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**Fifteenth Session of the GCOS/WCRP
Atmospheric Observation Panel for Climate (AOPC-XV)**

CONCLUSIONS AND RECOMMENDATIONS

(Geneva, 27-30 April 2009)

**GCOS – 132
WCRP 6/2009
(WMO/TD No. 1497)**

UNITED NATIONS
ENVIRONMENT PROGRAMME

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SCIENCE

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GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC)

**AOPC-XV: CONSOLIDATED LIST OF CONCLUSIONS,
RECOMMENDATIONS AND ACTION ITEMS**

(Geneva, Switzerland, 27-30 April 2009)

Chair's report (items 2)

1. The AOPC Chair reported on his work in support of the Panel during the past year, focussing on the GCOS progress report 2004-2008, participation in the GCOS Steering Committee and the WCRP Observation and Assimilation Panel (WOAP). He, along with other members of AOPC, had participated in an expert meeting on updating the GCOS Implementation Plan. The Panel noted the existence of overall good coordination between its work and that carried out under the responsibility of WOAP, and emphasized the value of co-sponsorship of both AOPC and WOAP by the two programmes.

Secretariat report (item 3)

2. After introductory remarks by the new Director of the GCOS Secretariat, Dr Carolin Richter, the Secretariat briefed the Panel on its activities during the intra-sessional period. The Panel thanked the Secretariat for all its efforts in comprehensively addressing action items arising from AOPC sessions, and the Chair expressed his personal thanks for all the support given to him by the Secretariat over the past year.
3. The Panel reiterated the importance of effective national GCOS coordination mechanisms, and asked the Secretariat to ensure that the distinction between GCOS National Focal Points and GCOS National Coordinators is always made clear.
4. The Panel welcomed the observer status for GCOS agreed by the recent Plenary Session of the Intergovernmental Panel on Climate Change (IPCC), noting that this would give the GCOS Secretariat, Steering Committee and panels a good opportunity to contribute effectively to IPCC deliberations. In particular, it would enable them to draw attention to the need for identification of observational needs and inadequacies during the scoping and drafting process for the Fifth Assessment Report.

WCRP (item 4)

5. The Panel thanked the Director of the World Climate Research Programme (WCRP), for his briefing on the strategic discussion by its governing body on the future of the Programme, and appreciated being informed of the interlinked structure and functions emerging from the discussion. The Panel looked forward to its continued cooperation and engagement with WCRP as its structure evolved.

GSN and GUAN (item 5)

6. The Panel welcomed the presentations by representatives from the GCOS Surface Network (GSN) Monitoring Centres, and the GSN and GCOS Upper-Air Network (GUAN) Lead and Archive Centre and urged the continuation of their

collective efforts, and those of the Commission for Basic Systems (CBS) Lead Centres, to maintain and improve the performance of GSN and GUAN.

7. The Panel noted issues related to the transition of climate data coding from alphanumeric codes to BUFR and recommended that the GCOS Implementation Project Manager liaise, as necessary, with the CBS Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC) charged with managing this transition process to ensure that climate requirements are being adequately taken into account.
8. The Panel recommended that information on snow depth and other snow-related parameters, currently transmitted by some countries in the regional or national section of their SYNOP reports, be (i) globally shared and (ii) globally monitored. It called upon WMO CBS to identify the appropriate centres for implementing such data exchange and monitoring, and to initiate a process in designating such centres, building on existing international data centres, such as the National Snow and Ice Data Center (NSIDC). It noted that the WMO Information System (WIS) could provide a means to actively pull data out of the global telecommunication system, thereby facilitating the monitoring of snow-depth data.
9. The Panel thanked the GSN/GUAN Lead and Archive Centre at the National Climatic Data Center (NCDC) for its continued efforts. It recommended that the GCOS Secretariat send a letter to the Acting Head of NCDC (Sharon LeDuc), pointing out the importance of NCDC's role to GCOS, including its acquisition of historical climate data, and indicating its hope for the continuing support by NCDC to these activities, in light of the retirement of key staff. Improvements on many fronts, such as the average altitude of radiosoundings delivering humidity, temperature and water vapour measurements, are clearly in part due to the efforts by NCDC and should continue.
10. The Panel also recommended that the Japan Meteorological Agency (JMA) and Deutscher Wetterdienst (DWD) be sent a letter along similar lines.
11. The Panel thanked the GCOS Implementation Project Manager for his work, in conjunction with the CBS Lead Centres and donors to the GCOS Cooperation Mechanism (GCM), to improve the GSN and GUAN networks in regions of need.
12. The Panel endorsed the priorities identified by the Advisory Group on GSN and GUAN (AGG) for renovating stations and adding new ones into the GSN and GUAN (see Annex I).
13. The Panel supported the updating of GCOS-73 by AGG members in coordination with the Secretariat. The new version would take into account the reference to CBS Lead Centres, updated observational requirements, and include a guide on metadata needs for operational purposes. The Panel requested that the updated GCOS-73 be kept consistent with the forthcoming update of the Commission for Climatology (CCI) Guide to Climatological Practices (WMO No. 100).
14. The Panel appreciated the steps that have been taken to harmonize the updating processes for the Regional Basic Climatological Networks (continuously, by WMO OBS) and GSN/GUAN (annually, by GCOS Secretariat), and recommended the continuation of these efforts.
15. The Panel encouraged the prompt generation of the World Weather Records (WWRs) for 2001-2010, including proper documentation on the World Climate

