DWD to extend its monitoring of CLIMAT messages to include the RBCN stations.
12. The panel appreciated the CCI offer to assist GCOS Lead Centres in carrying out their responsibilities, through structures that might include, for instance, a joint CCI / GCOS Task Team.
13. The Panel thanked the NCDC for their continuing efforts as GSN-GUAN Analysis and Archive Centre. It was concerned by the apparent lack of response to the WMO letter to Members that called for transmission of historical daily and sub-daily data to the Centre.
14. The Panel supported efforts by NCDC to inform Members about the availability of climate datasets and analysis tools, in an attempt to demonstrate the benefit of submitting data to the Centre.

## **5.2 Report from AGG**

The Advisory Group on GSN and GUAN (AGG) met prior to the AOPC-XVI meeting on Monday 7 February 2011. The report is attached as Annex III.

## **5.3 GSN and GUAN: System Improvement & Secretariat Activities**

The GCOS Implementation Project Manager, Mr richard Thigpen, presented an overview and status report on recent initiatives to revitalize the GCOS upper-air and surface networks and to improve the overall performance of these important baseline networks. These initiatives include direct

renovation projects, Regional Technical Support Projects, the activities of the CBS Lead Centers for GCOS Data, and various training workshops.

***Actions and recommendations:***

15. The Panel noted with appreciation the efforts by the GCOS Implementation Manager, and thanked the donors to the GCOS Cooperation Mechanism (GCM), while noting the issue of long-term funding. The Panel concurred with the views expressed by GCM donors that the limited funds available through the GCM should not be used on a long-term basis for supply of expendables to GUAN stations.
16. The Panel recalled that a proposal for designation of Bamako and Pointe Noire as GUAN stations had been referred to them by the GCOS Steering Committee (GCOS SC). As both stations had fallen silent following the conclusion of African Monsoon Multidisciplinary Analysis (AMMA), and were located in a region where there was reasonable coverage of operating GUAN stations, the Panel could not recommend that Bamako and Pointe Noire be designated the status of GUAN stations.

#### **5.4 Policy for Non-compliant stations**

Participants discussed possible policies for non-compliant GSN and GUAN stations, such as poorly performing stations or those that have been silent for a considerable period of time.

***Actions and recommendations:***

17. The Panel recommended the following policy for GSN and GUAN stations in recognition of concerns with station performance: in case of persistent problems in the receipt of data according to the Guide to the GSN and GUAN (GCOS-144), a letter should be sent either from WMO to the corresponding Permanent Representative with WMO or from the GCOS Secretariat to the GCOS focal point highlighting the issue. WMO constituent bodies and Technical Commissions (such as CCI) could also be used to establish contacts with Members. In absence of a satisfactory response, the station should be removed from the network.
18. The Panel reiterated the importance it attached to the provision of full metadata records, as laid down in the recent publication GCOS-144. It further noted that much credible information could be extracted from historical records from stations even if they do not comply with minimum site standards. In this regard, the panel emphasized the importance of NCDC completing implementation of its Multi-network Metadata System (MMS).
19. The Panel stressed the importance of the temporal continuity of records, so that if a station does not follow the preferred operational practice, for example in calculating the monthly mean temperature, the practice should not be corrected if the continuity of the record cannot be guaranteed.
20. In addition, the Panel would welcome an update of the status of NCDC's digitization of its holdings of data from African countries.

#### **5.5 Report on availability of sunshine, water vapour data in CLIMAT**

Dr Bruno Rudolf from the DWD reported on the availability of sunshine and water vapour data in CLIMAT messages.

***Actions and recommendations:***

21. The Panel was pleased to note that the number of water vapour pressure observations contained in CLIMAT messages was not substantially lower than the number of temperature observations. Sunshine records were provided in the messages from most countries, but

measurements were not (or had not in the past been) in general made at US stations and in Brazil and Canada.

## **5.6 Report on 2nd CBS Lead Centres Meeting Outcomes**

Meeting participants were briefed on the outcomes from the 2nd CBS Lead Centres' Meeting, held November 2009 in Geneva. The upcoming 3rd CBS Lead Centres' Meeting will be hosted by DWD in Hamburg, Germany, from 11-13 October 2011.

### ***Actions and recommendations:***

22. The Panel thanked Dr Shanklin for his presentation on the status of the CBS Lead Centres for GCOS, which highlighted their importance for the functioning of the GSN and GUAN, and increasingly of the RBCN. It was interested in his presentation of examples for GSN stations in different environments, with a focus on polar regions. The Panel in particular appreciated Dr Shanklin's achievements in significantly improving network performance in Antarctica.
23. The Panel was disappointed to learn of the 5% loss of radiosonde data for some Antarctic GUAN stations due to GTS problems.
24. The Panel was pleased to be informed that WMO Publication No. 9, Vol. A now provides a more precise specification of station location metadata where available. The Panel asked for a report from the WMO Observations and Information Systems Department at its next session on the progress made with the actual inclusion of updated coordinates.

## **6 Other Atmospheric Networks and Issues**

### **6.1, 6.2 GRUAN**

The Head of the GCOS Reference Upper-air Network (GRUAN) Lead Centre, Dr Holger Vömel, gave an overview on progress in the development of the GRUAN, followed by the report from the Chair of the AOPC Working Group on Atmospheric Reference Observations (WG ARO), Dr Peter Thorne.

### ***Actions and recommendations:***

25. The Panel appreciated the briefing by the Head of the GRUAN Lead Centre on the motivation and development status of the GRUAN, including the treatment of measurement uncertainties, the data dissemination model and next steps to decide on remaining issues, such as the scheduling of radiosonde launches.
26. The Panel also appreciated the presentation by the Chair of the Working WG ARO, expressing his concerns on organizational and governance issues related to GRUAN. The Panel considered the rules for selection of new sites, or removal of existing sites from the GRUAN, were a matter for either WG ARO or the Lead Centre to develop. The Panel recommended that WG ARO considers the development of a self-certification procedure, which may be applied by sites, for a limited period at least. Sites would also be monitored by the GRUAN Lead Centre.
27. The Panel encouraged as many GRUAN stations as possible to transmit their non-quality controlled data in near-real-time onto the GTS, so that basic monitoring by Numerical Weather Prediction (NWP) centres and collocations with hyperspectral infrared soundings and Global Positioning System (GPS) radio occultation data could be made routinely.
28. The Panel noted the request of WG ARO that an independent scientific advisory panel be set up. The Panel considered that the GRUAN programme should be reviewed under the auspices of AOPC three years after data was flowing regularly. This review should consider

whether an independent layer of network management (including independent site certification) and/or assessment was advisable and feasible.

29. AOPC noted that the GCOS SC had welcomed in September 2010 the steps being taken by CBS towards integration of the GRUAN towards CBS structures. It furthermore noted the outcome of CBS-EXT in November 2010 which  
“agreed on a mechanism for the development of observing practices for the GCOS Upper-Air Reference Network (GRUAN) stations. For GRUAN to become fully operational, its operational practices will have to be accommodated in the WMO Regulatory Material, in particular in the Manual and Guide on the GOS. The Commission agreed that an expert meeting should be organized to finalize these practices with a view of submitting them to CBS-XV for consideration. It requested the chairpersons of the Expert Team on Evolution of the Global Observing System (ET-EGOS), the Expert Team on Surface-based Remotely-Sensed Observations (ET-SBRSO) and the Expert Team on Satellite Systems (ET-SAT) to nominate members participating in this effort together with the OPAG-IOB Rapporteur on Regulatory Material. It was agreed that the GCOS Secretariat will be in charge of coordinating these activities.”
30. The Panel would welcome feedback from the upcoming third Implementation-Coordination Meeting (ICM-3) on these issues. A small number of succinct points could be presented by them to the AOPC Chair, with a view to him forwarding them as appropriate to the GCOS SC for their consideration.
31. The Panel decided to recommend to the GCOS SC that the review of the GRUAN Lead Centre in 2012 should be undertaken under the auspices of AOPC, based on reports from the Lead Centre and the Chair of WG ARO. Such reports should be provided to the Chair of AOPC by 31 March 2012, to enable AOPC to make a recommendation to the SC.