Data and Monitoring Programme (WCDMP) and NCDC websites, which also should be updated to record the availability of the reports for 1991-2000. The CBS Lead Centres should encourage the submission of data from National Meteorological Services (NMSs) to NCDC for this purpose. AOPC also recommended the inclusion of additional Essential Climate Variables (ECVs) in the WWRs (sunshine, water vapour pressure, maximum and minimum temperature) to complement those included as in previous decades (mean temperature, precipitation totals, station and mean sea-level pressure).

16. The Panel similarly recommended that members be encouraged to add sunshine data in the CLIMAT message where possible. It invited the GSN Monitoring Centre at DWD to produce a report on reception rates for sunshine as well as vapour pressure (based on 2008/9) for its next session.

GRUAN (item 6.1)

17. The Panel welcomed the presentation by the Chair of the AOPC Working Group on Atmospheric Reference Observations (WG ARO) on progress in implementing the GCOS Reference Upper-Air Network (GRUAN). It particularly welcomed the announcement by the US GCOS programme to provide some initial funding to the Atmospheric Radiation Measurement (ARM) programme to facilitate moves of ARM sites towards meeting GRUAN requirements.
18. The Panel also warmly welcomed JMA's offer to include Tateno as a GRUAN station, and requested that the Secretariat write a letter of appreciation to JMA. The letter should include an indication of the requirements expected to be met by a GRUAN station, and the associated commitments by the station operators, as provided already to the other initial GRUAN sites.
19. The Panel approved that the draft report from the first GRUAN Implementation-Coordination Meeting (ICM-1) be published as a GCOS publication.
20. The Panel asked the Secretariat to liaise with the appropriate WMO contact to allow the Head of the GRUAN Lead Centre to be included in the management board of the 2010 upper-air inter-comparison campaign under the auspices of the WMO Commission for Instruments and Methods of Observation (CIMO). The Panel encouraged the GRUAN community to actively participate in this campaign, for the benefit of GRUAN implementation.
21. The Panel recommended to WMO CBS to establish an expert team on GRUAN by the end of 2010 to ensure good liaison of GRUAN implementation with existing WMO networks.
22. The Panel approved the preparation of a GRUAN Implementation Plan with a time horizon of 2013, and welcomed the decision by the WG ARO to designate GRUAN, or parts thereof, as a pilot project in the WMO Integrated Global Observing System (WIGOS). The Panel stressed the importance of developing a GRUAN manual and encouraged the Lead Centre and the WIGOS Planning Office to support such a development.
23. The Panel recommended that the Head of the GRUAN Lead Centre be invited to attend the next meeting of AOPC to brief the panel on progress on the above and any other items, in collaboration with the Chair of WG ARO.

24. The Panel also supported the strategy by the WG ARO to start implementation of GRUAN based on a limited set of initial stations, and then expand the network to provide a more representative sampling of climatic zones and radiatively-challenging regions. The Panel noted the initial emphasis on implementing the reference in-situ measurements, but emphasized that the long-term development must include proper attention to the associated ground-based remote sensing.

Automatic Weather Stations (item 6.2)

25. The Panel thanked the representatives from CCI and the WMO OBS department for their presentations, noting the advantages and disadvantages associated with the transition to Automatic Weather Stations (AWSs) in relation to the climate record. It urged that the WMO Commissions charged with this subject (CBS, CCI, CIMO, Commission for Agricultural Meteorology (CAGM)) provide a coherent message to Members, and include the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) in addressing marine-specific issues related to automation. The Panel encouraged close liaison between the GCOS Secretariat and the CCI Management Group on this matter, and asked the GCOS Secretariat to ensure that it is kept informed on progress.

CCI issues (item 6.3)

26. The Panel welcomed the update by the CCI representative on the work by the CCI Open Programme Area Groups 1.1, 1.2 and 1.3, which provide valuable guidance on climate data management and observing practices. The Panel requested the Secretariat to ensure that the update of the GCOS Implementation Plan (GCOS-92) be undertaken in full consultation with CCI and its expert teams.

WCC-3 (item 6.4)

27. The Panel welcomed the informative briefing by Dr William Nyakwada on the latest status of the organization of the World Climate Conference-3 (WCC-3), and encouraged the conference organizers to adequately cover mitigation aspects in the conference programme. The Panel welcomed the opportunity that WCC-3 provides for strengthening GCOS, in particular for GCOS to assume the critical role as the observational component of the proposed new Global Framework for Climate Services.

Telecommunication issues (item 6.5)

28. The Panel recommended that the GCOS Implementation Project Manager liaise with the chair (Kelvin Wong, Bureau of Meteorology, Australia) and the co-chair (Leonid Bezrouk) of the CBS Expert Team on WIS-Global Telecommunication System (GTS) Operation and Implementation (ET-OI), with the aim of resolving the issues related to routing of CLIMAT messages through the GTS. It also suggested consultation with the President of CBS on this issue, in collaboration with the WMO OBS Department.
29. The Panel furthermore recommended that the GCOS Secretariat/Steering Committee formally approach CBS, through appropriate channels, to urge WMO Members to resolve data exchange issues, by reminding them of their agreed responsibilities, engaging the GCOS National Focal Points and the Regional Telecommunication Hub (RTH) focal points, and identifying those Members who did comply with their commitments. The quantitative results of the 2004-2008 GCOS progress report could support these actions.

Atmospheric composition (item 7)

30. The Panel thanked the representative of the WMO Global Atmosphere Watch (GAW) for his briefing and was pleased with the progress to date and the plans for activities that would promote further coordination of the global networks for atmospheric composition
31. The Panel urged the GAW Secretariat to strengthen their work in support of implementation of common coding standards, near-real time data supply, more user-friendly provisions for data archival and retrieval, and routine network monitoring, initially for the GCOS Ozone Baseline Networks, and eventually for the aerosol networks. In this connection, the Panel welcomed the planned 2010 workshop(s) on better integration of global aerosol networks, and recommended that GCOS Secretariat provide appropriate support.
32. The Panel further noted that improved algorithms were required to determine single-scattering albedo from ground-based instruments, particular in cases of low aerosol load.
33. The Panel welcomed the briefing on latest results and activities connected with monitoring carbon dioxide, methane and other greenhouse gases (GHGs).
34. The Panel stressed the importance of the establishment of irrefutable standards, preferably SI-traceable, in collaboration with national metrology institutions, given the increasing importance being placed on traceability of carbon-related observations to meet treaty obligations.
35. The Panel noted the increasing importance of reliably determining regional sources and sinks of greenhouse gases, including through use of reanalysis products, and looked forward to focusing more on this issue at its next session.
36. The Panel thanked JMA for its continuing work in hosting the World Data Centre for Greenhouse Gases, and encouraged observing programmes to submit GHG data and relevant metadata to JMA, in particular aircraft and ship measurements of greenhouse gases, following the example given by Japanese operators. The Panel encouraged the Centre to work with contributors and users to enable best use of the valuable data available.

Satellite issues (item 8)

37. The Panel expressed its appreciation for the report by the Committee on Earth Observation Satellites (CEOS) Climate Societal Benefit Area Coordinator on progress in the CEOS Response to the GCOS Implementation Plan, and looked forward to an update on this activity at its next session.
38. The Panel also thanked the National Oceanic and Atmospheric Administration (NOAA) for their presentation, which demonstrated progress in developing the concept of a maturity index. The Panel recognized that further work is required to develop the concept, including work to make the index more objective. The Panel endorsed the further development of the maturity index through collaboration between the NOAA Climate Data Records programme and the Sustained Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) initiative. Projects within SCOPE-CM should explore the

application of the maturity index at an early stage, and provide feedback to the originators.

39. The Panel recognized that hyperspectral sounders and Global Positioning System Radio Occultation (GPS-RO) provide reference-quality observations from space which, together with the GRUAN and the planned National Aeronautics and Space Administration (NASA) Climate Absolute Radiance and Refractivity Observatory (CLARREO), would provide independent pillars to ensure mutual consistency of datasets. The Panel encouraged the coordination of efforts between CEOS, the Coordination Group for Meteorological Satellites (CGMS) and the WMO Space Programme in these areas; it expressed its support for pilot studies on enhanced datasets using these reference-type measurements, including reanalyses.
40. The Panel supported the proposed establishment of an international working group on radio occultation under CGMS, to assess the needs for and ensure continuity of an RO climate observing system. It encouraged consistent processing of the data for climate purposes, and requested a briefing on the use of GPS-RO data for climate monitoring of ECVs at its next session.
41. The Panel furthermore invited comments from space agencies, for example through their coordination mechanisms CEOS and CGMS, as appropriate, to the update of GCOS-92 (currently in preparation).
42. The Panel encouraged the regular reprocessing of satellite data records for the generation of Fundamental Climate Data Records (FCDRs) from all relevant instruments, noting that FCDRs are the prerequisite for ECVs. The Panel recommends that FCDRs be produced by the space agencies operating the pertinent instruments, because expertise is required on instruments and level-1 data processing. This process should include regular feedback cycles by the scientific user community.
43. The Panel noted the progress in implementation of the SCOPE-CM initiative, and expressed its support for the ongoing pilot project efforts. It thanked all agencies currently participating in SCOPE-CM, and particularly thanked the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for their efforts in taking on the Secretariat role for the SCOPE-CM.
44. The Panel encouraged close coordination between the WMO Space Programme and the WMO Climate Programme in elaborating the role of SCOPE-CM in support of the functions of the WMO Regional Climate Centres.
45. The Panel welcomed the briefing by EUMETSAT on its extensive range of activities related to climate monitoring from space. It appreciated the good inter-agency cooperation in defining future mission requirements and sharing workload.
46. The Panel appreciated the briefing by the China Meteorological Administration (CMA) on retrieval of cloud parameters from FY-2 and looked forward to being informed on the commissioning of the FY-3 satellite at its next session.
47. The Panel was encouraged by the European Space Agency (ESA) Climate Change Initiative and urged ESA to develop it in full cooperation with existing initiatives related to that subject area, such as the Global Space-based Intercalibration System (GSICS) and SCOPE-CM. The Panel took note of the first