### **6.3, 6.4 Implementation and use of AWS; WMO CCI issues, CCI-15 in particular**

The meeting was briefed by the co-chair of the Open Panel of CCI Experts on Climate Data Management (OPACE 1), Dr William Wright, on issues related to CCI, such as standards and recommendations of Automatic Weather Stations (AWSs) for climate purposes developed by the CCI Expert Team on Observing Requirements and Standards for Climate (ET-ORSC). He further presented results and recommendations from the 15<sup>th</sup> session of the CCI.

#### ***Actions and recommendations:***

32. The Panel welcomed the informative briefing by the CCI representative on the Commission's activities. It looked forward to even closer collaboration and synergy between CCI and the GCOS panels.
33. The Panel welcomed the development under CCI auspices of a guide on the climate-sensitive use of AWSs at surface meteorological stations that would not endanger the climate record. The guide will provide meteorological services with advice on planning the introduction of AWSs, on the operation of stations including overlap, the introduction of new instrumentation, data backups, network optimisation (e.g. configuration of complementary manual and automated stations), and data management.
34. The Panel thanked the OPACE 1 for investigating with WMO Members their views on changing the climatological base period from 1961-1990 to 1981-2010.
35. The Panel commended the collaboration by WMO and NCDC to compile a letter to all WMO Members by March 2011, calling for the yearly submission of World Weather Records (WWRs) to the World Data Centre – Meteorology at NCDC. The letter should clearly

describe the benefits for countries of submitting data, such as online analysis tools and access to the data at the Centre. Such submissions would substantially improve the climatological database on a regular basis that is available to the international community, and would better support studies of climate variability and extreme events.

36. The Panel recommended that CBS Lead Centres for GCOS should, in their work with countries, reinforce the message conveyed by this letter, and generally encourage Members to contribute more data to WWRs. As noted by the CCI representative, annual submission of data to WWRs could potentially be facilitated by adding the functionality to the CDMS.
37. The Panel noted that many countries were automating production of CLIMAT messages at a central location. The current WMO recommendation was that messages should be produced at the station, as this allowed capture of all information that was needed for a complete CLIMAT message. The meeting recommended that automation of CLIMAT production should be used, particularly where it led to greater availability of CLIMAT messages, but where practicable stations should remain involved by completing unresolved fields in the message. To this end the panel noted the potential for CDMS to generate automated CLIMAT messages, and that the development of this functionality was part of the CCI OPACE 1 2010-2013 Work Plan.

#### **6.4a Global Surface Temperature Initiative**

The developing land surface temperature initiative of the UK Met Office and in particular the workshop held in Exeter, UK, in September 2010 were outlined by Mr Blair Trewin from the Australian Bureau of Meteorology.

##### ***Actions and recommendations:***

38. The Panel expressed its appreciation for the briefing on the Global Surface Temperature Initiative given by Mr Blair Trewin on behalf of the chair of its ad-hoc steering committee, Dr Peter Thorne (NCDC). The Initiative, endorsed by WMO, WCRP and GCOS, should inter alia, aim at better accessibility of temperature and, eventually, precipitation data from countries.
39. The Panel invited the proponents of the Initiative to provide a report on the proposed governance of the Initiative, once an agreement has been reached. The Panel also noted that to date, no official WMO focal point has been identified for the Initiative.
40. Crowd-sourced digitization is a suggested means of transcribing the large amounts of data on paper records into accessible electronic forms. However the CCI representative expressed the need for caution in such enterprises, citing the example from his own organisation when an experiment with external contractors led to an unacceptably high number of errors. The possibility of multiple-key entry of the data was discussed, and the CCI representative cautioned that there needs to be some means of evaluating whether this technique led to a suitably satisfactory reduction in key-entry errors. The Panel stressed the need for such an evaluation of whether this technique leads to a satisfactory reduction in key-entry errors.

#### **6.5 BSRN: Science and Operations Upgrade**

Dr Martin Wild gave an overview on the current operational status of the Basic Surface Radiation Network (BSRN) and presented a number of scientific applications of these data. He further summarized the outcome of the recent 11<sup>th</sup> Biennial BSRN Scientific Review and Workshop, held in Queenstown, New Zealand, in April 2010.

##### ***Actions and recommendations:***

41. The Panel thanked the representative from the BSRN community for his informative presentation on science and operations of the network. It was pleased to see the growth in the total number of stations worldwide. It noted, however, the lack of stations in Africa and Central Asia, partly due to funding problems.
42. The Panel recommended that BSRN liaise with OOPC and the operators of ocean mooring-based radiation measurement, with a view to improve observational coverage over the ocean (which is important to estimate atmosphere-ocean heat transfer).

## **6.6 Progress in improving GTS Data Exchange**

This is covered above under agenda items 5.

## **6.7 Progress in implementing the WIS**

40. The Panel appreciated the comprehensive report it received on the WMO Information System (WIS) and welcomed the development of a WIS Manual and Guidelines, which will facilitate acceptance of the system by users. The Panel noted with approval that the WIS accommodates any common data format since it provides a catalogue of metadata and pointer to data providers.

## **6.8 Implementation of WIGOS and GOS, and Implications for GCOS**

41. The Panel also appreciated being given an update on the development of WIGOS and looked forward to support the coordination of GCOS with WIGOS-related activities.
42. The Panel noted the availability of a draft updated Implementation Plan on the Evolution of the Global Observing System (EGOS-IP). It further noted that the GCOS community had been invited to comment, in particular on sections 5 and 6 of the EGOS-IP, by 31 March 2011 if possible. (The draft document is available at: <ftp://ftp.wmo.int/Documents/PublicWeb/www/gos/egosip/>).

## **7 Atmospheric Forcing**

### **7.1-7.5 GAW Overview, CO<sub>2</sub> and CH<sub>4</sub> Network, Aerosol Networks, Ozone Networks and Data Exchange Issues, and the WDCGG**

Dr Oksana Tarasova and Dr James Butler reported from the Global Atmospheric Watch (GAW) Programme activities with particular focus on the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O Networks, as well as the Aerosol Networks. Dr Geir Braathen briefed meeting participants on the Ozone Network and the status of data exchange in GAW and non-GAW atmospheric composition networks, followed by a report from Mr Nozomu Ohkawara from the WMO World Data Centre for Greenhouse Gases (WDCGG) operated by JMA since 1990.

#### ***Actions and recommendations:***

43. The Panel was pleased to receive a comprehensive overview of GAW activities, in particular on the ozone, greenhouse gas (including CO<sub>2</sub>, CH<sub>4</sub>) and aerosol networks.
44. The Panel thanked the GAW representative for clarifying the accessibility of ozone data from GAW world data centres and encouraged continuation of the efforts to make ozone and aerosol data available in near real time to the scientific community
45. The Panel recommended to the GCOS SC that subsets of the WMO GAW CO<sub>2</sub> and CH<sub>4</sub> networks be recognized by GCOS as baseline networks, and that an agreement be forged between GCOS and the WMO Atmospheric Research and Environment Programme (AREP)

Department / GAW on this issue (as has been done in the past for CO<sub>2</sub>, CH<sub>4</sub> and the ozone networks).