meeting of the Climate Science Advisory Board for the Initiative, taking place on 29 April 2009 at ESA ESRIN, with the goal to prioritize its programmatic objectives. The Panel further recommended that ESA follow the evolving GCOS guidelines for the generation of climate datasets and products including a maturity index, and looked forward to an updated report by ESA at its next session.

48. The Panel appreciated the reprocessing of geostationary satellite data undertaken by JMA and the availability of these data for use by reanalysis groups worldwide. It further noted that JMA was also utilizing reprocessed geostationary data from EUMETSAT in its reanalyses.
49. The Panel recalled the commitment by space agencies to systematically reprocess their geostationary satellite data record for use in reanalysis (Action A-11 in the CEOS Response to the GCOS IP), including the generation of Atmospheric Motion Vectors (AMVs) and clear-sky radiances from the complete geostationary constellation.
50. The Panel greatly appreciated the briefing on the latest findings on the measurement of top-of-atmosphere solar irradiance based on the Total Irradiance Monitor (TIM) instrument on the Solar Radiation and Climate Experiment (SORCE) mission, indicating a solar constant several W/m² smaller than previous measurements. It welcomed the explanations by Dr Cahalan of some of the reasons why earlier measurements were less reliable. It further stressed the importance of continued measurements of spectrally-resolved as well as total irradiance, and encouraged the continuation of research in this area.
51. The Panel appreciated the publication of the guideline for satellite-based datasets and products and recalled the request by the GCOS SC-XVI for the Secretariat to develop a draft extended to in-situ observations.
52. The Panel asked its members to review the guideline and to provide the Secretariat with proposals to improve and extend it to in-situ observations. The Panel requested the Secretariat to ask Panel members to approve, once developed, the final draft of the extended guideline before its release as a GCOS publication.

Marine issues (item 9)

53. The Panel thanked the outgoing Chair of the Ocean Observations Panel for Climate (OOPC) for his comprehensive briefing on the latest status of oceanic variability (Arctic sea-ice cover, El Nino-Southern Oscillation (ENSO), Tropical Atlantic ocean) as well as for highlighting the most pressing issues in implementing the ocean observing system for climate (science, technology, institutional issues). The Panel hoped for a continued engagement by Dr Harrison in its proceedings.
54. The Panel thanked the co-chairs of the SST/Sea-ice WG for revitalizing the SST part of the Group.
55. The Panel noted that the WCRP Climate and Cryosphere (CliC) community is taking steps to organize a dedicated sea-ice working group, exploring intercomparisons of different sea-ice cover products, in close collaboration with the Sea-Surface Temperature (SST)/Sea-Ice Working Group, and encouraged

the development of these initiatives in the framework of the evolving Global Cryosphere Watch (GCW; see item 11).

56. The Panel noted the preparation for the OceanObs'09 conference and looked forward to a briefing on the outcomes at its next session.
57. The Panel noted that the AOPC/OOPC Surface Pressure Working Group had again asked for GCOS recognition of the International Surface Pressure Databank (ISPD). It further noted the importance of the ISPD, given progress in the use of historical surface pressure data in reanalysis projects. It took the view that the Guideline for the generation of satellite datasets and products, once extended to in-situ observations could serve as a useful mechanism for self-assessment of the ISPD. It nevertheless recommended that a letter in support of the ISPD activities should go from the Director of the GCOS Secretariat to the Co-Chairs of the Working Group.
58. The Panel noted the persisting problems in the measurement and submission of Voluntary Observing Ship (VOS)/VOSCLim data of all types, and noted the importance of communicating the needs of the climate community to the operators of commercial ships.

Terrestrial issues (item 10)

59. The Panel encouraged close coordination of the initiatives from various space agencies (ESA, EUMETSAT, JMA, NASA, NOAA, and others) to achieve consistent application of albedo-related products in climate models.
60. The Panel noted the mutual interest of AOPC and TOPC in consistent monitoring of carbon fluxes and the range of emissions from biomass burning, and supported the inclusion of the related observational requirements in the updated GCOS-92.
61. The Panel thanked the European Commission Joint Research Centre for making the arrangements for a second joint workshop dealing with cross-domain issues, and looked forward to a report that will be published in the literature as well as a GCOS publication.
62. In addition, the Panel asked the Secretariat to arrange for publication of the report of the first joint workshop.

Cryospheric issues (item 11)

63. The Panel noted the significant progress made during the last two years in observing Polar Regions during the International Polar Year (IPY) and encouraged further efforts to develop regional observing systems in both of the Polar Regions to reinforce existing global observing systems. In particular, the Panel welcomed the establishment of supersites in Polar Regions with collocated measurements of all key variables, especially permafrost and snow cover. It supported ex-officio linkage between AOPC, TOPC or GCOS Steering Committee and the new WMO Panel on Polar Observations.
64. The Panel noted the initial activities towards establishing a Global Cryosphere Watch and other IPY legacy initiatives. It encouraged further development of the concept of a GCW and effective collaboration between the GCOS panels and those involved in developing these activities. The Panel also re-emphasized the

importance of good forward-planning of data management and data sharing strategies.

Reanalyses and Integrated Products (item 12)

65. The Panel considered it appropriate that the GCOS Secretariat prepare a letter of appreciation to the Global Precipitation Climatology Centre (GPCC) from WMO for its 20 years of service to the community, to be sent at an appropriate time in 2010 given the imminent change in the Permanent Representative of Germany to WMO.
66. 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 precipitation station data (letter is currently being drafted by the GCOS Secretariat in collaboration with GPCC). It also called on the WMO Secretariat to assist, when needed, in improving working relations between GPCC and WMO Members, and in promoting the international exchange of rain gauge data and metadata.
67. The Panel requested GPCC to include an analysis of the user base of GPCC products in its briefing at the next session.
68. The Panel welcomed the briefing by JMA on the development of the new JRA-55 reanalysis. The Panel similarly welcomed the presentation by Adrian Simmons on reanalysis activities by the European Centre for Medium-Range Weather Forecasts (ECMWF), ERA-Interim in particular, and on the EU-funded GEMS project. It noted in particular the importance of homogeneous SST records for use in reanalyses.
69. The Panel recommended the continuation of these efforts in support of climate monitoring.
70. The Panel noted with appreciation that reanalyses from recent or new initiatives at ECMWF, JMA, NASA (by the Global Modeling and Assimilation Office - GMAO) and NOAA (by the National Centers for Environmental Prediction - NCEP, and the Earth System Research Laboratory - ESRL) would soon all be available. With a view to the next in the series of WCRP international conferences on reanalysis, the Panel recommended that consideration be given to establishing study groups to intercompare these reanalyses according to several topical areas. The Panel Chair was requested to discuss this further with the Chair of WOAP.

Climate and observations in Africa (item 13.1)

71. The Panel appreciated the presentation by Dr Andre Kamga-Foamouhou on the use of observational climate data for testing and verifying regional model forecasts in Africa.
72. The Panel recognized the need for making a strong case on the value of observations for decision-making, by demonstrating the links between climate data and impact data, for example highlighting the importance of regional and national datasets for model testing and verification, and for the IPCC process in general. The WCC-3 is expected to provide an excellent opportunity to showcase this, and to create a framework in which to facilitate access to the required data.

Climate extremes & State of the climate (item 13.2)

73. The Panel was interested to be informed of the annual publication 'State of the Climate', recognizing the balance between timely updated information and quality assurance through peer-review processes. It welcomed the use of ECVs as an indication of completeness of the publication, and recommended wider community involvement in this publication, especially in oceanography and the cryosphere.
74. The Panel felt the establishment of the online Weather and Climate Extremes archive (<http://wmo.asu.edu>) a useful information source for the scientific community and the broader public.

Climate indices (item 13.3)

75. The Panel recognized the continuing need for developing climate indices and welcomed a comprehensive update on this issue at its next session.

Data rescue (item 13.4)

76. The Panel appreciated the efforts by the WCDMP to advance projects devoted to data rescue as well as to climate data management in all WMO Regions. It re-emphasized the importance of metadata in all those projects.
77. The Panel noted that in relation to the potential cessation of CLIMAT TEMP message generation instigated by AOPC, WCDMP has to date been contacted by 25 Members in response to a questionnaire. WCDMP will engage further with the one Member so far who has expressed objection to cessation of these messages. The Panel looked forward to a WMO decision on this issue before CCI-XV in February 2010.

CLARIS update (item 13.5)

78. The Panel thanked Phil Jones/Matilde Rusticucci for the update on the Europe-South America Network for Climate Change Assessment and Impact Studies in La Plata Basin (CLARIS LPB) project within the EU 7th Framework Programme, aiming at improving the description of recent past climate variability in the La Plata Basin using instrumental and proxy data, and looked forward to a more comprehensive update at its next session.

Climate science forum (item 14)

79. The Panel highly appreciated the presentation by Phil Jones on aspects of historical instrumental and palaeoclimatic research, such as an investigation of the urban heat island effect in London, the correction of historical surface temperatures in the Greater Alpine Region, and some results of tree-ring-based reconstructions of past climate.

GCOS Progress Report; Update of GCOS-92 (item 15)

80. The Chairman presented the Progress Report and the latest version of the updated GCOS-92 to the Panel and invited members to comment on both

reports. The Panel supported the identification of the need for measurements of precursor species to support monitoring of the ozone and aerosol ECVs. The Panel furthermore noted the need to reassess the requirements for Total Solar Irradiance (TSI) measurements in the light of the information provided to it earlier in the session.