46. The Panel recommended to the GCOS SC that a similar recognition be given and agreement be reached, for the WMO GAW N<sub>2</sub>O network as a comprehensive network, and a subset thereof as a baseline network.
47. The Panel furthermore appreciated the important work done at the WMO-GAW WDCGG, hosted by JMA, with assistance of the US National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL) in the development, and the WMO Secretariat for the production and publication, of the annual WMO Greenhouse Gas Bulletin. This Bulletin, published every year in conjunction with the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change, gives valuable visibility to WMO in general and to GAW in particular.
48. The Panel was pleased by progress made since its last session on developing the component of an Integrated Global Aerosol Observing System (IGAOS) within the framework of GAW and requested an update at its next session on a proposal that GCOS recognize these networks. The Panel recommended that the GCOS Secretariat should make suggestions on how it might support activities to further the development of IGAOS.

## **7.6 GCOS and the proposed IGCO system**

Prof Han Dolman, Chair of the TOPC, reported on recent activities in the terrestrial domain where several new ECVs have been identified in the 2010 Update of the GCOS Implementation Plan (IP-10). He particularly focussed on the development of standards and guidelines for terrestrial ECVs and the establishment of a terrestrial framework, as well as the Group on Earth Observations (GEO) Carbon strategy.

### ***Actions and recommendations:***

49. The Panel welcomed the briefing by the Chair of TOPC on progress in his area of activity, in particular the GEO Carbon Strategy (formerly known as IGCO) aiming at a comprehensive global observing system for carbon. It recommended that GCOS provide more programmatic support to the Strategy, given its overlap with the 2010 Update of the GCOS Implementation Plan. It also invited its Members to provide comments on the Strategy.
50. The Panel noted the importance of effective outreach material, such as the brochures on terrestrial ECVs prepared under GTOS Secretariat auspices. The Panel recommended that outreach material be prepared on the other ECVs, with the assistance of panel members, and taking into consideration existing documentation on ECVs, such as the GCOS Implementation Plan and its Satellite Supplement, information from the Global Observing Systems Information Center (GOSIC) webpage, and the planned WIKIs of the ESA Climate Change Initiative (CCI) and of the GCOS Secretariat.

## **7.7 Development of a Terrestrial Reference Network**

51. The Panel noted progress in the development of the UN/ISO-based Framework for Terrestrial Standards and encouraged the Secretariat to support any related activities.
52. The Panel encouraged institutional leverage with WMO, the UN Food and Agricultural Organization (FAO) and other institutions and programmes (e.g., ESA, Fluxnet, the Committee on Earth Observation Satellites (CEOS) Working Group on Calibration and Validation (WGCV)) on the proposed white paper on the terrestrial reference network (Action T3 in the IP-10).

## **8 Satellite Issues, Data and Products**

### **8.0 Updated GCOS Satellite Requirements**

The AOPC Chair outlined the series of GCOS publications “in support of the UNFCCC” and explained the procedure for currently preparing an update of GCOS Satellite Requirements following the 2010 update of the Implementation Plan.

#### **Actions and recommendations:**

53. The Panel thanked Prof Paul Mason and Dr Stephan Bojinski for their work as editors of the 2011 Satellite Supplement to the 2010 Update of the GCOS Implementation Plan and encouraged its Members to review the draft Satellite Supplement once available for open review.
54. The Panel discussed the challenges of providing meaningful threshold and breakthrough observation requirements for satellite-based ECV products, in the context of the WMO Rolling Requirements Review (RRR), since the utility of datasets for climate applications often becomes apparent only over time. The Panel noted nevertheless the value of the GCOS satellite requirements in the RRR as a basis for space agency planning.

### **8.1 Progress in the updated CEOS response to the GCOS 2010 Implementation Plan Update**

55. The Panel expressed its appreciation for the thorough and well-managed response to the 2010 Update of the GCOS Implementation Plan that CEOS is leading, as presented by Dr Mitchell Goldberg. It invited its Members to provide feedback on the template used by CEOS to identify actions and agency commitments.
56. The Panel recommended that the GCOS Secretariat give consideration to ways to effectively encourage Parties and international organizations to respond to 2010 Update of the GCOS Implementation Plan actions related to *in situ* observations.

### **8.2 NOAA Activities related to Climate Monitoring, including the MW-sounding temperature consensus data set initiative**

57. The Panel appreciated the paper by Dr Goldberg showing how comparisons of Atmospheric Infrared Sounder (AIRS) and Infrared Atmospheric Sounding Interferometer (IASI) radiances with those simulated from reanalyses can be used for independent validation of the climate reanalyses, in particular to improve understanding and reconcile differences between the reanalyses. He noted that to monitor differences between the reanalyses, there needs to be radiative transfer code which agrees at the 0.2 K level with observed values. GRUAN radiosondes collocated with AIRS and IASI are critical for reducing uncertainties in radiative transfer and for demonstrating the accuracy of the radiative transfer algorithm, as well as for validating the AIRS and IASI data. Given confidence in AIRS and IASI, the reanalysis and NWP communities will be encouraged to assimilate the original AIRS and IASI data without bias corrections, and remaining differences between reanalyses will be primarily due to model physics.

### **8.3 Climate Model validation activities at the Met Office Hadley Centre; ESA Climate Change Initiative General Overview**

58. The Panel acknowledged the work presented by the UK Met Office in using satellite data for validation of climate models. It welcomed the use of observation simulators that convert model output into a simulated satellite signal, thus facilitating a more exact comparison of model output and satellite data.

59. The Panel welcomed the overview of the ESA CCI, which responds to GCOS satellite requirements and the need for seamless satellite climate data records. It noted that this initiative through the Climate Modelling User Group (CMUG) provides a framework for modellers and observers to understand better each other's needs and priorities.

#### **8.4 Report from CGMS-38**

Dr Johannes Schmetz reported on EUMETSAT Climate Activities and on the 38th meeting of the Coordination Group for Meteorological Satellites (CGMS), held in New Delhi, India from 8-12 November 2010.

##### ***Actions and recommendations:***

60. The Panel was pleased to hear the comprehensive report on the CGMS issues. The Panel recommended that all agencies participating in the Global Space-based Inter-Calibration System (GSICS) record satellite calibration anomalies and provide that information online.
61. The Panel expressed support for the ongoing activities toward a space-based architecture for climate monitoring. It also strongly supported the view that the future space-based architecture should build on existing foundations, and establish new elements and improvements only where necessary. Currently available building blocks (existing and planned satellite programmes, international coordination mechanisms) should be the basis for the architecture and be woven together effectively, recognizing different but complementary roles, and the multi-domain nature of the GCOS ECVs. A key aspect of the architecture should also be coherent weaving-together of space-based measurements with in-situ observations.
62. The Panel welcomed the initiative of CGMS members to undertake support of the Global Cryosphere Watch (GCW) in terms of identifying relevant operational satellite products and also developing new satellite-derived climate products. The products should come with an adequate estimate of uncertainties which in turn will help to better understand differences between and among comparable products.
63. The Panel was pleased to see the recommendations by CGMS to its members to consider the development of new operational sensors for cryospheric variables, notably snowfall. It reiterated that such plans existed yet did not materialize in spite of the inherent importance to observations of the hydrological cycle.
64. The Panel welcomed the development of GSICS product-acceptance procedures and encouraged their further development. It further recommended that NOAA submit the current version of the Advanced Very High Resolution Radiometer (AVHRR) dataset for GSICS product acceptance.
65. The Panel thanked the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and JMA for their reprocessing work and for making the data available to other centres. It further noted the CGMS initiative on intercomparison of Atmospheric Motion Vectors (AMVs) and its benefits for the Sustained Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM).
66. The Panel was pleased to learn that agencies are taking steps to close existing gaps in atmospheric composition measurements. It was noted with satisfaction that plans are being moved forward for future missions, notably the pertinent ESA pre-cursor mission and the Sentinel-5 mission to be flown on the successor to the current system of Metop satellites. The Panel remains concerned nevertheless with the lack of plans for an upper-tropospheric / lower-stratospheric limb-sounding mission.

67. The Panel took note of the ongoing action of CGMS members to review the draft mapping of the Gap Analysis performed under WMO lead onto the GCOS ECVs. The work is considered useful because it is an important starting point for further analysis and for clarifying the implications of existing gaps. The Panel would be interested to learn about the outcome of the review by CGMS members.
68. The recommendation by CGMS-38 to consider ways and means to strengthen the support to international scientific expert teams was very much welcomed by panel participants; it was emphasized that this support is a pre-requisite for the consistent and coordinated progress of the science and applications of the satellite observations. An open and generally supportive policy of the space agencies to provide this support is more than welcome.
69. At CGMS-38 the Chinese Meteorological Agency (CMA) reported on the use of surface targets in China for vicarious satellite calibration. The importance of the effort was recognized by the Panel. Clearly the new targets will be beneficial to improve the accuracy of satellite measurements and it would also be an important contribution to GSICS.
70. The use of radio-occultation measurements to assess remaining bias errors in the Microwave Sounding Unit (MSU) / Advanced Microwave Sounding Unit (AMSU)-A data records for monitoring long-term atmospheric temperature trends was discussed at CGMS-38. The Panel strongly subscribed to this ongoing work because it will further improve the quality of the long-term MSU / AMSU-A data records. The Panel also noted the good progress that has been made in recent years by the various groups working with the MSU radiances. Understanding of instruments and of the biases between successive instruments has been greatly advanced, which in turn increases the confidence in this important source of information on atmospheric temperature trends.
71. The Panel also raised the potential of radio-occultation measurements to effectively connect the individual radiosonde stations of the GRUAN; in fact radio-occultation measurements on satellites could be considered to be a travelling reference for the upper tropospheric and stratospheric temperatures.

## **8.5 EUMETSAT Activities related to Climate Monitoring**

72. The Panel welcomed the briefing on EUMETSAT activities in support of climate monitoring, both mission planning and reprocessing datasets. It stressed the need for functioning international expert groups to compare climate datasets and called for follow-up to the GCOS/WCRP initiative that asked for support to such groups. In tandem with the published GCOS Guideline (GCOS-143), intercomparisons will effectively provide fitness-for-purpose assessments.

## **8.6 Development of the SCOPE-CM Initiative, including maturity index**

73. The Panel noted progress in the development of SCOPE-CM and supported the work of the ongoing pilot projects. It encouraged the addition of ocean and terrestrial-specific pilot activities to SCOPE-CM.

## **8.8 Satellite Activities for climate at JMA**

74. The Panel thanking Mr Nozomu Ohkawara for his presentation. The Panel's conclusions are covered by points recorded for items 8.2 and 8.4.

## **8.9 Recognition, Feedback and intercomparison Mechanisms, including the planned WOAP workshop**

75. The Panel recommended that the GCOS Secretariat and WCRP prepare a follow-up letter to institutions regarding support to international peer review of climate datasets, with clear explanation of the objective and with best practice examples, drawing on conclusions from the WOAP ECV workshop.

## **9 Marine Issues**

### **9.1 Report from OOPC**

Dr Eric Lindstrom, Chair of the OOPC, reported from recent activities in the oceanic domain, such as the evolving Integrated Framework for Sustained Ocean Observing (IFS00).

#### ***Actions and recommendations:***

76. The Panel welcomed the briefing by the OOPC Chair. It recognized the need for more emphasis on interface variables and cross-domain issues, atmosphere-ocean in particular, and recommended to include an expert on marine boundary layer and atmosphere-ocean interaction on the Panel.
77. The Panel recommended that the next iteration of the GCOS Implementation Plan should fully account for ocean, atmosphere and flux requirements on the observing system (radiation, gases, momentum, freshwater, sensible and latent heat). A new joint AOPC-OOPC mechanism should be developed over the coming years addressing this subject area.
78. The Panel noted the recommendation from the OOPC Chair that the Sea-Surface Temperature (SST) / Sea-Ice WG be thanked for its efforts over the years and that a new structure for meeting the needs of OOPC and AOPC concerning sea ice and SST products be considered. The AOPC Chair undertook to discuss this with the Chair of the WG.
79. The Panel indicated its support to the evolving IFS00 and was interested in how to best use the link between the IFS00 Readiness Levels and the SCOPE-CM Maturity Matrix.

### **9.3 Report from the Surface Pressure Working Group**

80. The Panel encouraged continuing support to data rescue activities and the establishment of best practices. It emphasized the importance of initiatives such as the 'Atmospheric Circulation Reconstructions over the Earth' (ACRE) project in spearheading such efforts which have proven tremendously valuable for better understanding of past climate variability and change. It also recognized the increasing use of citizen scientists' contributions to data digitization.

## **10 Terrestrial Issues**

### **10.1 Report from TOPC**

This is covered above under agenda items 7.6 and 7.7.

### **10.2 Report from Workshop on estimation of Net Primary Production (NPP) at A-O-T interfaces**

**Actions and recommendations:**

81. The Panel thanked the Joint Research Centre (JRC) of the European Commission for organizing and supporting a joint workshop, co-sponsored by AOPC, OOPC and TOPC, on assessing the productivity of the global biosphere in Ispra, Italy, in June 2009.
82. The Panel recognized the parallelism in the physical meaning of land and ocean-based downwelling Photosynthetically Active Radiation (PAR), highlighted in the report from that workshop, and endorsed the generation of a common language and terminology across both domains. It stressed the need for coherent, compatible models to characterize Primary Production (PP) seamlessly over terrestrial and oceanic environments and recognized the organic links between the productivity of the biosphere and the characterization of the carbon cycle at the Earth's surface.
83. The Panel recommended liaison with the Global Energy and Water Cycle Experiment (GEWEX) SRB project for possible synergies on a separate PAR surface irradiance product; it also asked OOPC to explore the possibility of installing sensors on ocean moorings that would provide PAR observations.
84. The Panel recommended that solar irradiance in the PAR spectral region should be included as a required product in the surface radiation budget section of the GCOS Implementation Plan and its Satellite Supplement. Until such a product is routinely generated with sufficient accuracy, PAR irradiance can be approximated on the basis of information on clouds, aerosols, surface albedo and ancillary data such as gaseous atmospheric absorbers, altitude, etc. This implies a strong dependence of the biosphere primary productivity on a number of other ECVs. The Panel confirmed the need to elucidate biases between existing Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) products and suggested that a similar product for marine environments be developed. Furthermore, a systematic inter-comparison of methods within and across land and ocean domains is required.
85. The Panel also highlighted that the impacts of land use and land cover change on CO<sub>2</sub> emissions need to be better characterized.

**11 Cryospheric Issues**

86. The Panel highly appreciated the briefing on the status of the GCW.
87. The Panel noted persisting issues with the international exchange of snow data. The Panel reiterated the need for centres for implementing snowfall data exchange and monitoring, and for initiating a process in designating such centres, building on existing international data centres (cf Action 8 from AOPC-XV, 2009).
88. The Panel invited its Members to provide the Executive Council Panel of Experts on Polar Observations, Research and Services (EC-PORS) with comments or suggestions on the GCW implementation strategy as provided as references in document 11.1, especially on the view of next steps that could benefit AOPC and the wider GCOS programme.
89. The AOPC will undertake discussions with the chairs of TOPC and OOPC with a view of establishing a better way of handling the interface issues; with reference to the cryosphere, the Chairs will look for a way to support and be supported by GCW, as well as to identify GCW focal points if appropriate.
90. The Panel recommends that the GCOS SC should discuss the GCOS panel structure, for example with a view to engage in an effective dialogue with the future GCW.