81. The Panel noted the current Group on Earth Observations (GEO) activity on Monitoring and Evaluation of progress with the implementation of the Global Earth Observation System of Systems (GEOSS). For evaluating future progress on the implementation of the updated version of GCOS-92, it was felt important that all Action items should identify clearly the responsible agents for implementation and provide measurable performance indicators. All action items should have a short title.

82. In response to countries having provided national reports on their GCOS activities, the Panel requested that the Secretariat should determine ways and means of giving feedback to the providers of the national reports.

Next session (item 17)

83. The Panel agreed to hold its next session in Geneva, for four and a half days (including the half-day AGG session), on 26-30 April 2010.

Minutes and Recommendations from the Advisory Group on GSN and GUAN (AGG) Meeting at AOPC-XV, 27 April 2009

AGG Members attending: Phil Jones (Chair), David Parker, Tom Peterson, Dick Thigpen, and Mohan Abayasekara

Also attending: Stephan Bojinski, Adrian Simmons, Kazutoshi Onogi, Carolin Richter, Anna Kuhn, and Frederik Zietzschmann

Agenda:

The agenda items are given in italics – but are not necessarily reported in the order that they were discussed. This document is the report back to AOPC-XV.

Discussion

GTS transmission problems still cause problems for GCOS. What can AGG/AOPC do to sort out some of the problems?

Transmission problems within the GTS still affect CLIMAT data reception. This is clearly apparent from different receipts at DWD/NCDC/JMA. Many of the problems relate to the RTH connection points. Some hubs may not have the capability of changing routing catalogues.

Dick Thigpen will contact the President of CBS, Fred Branski for assistance, in cooperation with the WMO OBS department. A recommendation from AOPC is for CBS to investigate whether these switches can be set so that all CLIMAT data are exchanged by all hubs (items covered in Action 28).

One lead centre asks how can a station be listed in the GSN if they have never sent CLIMAT reports? Related to this is how/when do we remove stations which don't perform?

It is difficult to know if a silent GSN station really is silent. It could be due to transmission issues or it could be related to a recalcitrant or non-existent focal point. Also some stations are functioning, but can't/won't produce CLIMAT messages.

When the networks were set up in 1997, the document GCOS-73 provided details of how a GSN and GUAN station should function. It would be useful for CBS Lead Centres if this document were updated. Phil Jones will distribute parts of this GCOS document for updating to a number of AGG members. This process began in AOPC-XIV, but will be completed during AOPC-XV. In this update, there should be a new section on metadata, including what should be requested from GSN operators and what can be achieved from initiatives through the CBS Lead Centres. The most important aspects are site and sensor changes. The Guide to Climatological Practices (CCI publication) might also be useful. This should be available in about a year's time. This revision to GCOS-73 should also include reference to GCOS-127 for the 'CLIMATE code practical help'.

Dick Thigpen (the GCOS Implementation Manager) and others in AGG/AOPC will continue to raise awareness of the GSN and GUAN whenever possible.

How are new stations introduced into the GSN and GUAN? Should there be a 'Welcome to GCOS' certificate?

GCOS Secretariat will send welcome certificates to new GSN and GUAN sites (in February each year after the AGG update of the networks). New GSN sites should be reminded about the need to send historic data to the Archive Centre (NCDC).

There was some discussion of the station Summit in central Greenland (Kalaalit Nunaat). Denmark (DMI) indicates they cannot promise support.

Summit station should be added to the GSN as the data are useful for a number of purposes. This recommendation is despite DMI being unable to promise continued support. The site should be sent a welcome certificate.

Some Member countries do not have focal points and a number of Members have no GSN/GUAN stations.

The first is an ongoing problem, which seems impossible to resolve. Over the last year, a number of GSN sites have been added to the list so more countries have at least one station. These stations were added in January 2009.

Network issues – formats, contacts, email alerts and updating

i) Process of updating station lists: early notification of countries

Updating is undertaken every January, following an email/telecom meeting of AGG. The GCOS Secretariat sends a monthly email to CBS as well as focal points, which includes web site details of receipt rates supplied by DWD/JMA/NCDC. The number of bounces to focal point email addresses has been significantly reduced, but this is still not a guarantee that the monthly messages are being read.

ii) Format problems

DWD provides reports of CLIMAT messages that pass format tests. GCOS Secretariat has produced GCOS-127 (with assistance from DWD) and reference to this will be included in the update to GCOS-73. Once completed, the revised GCOS-73 should be sent to the GCOS Secretariat email list.

iii) Practical help for coding CLIMAT messages: further action needed?

The document produced (GCOS-127) will be referred to in GCOS-73, and details be sent by the GCOS Secretariat to their focal point and CBS email list.

iv) Country contacts re historical GSN data

These should be the GCOS Focal Points. Last requests were sent to these focal points. There is still an issue for countries without focal points. NCDC are contacting these focal points and reports of receipts are provided in AOPC-XV/Doc. 5.1 (submitted by Tom Peterson). NCDC should also make use of the CBS Lead Centres for assistance with historic data if they are not already doing so.