## **12 Integrated Products, including Reanalyses**

### **12.1 High-resolution precipitation data set**

91. The Panel welcomed a status report by Dr Andreas Becker of the Global Precipitation Climatological Centre (GPCC) and took note of the progress GPCC made in pursuit of its mission. The Panel endorsed GPCC plans to extend the scope of its activities towards continuous monitoring of global daily land-surface precipitation based on observations from rain-gauge networks, in addition to its activities for monthly observations. The AOPC encouraged the GPCC to liaise with the GCOS Secretariat on follow-up. The Panel stressed that documentation of GPCC activities in the scientific literature was critical to improve take-up of GPCC products.
92. The Panel supported the distribution of a circular letter by WMO to its Members emphasizing the importance of the GPCC activities and achievements, and asking NMSs for support of GPCC by provision of non real-time monthly and daily precipitation station data (existing letter to be amended by the GCOS Secretariat in collaboration with GPCC). It also called on the WMO Secretariat to continue assisting, when needed, in improving working relations between GPCC and WMO Members, and in promoting the international exchange of rain gauge data and metadata.

### **12.2 JMA Reanalysis report**

93. The Panel was pleased to learn from Mr Nozomu Ohkawara of good progress in the development of the new JRA-55 reanalysis and looks to continued good liaison with the other centres undertaking reanalysis.

### **12.3 US Reanalysis efforts**

94. The Panel thanked Dr Michael Bosilovich for reporting on the status of both the Modern Era Retrospective Analysis for Research and Applications (MERRA) and 20<sup>th</sup> Century Reanalysis (20CR).
95. The panel were interested to be informed that the 20CR (1878-2008) reanalysis of surface pressure observations produces 500mb anomaly height correlations comparable to current 3-day forecast skill. The variance of the reanalysis ensemble members can be used for a measure of uncertainty of the reanalysis. An example of this uncertainty estimate was provided for case studies in the early 1920s and contrasted with the 1970s. The Panel noted the continuing data recovery efforts that this project benefited from, and that subsequent century scale projects would be improved by further data recovery.
96. The Panel noted that MERRA in contrast uses a large suite of satellite observations for the recent period (1979 present and continuing). While intercalibrated MSU channels are assimilated, the reanalysis changes when AMSU becomes available. The quality of the reanalysis at any given time is an improvement over previous generations of reanalysis, but the changing observing system (and how model bias is characterized) prevent time series analysis. The changing observing system can be quantified with principal component analysis of the analysis increments.
97. The Panel welcomed in particular the information that the Archive of MERRA Innovations and Gridded Observations (AMIGO) will soon be released. AMIGO provides the observations that were assimilated into MERRA on the MERRA grid, which will provide researchers straightforward access to the assimilated observations and how the assimilation used each observing system (observation minus forecast, observation minus analysis).

98. The Panel noted a status report on us National Centers for Environmental Prediction (NCEP) reanalysis activities given by Dr Mitchell Goldberg.

#### **12.4 ECMWF Reanalysis Update**

99. The Panel was informed by its Chair of the progress of ERA-Interim and welcomed the activities planned for ERA CLIM, which would include significant data recovery efforts, a new reanalysis for the 20th Century using surface observations, a successor to ERA-Interim and provision of substantial feedback on the observations used.

#### **12.5 European Regional Reanalyses**

100. The Panel welcomed the briefing by Dr Albert Klein-Tank on the new EURO4M European Reanalysis and Observations for Monitoring. It noted with concern the different data policies within Europe.

101. The Panel welcomed an offer by Prof Phil Jones to report on a similar activity in Saudi Arabia and adjoining states at the next session.

### **13 Climate Indices; Data Rescue; Climate Information for Regional Adaptation**

#### **13.1 Climate and Cities**

102. The Panel expressed its thanks to Prof Sue Grimmond for her presentation on climate and cities. Recognizing the human element with respect to climate change and climate change impacts, and acknowledging linkages between climate change and air quality and among research, observations, and services, the Panel recommended development of a scoping study to evaluate and prioritize observation-related needs for understanding and predicting urban climate.

#### **13.3 Briefing on atmospheric and ocean indices and on Climate impacts in the US**

103. The Panel regretted that circumstances allowed only brief (but informative) remarks on these topics by Dr Tom Peterson. It took the opportunity to congratulate Dr Peterson on his appointment to the presidency of CCI, and thanked him for his many years of service to AOPC.

#### **13.4 WCDMP and Related Issues**

104. The Panel was briefed on these issues by Dr William Wright. It encouraged greater collaboration between OPACEs and GCOS, especially in relation to data rescue, and the potential capabilities provided by CDMS (including CLIMAT automation, submission of data for WWRs, and potentially compilation of messages in BUFR format). The Panel welcomed the publication of the Guide to Climatological Practices, which is currently in translation.

#### **13.5 Update on the CLARIS Project and other network issues in South America**

105. The Panel welcomed the briefing from Prof Matilde Rusticucci on results of the Europe-South America network for climate change assessment and impact studies (CLARIS) project.

#### **13.6 Update on the World Bank Project and ClimDev Africa**

106. The Panel appreciated the update by Dr William Westermeyer on the World Bank Project and Climate for Development in Africa (ClimDev Africa) project. It encouraged the GCOS

Secretariat to continue to seek efforts to improve observations in developing countries through activities similar to these.

107. The Panel noted that the concept of three linked workshops improves capabilities across the region for using data records and model projections for adaptation planning and demonstrates the application of climate information for various sectors. Simultaneously, the national observation data made available in the first workshop contribute to gap filling in the global observation datasets of derived climate indices and of daily station data. In this way, both the NMHSs in the region and the global research community benefit from this activity.

## **14 Climate-related Conferences and Outcomes**

### **14.1 Report on the Development of the GFCS**

108. The Panel thanked the GFCS representative for his informative report on the status of the Framework. It agreed that making natural and human systems more resilient to environmental stress would provide an effective adaptation strategy. Climate services and effective capacity building should support such efforts.

109. The Panel noted that the GCOS is one of the pillars of the GFCS and agreed to support fully the advancement of the GFCS within its scope and mandate.

110. The Panel noted the CCI plans to draft recommendations for capacity building in relation to CDMS implementation, and that this may provide useful input into a more general “best practice” strategy for capacity building, applicable to the GFCS emphasis on assisting Developing and Least Developed countries.

111. The Panel noted once again the importance of access to high frequency weather observations in order to develop national climate service information concerning the frequency, severity and return periods of extreme weather events experienced in the past.

### **14.2 Report on the WMO-BIPM Conference on “Measurement Challenges for Global Observation Systems for Climate Change Monitoring - Traceability, Stability and Uncertainty”**

112. The Panel expressed its gratitude to those institutions that are supporting the Mutual Recognition Arrangement between WMO and the Bureau International des Poids et Mesures (BIPM), and encouraged further progress in ensuring that climate-related measurements, in particular those for greenhouse gases and surface radiation, are traceable to established international scales. Thus, WMO, in addition to providing compatibility among monitoring sites through its Quality Assurance/Quality Control and calibration programmes, will be able to maintain traceability to International System of Units (SI) units through its participation in key comparisons and other metrology institute activities.

### **14.3 Report on GEO-IPCC Workshop on Data for Climate Impact Studies**

113. The Panel looked forward to having the draft recommendations from the workshop circulated with the GCOS secretariat in due time. It emphasized the importance of addressing the need for direct observations of climate change impacts in all parts of the world, particularly in support of the UNFCCC, the GFCS and the upcoming 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR5).

## **15 Climate Science Forum**

### **15.1 WCRP SPARC Perspectives (including data initiative)**

114. The Panel welcomed the overview by the Stratospheric Processes and their Role in Climate (SPARC) programme on its activities, both programmatically and technically. It emphasized the role of satellite observations to establish climatologies and study long-term changes. It also emphasized the relevance of networks of ground-based and balloon measurements of temperature, H<sub>2</sub>O, and O<sub>3</sub> and their role for validation purposes (models and satellite products).

115. Given the importance of long climate records from individual instruments, the Panel encouraged space agencies to do everything they can to prolong the lifetime and exploitation of currently flying instruments on ESA's Environmental Satellite (ENVISAT), Odin, Science Satellite-1 (SCISAT-1), and Earth Observation Satellite (EOS), and to provide the funding to improve the data products from these missions. The Panel noted with concern that the likely gap in future limb missions implies that no vertically resolved stratospheric and mesospheric trace gas measurements will be available when the current missions end (most of them are long past their scheduled lifetimes). It also discussed the current lack of direct space-based observations of stratospheric winds, which restricts meteorological reanalyses to assimilation of wind data only from the sparse radiosonde network in tropical regions. The Panel emphasizes the urgent need to plan and fly new atmospheric limb sounder missions in order to remedy this situation.

116. The Panel welcomed the briefing on the different SPARC activities on assessments of observations, in particular the SPARC Data Initiative, and encouraged continuation of these assessments to help guarantee knowledge on the quality and validity of available and new measurements, and to establish long term data sets supported by the whole community.

## **15.2 Urbanization influences on surface temperature trends**

117. The Panel welcomed a presentation by Prof Phil Jones on recent studies on the influences of urbanization on the surface temperature trends. A basic conclusion is that any residual warming due to urbanization is an order of magnitude less than the general warming that has occurred over the last 100 years. Overall, the urban effects in the global temperature record are found rather small.

## **16 AOPC Observation Requirements for GCOS Essential Climate Variables (ECVs)**

### **16.1 General Review of ECV Status**

118. The Panel discussed mechanisms of regularly reviewing and providing supplementary information on the ECVs, other than by updating the GCOS Implementation Plan, in particular to formulate finer definitions of 'aerosols' and 'albedo'.

119. The Panel welcomed the undertaking by GCOS Secretariat to make additional background information on GCOS ECVs available in form of Wiki pages, which are currently in a draft stage.

120. The Panel encouraged as a first step the Panel chairs to assist the Secretariat in moderating 'their' domains and to consider distributing responsibilities among Panel members if the effort involved becomes too great.

### **16.2 Revision of AOPC Observation Requirements**

121. The Panel discussed the revision of AOPC observation requirements as expressed in the WMO Rolling Review of Requirements, and noted that revision would be necessitated in

part from the updating of the Satellite Supplement but that there were other matters to be clarified. The Chair undertook to discuss these with other interested parties.

## **17 Summary of Decisions and Actions**

The GCOS Secretariat produced a draft list of actions which was reviewed by the participants.

## **18 Other Business; Next session**

### **18.1 Panel Membership**

#### ***Actions and recommendations:***

122. The Panel thanked its outgoing panel members Prof Matilde Rusticucci and Dr David Parker for their dedicated service to GCOS.

### **18.2 Next Session**

123. The Panel envisaged holding its next session at the EU Joint Research Centre (JRC) in Ispra (VA), Italy, in April 2012.

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## Annex I

WMO/IOC/UNEP/ICSU  
GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

AOPC-XVI

GCOS/WCRP  
ATMOSPHERIC OBSERVATION PANEL FOR CLIMATE  
SIXTEENTH SESSION  
GENEVA, SWITZERLAND, 7-11 FEBRUARY 2011

Item 1.1

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## Annex II

WMO/IOC/UNEP/ICSU  
GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

AOPC-XVI  
Doc. 1,  
(11.II.2011)  
(Rev 6)

GCOS/WCRP  
ATMOSPHERIC OBSERVATION PANEL FOR CLIMATE  
SIXTEENTH SESSION  
GENEVA, SWITZERLAND, 7 – 11 FEBRUARY 2011

Item 1.2

(NOTE: A meeting of the Advisory Group on GSN/GUAN (AGG) will be held on 7 February (Monday), from 9.00 to 12.30, to deal with issues of composition and performance of the GSN and GUAN. **The full AOPC session starts on Monday at 13.45 and ends on Friday at 12.30**)

Item	Doc. No.	Presenter(s) (time slots include discussion)
<b>Monday 7 February</b>		
<b>13.45 – 17.30</b>		
<b>1. Opening of the Meeting (20')</b>		
1.1 Welcome and introductions		Simmons, WMO
1.2 Adoption of Agenda	1	Simmons
1.3 Conduct of the Meeting		Secretariat
<b>2. Report from the AOPC Chair</b>		
- Review of activities since AOPC-XV, including April 2010 follow-up and issue of GCOS IP-10	2.1	Simmons (20')
- Issues and objectives for the meeting	2.2	Simmons, Secretariat (10')
- Review of Actions from AOPC-XV		
<b>3. Report of GCOS Director and Secretariat</b>		
- Overview of Secretariat activities	3	Richter (10')
<b>4. World Climate Research Programme Perspective</b>		
	4	Asrar (10')
<b>5. GSN, GUAN and RBCN</b>		
5.1 GSN and GUAN: Monitoring, Lead and Analysis Centres Report	5.1a 5.1b 5.1c	Rudolf (15') Ohkawara (15') Menne ( <b>16.00</b> from remote;15')
5.2 Report from AGG	5.2	Jones (10')
5.3 GSN and GUAN: System Improvement & Secretariat Activities	5.3	Thigpen (15')
5.4 Discussion on Policy for Non-Compliant Stations		Thigpen (10'+10')
5.5 Report on availability of sunshine, water vapour data in CLIMAT	5.5	Rudolf (20')
5.6 Report on 2 <sup>nd</sup> CBS Lead Centres Meeting Outcomes	5.6, 5.6a	Shanklin, Thigpen (20')
<b>17.45 Reception – WMO Attique</b>		