Improvements to Station Co-ordinates

AGG agreed that the two action items from last year's session remain valid:

-AOPC requested that CBS continue improving the accuracy of station locations in WMO Vol. A down to the order of 10m" (Action AOPC-XIV 18b)

-AOPC requested that GSN and GUAN station data and maps be displayed, if possible along with appropriate metadata, in visualization tools [such as Google Earth] (Action AOPC-XIV 18c)"

Better resolution enables the Met enclosures to be seen using Google Earth. Whilst this isn't that important from a scientific perspective, it is likely to become more important as climate issues rise up the agenda. The GCOS Secretariat will continue to send their January updates to the GSN to the WMO World Weather Watch (WWW) Programme for inclusion in the RBCN.

WWR (World Weather Records) 10-year volumes

WWR 10-year updates for 2001-2010 will be produced from 2011 onwards.

WCDMP's web site is out of date. It says the last for the 1980s was finished in 1999. It also doesn't acknowledge that the 1990s volume exists as a CD, which is also the same for NCDC.

AGG presumes the responsibility for initiating the WWR process for the current decade falls within the remit of WCDMP.

AGG recommends that the 9 CBS Lead Centres would be a useful addition to the process for developing the data necessary for the current decade.

AOPC also to recommend to increase the number of variables (sunshine, vapour pressure, maximum and minimum temperature) reported in addition to those present in previous decades (mean temperature, precipitation totals, station and mean sea-level pressure) as all are ECVs (items covered in Action 15).

Sunshine data in CLIMAT reports, needed or not, important or not?

AGG recommends that members should be encouraged to add sunshine in the CLIMAT message if they are measuring it.

DWD will be asked for AOPC-XVI to produce a report on reception rates for sunshine and vapour pressure (based on 2008/9) (covered in Action 16).

AGG/AOPC priorities for the GUAN

Angola: Luanda is still the top priority.

Chad: The GCOS Implementation Manager will ask Chad whether N'Djamena and Faya can be added to the GUAN.

Antarctic: The reception of Marambio (Antarctic) has been relatively poor. The GCOS Implementation Manager will ask the Argentine focal point, whether additional support is required.

AGG/AOPC priorities for the GSN

Indonesia: there is a Dutch-organized workshop later in 2009. The AGG Chair will contact Albert Klein Tank (KNMI) to ensure that the workshop is shown a list of GSN and GUAN stations in the region. In particular, it is hoped that at least two GSN sites can be designated in Kalimantan (the Indonesian part of Borneo), and that GPCC and GSN-related data issues can be resolved.

Cuba: the GCOS Implementation Manager will pursue his contacts with Cuba, for two GSN sites on the island.

Brazil: The lack of GSN in interior Brazil was noted. This will be taken up by the AGG Chair during an EU-funded project (CLARIS-LPB) when contact is made with Brazilian scientists in the project. The principal issue in Brazil appears to be related to the Brazilian Met Service having different priorities from AOPC.

New Zealand: The GCOS Implementation Manager will contact NZ about non-reporting of GSN from a number of sites in the SW Pacific.

Yemen: The need for a GSN station in Yemen was reiterated. Further follow-up by the GCOS Implementation Manager with responsible institutions and people in Yemen is needed. The GCOS Secretariat report on the visit of MetOffice Archives with a focus on historical Yemen data should be used as a basis.

Agenda

Item	Doc. No.	Presenter(s) (time slots include discussion)
Monday 27 April		
14.00 – 17.30		
1. Opening of the Meeting (20')		
1.1 Welcome and introductions	[INF.1]	Simmons, WMO
1.2 Adoption of Agenda	[1.2]	Simmons
1.3 Conduct of the Meeting		Bojinski
4. World Climate Research Programme Perspective		
	[4]	Asrar (20')
2. Report from the AOPC Chair		
- Review of activities since AOPC-XIV	[2.1]	Simmons (20')
- Issues and objectives for the meeting		
- Review of Actions from AOPC-XIV	[2.2]	Simmons, Bojinski (10')
3. Report of GCOS Director and Secretariat		
- Overview of Secretariat activities	[3]	Richter (20')
5. GSN and GUAN		
5.1 GSN and GUAN: Monitoring, Lead and Analysis Centres Report	[5.1a] [5.1b] [5.1c]	Fuchs (15') Onogi (15') Peterson (20')
5.2 GSN and GUAN: System Improvement & Secretariat Activities	[5.2]	Thigpen, Ondras (20')
5.3 Report from AGG		Jones (20')
17.45 Reception – WMO Attique		
Tuesday 28 April		
09.00 – 12.30		
6. Other Atmospheric Networks and Issues		
6.1 Report from WG-ARO: Implementation of GRUAN	[6.1]	Thorne (30')
6.2 Implementation and use of AWS – CCI and CBS Views	[6.2a] [6.2b]	Ondras (15') Heino (15')
6.3 WMO CCI issues, CCI OPAGs 1 & 2 in particular	[6.3]	Heino (15')
6.4 Preparation for World Climate Conference – 3	[6.4]	Nyakwada (for Nyenzi) (30')
7. Atmospheric forcing		
7.1 Update on coordination of atmospheric chemistry observations (GAW, non-GAW, space, others)	[7.1]	Braathen (for Barrie) (20')
7.2 CO ₂ -CH ₄ Comprehensive Networks and Ozone Baseline Networks	[7.2]	Butler (40')