<b>Tuesday 8 February</b>		
<b>09.00 – 12.30</b>		
<b>6. Other Atmospheric Networks and Issues</b>		
6.3 Implementation and use of AWS	6.3	Wright (15')
6.4 WMO CCI issues, CCI-15 in particular	6.4	Wright (15')
6.5 BSRN: Science and Operations Update	6.5	Wild (20')
6.6 Progress in Improving GTS Data Exchange – CBS Views	6.6	Thigpen (15')
6.7 Progress in Implementing WIS	6.7	Thomas (20')
6.8 Implementation of WIGOS and GOS, and Implications for GCOS	6.8	Ryan (25')
<b>7. Atmospheric Forcing</b>		
7.0 Introduction to the Contribution by GAW		Tarasova (10')
7.1 Status of Ozone Baseline Networks	7.1	Braathen (15')
7.2 Status of CO <sub>2</sub> -CH <sub>4</sub> Networks, including proposal for designation of CO <sub>2</sub> -CH <sub>4</sub> Baseline Networks	7.2	Butler (20')
7.3 Plans for an integrated global aerosol observing system	7.3	Tarasova (15')
7.4 Status of data exchange in GAW and non-GAW atmospheric composition networks (related to 7.1-7.3)	7.4	Braathen (15')
<b>12.30 – 14.00 LUNCH</b>		
<b>14.00 – 17.30</b>		
<b>6. Other Atmospheric Networks and Issues (cont'd)</b>		
<b>14.00</b> 6.1 Report GRUAN Lead Centre	6.1	Vömel (30')
6.2 Report from WG-ARO: Implementation of GRUAN	6.2	Thorne (from remote; 30')
6.4a Global Surface Temperature Dataset Initiative	6.4a	Trewin (for Thorne)
<b>7. Atmospheric Forcing (cont'd)</b>		
7.5 Activities of the World Data Centre for Greenhouse Gases (WDCGG)	7.5	Ohkawara (20')
<b>16.30</b> 7.6 GCOS and the proposed IGCO system	7.6	Dolman (from remote; 20')
7.7 Development of a Terrestrial Reference Network	7.7	Dolman (from remote; 20')
<b>10. Terrestrial Issues, including Framework for Standards</b>		
10.1 Report from TOPC	10.1	Dolman (30')
10.2 Report of Workshop on estimation of NPP at A-O-T interfaces	10.2	Verstraete (15')
10.3 Status of Terrestrial Framework for Standards	10.3	Dolman (15')
<b>19.30 Group Dinner at Café du Soleil</b>		
<b>Wednesday 9 February</b>		
<b>9.00 – 12.30</b>		

<b>8. Satellite issues, Data and Products</b>		
8.0 Updated GCOS Satellite Requirements		Simmons (15')
8.9 Recognition, feedback, and intercomparison mechanisms, including planned WOAP workshop		Simmons (20')
8.3 Validation activities at MetOffice; ESA CCI General Overview	8.3	Saunders (30')
8.4 Report from CGMS-XXXVIII	8.4	Schmetz (15')
8.5 EUMETSAT Activities related to Climate Monitoring	8.5	Schmetz (15')
8.6 Development of the SCOPE-CM Initiative, including Maturity Index	8.6	Ryan (15')
8.8 Satellite activities for climate at JMA	8.8	Ohkawara (15')
<b>9. Marine Issues</b>		
<b>11.30</b> 9.1 Report from OOPC	9.1	Lindstrom (from remote; 40')
9.3 Report from Surface Pressure Working Group	9.3	Parker (for Allan) (20')
<b>12.30 – 14.00 LUNCH</b>		
<b>14.00 – 18.00</b>		
<b>14.00</b> 8.1 Progress in the updated CEOS Response to the GCOS 2010 IP Update	8.1	Goldberg (from remote; 20')
8.2 NOAA Activities related to Climate Monitoring, including the MW-sounding temperature consensus dataset initiative	8.2	Goldberg (from remote; 15')
12.3 US Reanalysis efforts II (NCEP)	12.3b	Goldberg (from remote; 10')
<b>11. Cryospheric Issues</b>		
11.1 Global Cryosphere Watch; WMO EC Expert Panel on Polar Observations, Research and Services.	11.1	Goodison (20')
<b>12. Integrated Products, Reanalyses</b>		
12.1 High-resolution precipitation dataset	12.1	Becker (20')
12.2 JMA Reanalysis Issues	12.2	Ohkawara (15')
<b>16.30</b> 12.3 US Reanalysis efforts I (GMAO, ESRL)	12.3a	Bosilovich (from remote; 30')
13.3 AOPC/OOPC Climate indices - Status of CCI ET-CCDI work, and ocean indices	13.3	Peterson (20')
<b>Thursday 10 February</b>		
<b>9.00 – 12.30</b>		
<b>12. Integrated Products, Reanalyses (cont'd)</b>		
12.4 ECMWF Reanalysis Update	12.4	Simmons (15')
12.5 European Regional Reanalyses	12.5	Klein-Tank (15')
<b>13. Climate Indices, Data Rescue, Climate Information for Regional Adaptation</b>		

13.1 Climate and cities	13.1	Grimmond (60')
13.4 WCDMP Update	13.4	Wright (30')
13.5 Update on the CLARIS Project and other network issues in South America	13.5	Rusticucci (30')
<b>12.30 – 14.00 LUNCH</b>		
<b>14.00 – 17.30</b>		
<b>13. Climate Indices, Data Rescue, Climate Information for Regional Adaptation</b>		
13.6 Update on World Bank Project and ClimDev Africa	13.6	Westermeyer (30')
<b>14. Climate-related Conferences and Outcomes</b>		
14.1 Report on Development of the Global Framework for Climate Services	14.1	Love (45')
14.2 Report on WMO-BIPM Conference on Measurements to Detect Climate change	14.2	Butler (20')
14.3 Report on GEO-IPCC Workshop on Data for Climate Impact Studies	14.3	Williams (15')
<b>15. Climate Science Forum</b>		
15.1 WCRP SPARC Perspectives (including Data Initiative)	15.1	Tegtmeier (40')
15.2 Urbanization influences on surface temperature trends		Jones (40')
<b>Friday 11 February</b>		
<b>9.00 – 12.30</b>		
<b>16. AOPC Observation Requirements for GCOS Essential Climate Variables</b>		
16.1 General Review of ECV status	16.1	All (30')
16.2 Revision of AOPC requirements in WMO/CEOS database	16.2	All (60')
<b>17. Summary of Decisions and Actions (90')</b>		
<b>18. Closure (10')</b>		
18.1 AOB, Next session		
18.2 Adjourn		

## Annex III

### AGG Report (7 Feb 2011)

The AGG discussion is summarised on a point-by-point basis

1. The previous AGG meeting in Exeter in September 2010 discussed a number of changes to the GSN and GUAN. These were further discussed by email and endorsed at this meeting. They will be applied by the GCOS Secretariat in the coming week.
2. AGG discussed possible improvements to the networks in areas such as Africa, the Arctic and the Antarctic, but there were no specific recommendations.
3. The GCOS Implementation Manager (Dick Thigpen) reported on the status of renovation projects and ongoing network problems. These will be more fully reported in his report to AOPC.
4. There has been no improvement in the issue of Indian radiosondes.
5. The AGG discussed the issue of poorly performing GSN and GUAN stations including those that have been silent for a considerable period. The codes of the silent stations are known to the monitoring centres for the two networks. Where contact cannot be made through normal routes to the FP or the PR, the GCOS Secretariat will write to the country. Stations will be removed after a continued lack of contact with the Secretariat, but only after every attempt has been made to improve the operation of the station.
6. AGG discussed the issue of the calculation of monthly mean temperature by stations within the GSN. This was resolved by allowing countries to continue their current method of operation, but it is recognized that specific initiatives for the Antarctic region have led to consistent time series (and their updates) being achieved through the collection of all the original daily and sub-daily data by the CBS Lead Centre for the Antarctic (BAS, Cambridge, UK). This was felt to be a special case.
7. AGG discussed the issue of a CLIMAT-type daily summary message (in addition to that available through the SYNOP system), but felt that this was opening up too many issues. A number of centres (DWD, KNMI, NCD) make use of SYNOP information, but all agreed that this was not an adequate substitute (for daily data) for final-product daily data from the Met Service.
8. In terms of the total number of stations, CLIMAT reception rates have dramatically increased in the recent two years (specifically for a few countries such as Germany and Spain). The AGG welcomed this and hoped that more countries would follow this lead.
9. The AGG noted the presentation (by DWD) on the reception rates of sunshine and vapour pressure on the CLIMAT system. This was welcomed by AGG, but it was not essential for the few countries that do not report these variables to start to do so. If these data are to be more widely used, it was felt that there needed to be more metadata giving details of how they are calculated (particularly with respect to water vapour the number and times of observations each day).

## Annex IV

### List of Acronyms

ACRE	ATMOSPHERIC CIRCULATION RECONSTRUCTIONS OVER THE EARTH
AGG	AOPC ADVISORY GROUP ON GSN AND GUAN
AIRS	ATMOSPHERIC INFRARED SOUNDER (NASA)
AMMA	AFRICAN MONSOON MULTIDISCIPLINARY ANALYSES
AMV	ATMOSPHERIC MOTION VECTOR
AREP	ATMOSPHERIC RESEARCH AND ENVIRONMENT PROGRAMME (WMO)
AVHRR	ADVANCED VERY HIGH RESOLUTION RADIOMETER
AWS	AUTOMATIC WEATHER STATION
BIPM	BUREAU INTERNATIONAL DES POIDS ET MEASURES
BSRN	BASIC SURFACE RADIATION NETWORK
BUFR	BINARY UNIVERSAL FORM FOR THE REPRESENTATION OF METEOROLOGICAL DATA (code)
CBS	COMMISSION FOR BASIC SYSTEMS (OF WMO)
CCI	CLIMATE CHANGE INITIATIVE (ESA)
CCL	COMMISSION FOR CLIMATOLOGY (WMO)
CDMS	CLIMATE DATA MANAGEMENT SYSTEMS
CEOS	COMMITTEE ON EARTH OBSERVATION SATELLITES
CGMS	COORDINATION GROUP FOR METEOROLOGICAL SATELLITES
CIMO	COMMISSION FOR INSTRUMENTS AND METHODS OF OBSERVATION (WMO)
CLARIS	EUROPE-SOUTH AMERICA NETWORK FOR CLIMATE CHANGE ASSESSMENT AND IMPACT STUDIES
CLIMDEV AFRICA	CLIMATE FOR DEVELOPMENT IN AFRICA
CMA	CHINA METEOROLOGICAL ADMINISTRATION
CMUG	CLIMATE MODELLING USER GROUP (ESA CCI)
CMIP	COUPLED MODEL INTERCOMPARISON PROJECT
COP	CONFERENCE OF THE PARTIES
DWD	DEUTSCHER WETTERDIENST (GERMANY)
ECMWF	EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS
ECV	ESSENTIAL CLIMATE VARIABLE
ESA	EUROPEAN SPACE AGENCY
ESRL	EARTH SYSTEM RESEARCH LABORATORY (NOAA)
ET-EGOS	EXPERT TEAM ON EVOLUTION OF THE OBSERVING SYSTEM (WMO)
ET-ORSC	EXPERT TEAM ON OBSERVING REQUIREMENTS AND STANDARDS FOR CLIMATE (WMO)
ET-SAT	EXPERT TEAM ON SATELLITE SYSTEMS (WMO)
ET-SBRISO	EXPERT TEAM ON SURFACE-BASED REMOTELY-SENSED OBSERVATIONS (WMO)
EUMETSAT	EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES (WMO)
EC-PORS	EXECUTIVE COUNCIL PANEL OF EXPERTS ON POLAR OBSERVATIONS, RESEARCH AND SERVICES (WMO)
FAO	FOOD AND AGRICULTURAL ORGANIZATION (UN)
FAPAR	FACTION OF ABSORBED PHOTOSYNTHETICALLY ACTIVE RADIATION
GAW	GLOBAL ATMOSPHERE WATCH (WMO)
GCM	GCOS COOPERATION MECHANISM
GCW	GLOBAL CRYOSPHERE WATCH
GFCS	GLOBAL FRAMEWORK FOR CLIMATE SERVICES
GEO	GROUP ON EARTH OBSERVATIONS
GEOSS	OBSERVING EARTH OBSERVATION SYSTEM OF SYSTEMS

GEWEX	GLOBAL ENERGY AND WATER CYCLE EXPERIMENT (WCRP)
GHG	GREENHOUSE GAS
GMAO	GLOBAL MODELING AND ASSIMILATION OFFICE (NASA)
GOOS	GLOBAL OCEAN OBSERVING SYSTEM
GPCC	GLOBAL PRECIPITATION CLIMATOLOGY CENTRE
GPS	GLOBAL POSITIONING SYSTEM
GRUAN	GCOS REFERENCE UPPER AIR NETWORK
GSICS	GLOBAL SPACE-BASED INTERCALIBRATION SYSTEM
GSN	GCOS SURFACE NETWORK
GTS	GLOBAL TELECOMMUNICATION SYSTEM (WMO)
GUAN	GCOS UPPER-AIR NETWORK
IASI	INFRARED ATMOSPHERIC SOUNDING INTERFEROMETER
IFSOO	INTEGRATED FRAMEWORK FOR SUSTAINED OCEAN OBSERVING
IGAOS	INTEGRATED GLOBAL AEROSOL OBSERVING SYSTEM
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
IPY	INTERNATIONAL POLAR YEAR
ISPD	INTERNATIONAL SURFACE PRESSURE DATA BANK
JMA	JAPAN METEOROLOGICAL AGENCY
MERRA	MODERN ERA RETROSPECTIVE ANALYSIS FOR RESEARCH AND APPLICATIONS
MSU	MICROWAVE SOUNDING UNIT
NASA	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (USA)
NCDC	NATIONAL CLIMATIC DATA CENTER (USA)
NCEP	NATIONAL CENTERS FOR ENVIRONMENTAL PREDICTION (USA)
NMS	NATIONAL METEOROLOGICAL SERVICE
NWP	NUMERICAL WEATHER PREDICTION
NASA	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (USA)
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (USA)
NSIDC	NATIONAL SNOW AND ICE DATA CENTER (USA)
OOPC	OCEAN OBSERVATIONS PANEL FOR CLIMATE
OPAG	OPEN PROGRAMME AREA GROUP
OPACE	OPEN PANEL OF CCI EXPERTS
PAR	PHOTOSYNTHETICALLY ACTIVE RADIATION
PCMDI	PROGRAM FOR CLIMATE MODEL DIAGNOSIS INTERCOMPARISON
RBCN	REGIONAL BASIC CLIMATOLOGICAL NETWORKS (WMO)
RBSN	REGIONAL BASIC SYNOPTIC NETWORKS (WMO)
RRR	ROLLING REQUIREMENTS REVIEW (WMO)
RTH	REGIONAL TELECOMMUNICATION HUB (GTS)
SBSTA	SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE (UNFCCC)
SCOPE-CM	SUSTAINED COORDINATED PROCESSING OF ENVIRONMENTAL SATELLITE DATA FOR CLIMATE MONITORING
SI	INTERNATIONAL SYSTEM OF UNITS
SORCE	SOLAR RADIATION AND CLIMATE EXPERIMENT (NASA)
SPARC	STRATOSPHERIC PROCESSES AND THEIR ROLE IN CLIMATE
SST	SEA-SURFACE TEMPERATURE
TOPC	TERRESTRIAL OBSERVATION PANEL FOR CLIMATE
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE
WCDMP	WORLD CLIMATE DATA AND MONITORING PROGRAMME (WMO)
WCRP	WORLD CLIMATE RESEARCH PROGRAMME
WDCGG	WORLD DATA CENTRE FOR GREENHOUSE GASES
WG ARO	AOPC WORKING GROUP ON ATMOSPHERIC REFERENCE OBSERVATIONS (AOPC)
WGCV	WORKING GROUP ON CALIBRATION AND VALIDATION
WIGOS	WMO INTEGRATED GLOBAL OBSERVING SYSTEM

WIS  
WMO  
WOAP  
WWR

WMO INFORMATION SYSTEM  
WORLD METEOROLOGICAL ORGANIZATION  
WCRP OBSERVATIONS AND ASSIMILATION PANEL  
WORLD WEATHER RECORD

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