7.3 Status of global observing network for aerosols	[7.3]	Braathen (for Barrie) (20')
12.30 – 14.00 LUNCH		
14.00 – 17.30		
7.4 Activities of the World Data Centre for Greenhouse Gases (WDCGG)	[7.4]	Onogi (20')
8. Satellite issues, data and products		
8.1 Progress in CEOS Response to GCOS Satellite Req's	[8.1]	Goldberg (30')
8.2 Development of Maturity Index for Climate Data Records at NOAA	[8.2]	Goldberg (30')
8.5 Report on CGMS-XXXVI relevant to climate observations	[8.5]	Schmetz (30')
8.6 EUMETSAT Activities related to Climate Monitoring	[8.6]	Schmetz (30')
8.3 Development of the SCOPE-CM Initiative	[8.3]	Ryan (20')
8.7 Development of satellite products by CMA	[8.7]	Zhao (30')
19.30 Group Dinner at Café du Soleil		
Wednesday 29 April		
9.00 – 12.30		
8. Satellite issues, data and products (cont'd)		
8.4 ESA Climate Change Initiative	[8.4]	Mathieu (30')
8.8 Satellite activities for climate at JMA	[8.8]	Onogi (15')
8.10 GCOS Guideline for the generation of satellite datasets	[8.10]	Simmons, Secretariat (10')
9. Marine Issues		
9.1 Report from OOPC	[9.1]	Harrison (45')
9.2 Report from SST/Sea Ice Working Group	[9.2]	Harrison (for Rayner) (15')
9.3 Report from Surface Pressure Working Group	[9.3]	Parker (for Allan) (20')
12.30 – 14.00 LUNCH		
14.00 – 17.30		
10. Terrestrial Issues		
10.1 Report from TOPC	[10.1]	Verstraete (for Dolman) (45')
10.2 Workshop on estimation of NPP at A-O-T interfaces	[10.2]	Verstraete (15')
8. Satellite issues, data and products (cont'd)		
8.9 Discussion on solar constant derived from SORCE	[8.9]	Cahalan (20')
11. Cryospheric Issues		
11.1 Conclusions from IPY	[11.1]	Sarukhanian (20')

11.2 Global Cryosphere Watch	[11.2]	Ryabinin (for Goodison) (20')
15. GCOS Progress Report and Implementation Plan		
15.1 Review of Draft GCOS Progress Report 2004-2008	[15.1]	Simmons, All (15')
15.2 Review of Draft Updated GCOS IP	[15.2]	Simmons, All (30')
12. Integrated products, Reanalyses		
12.1 High-resolution precipitation dataset	[12.1]	Fuchs (30')
Thursday 30 April		
9.00 – 12.30		
12. Integrated products, Reanalyses (cont'd)		
12.2 JMA Reanalysis issues	[12.2]	Onogi (30')
12.3 ECMWF Reanalysis, including atmospheric composition	[12.3]	Simmons (30')
6. Other Atmospheric Networks and Issues (cont'd)		
6.5 Status of data transmission – Update on WIS	[6.5]	Kerhervé (20')
13. Climate indices, Data rescue, Climate Information for Regional Adaptation		
13.1 African climate data and their use for studies of climate variability and change	[13.1]	Kamga (60')
13.2 Climate extremes & State of the climate	[13.2]	Peterson (60')
13.3 AOPC/OOPC Climate indices - Status of CCI ET-CCDI work, and ocean indices	[13.3]	Harrison (15')
12.30 – 13.30 LUNCH		
13.30 – 18.00		
13. Climate indices, Data rescue, Climate Information for Regional Adaptation (cont'd)		
13.4 WCDMP Data Rescue Update	[13.4]	Baddour, Heino, Peterson (30')
13.5 Update on the CLARIS Project	[13.5]	Jones (for Rusticucci) (30')
14. Climate science forum		
14.1 Use of early instrumental data and proxy data for climate change science	[14.1]	Jones (60')
16. Summary of decisions and actions (90')		
17. Closure (10')		
17.1 AOB, Next session		
17.2 Adjourn		

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Glossary of Acronyms

ACRE	ATMOSPHERIC CIRCULATION RECONSTRUCTIONS OVER THE EARTH
AGG	AOPC ADVISORY GROUP ON GSN AND GUAN
AMMA	AFRICAN MONSOON MULTIDISCIPLINARY ANALYSES
AMV	ATMOSPHERIC MOTION VECTOR
ARM	ATMOSPHERIC RADIATION MEASUREMENT (US DOE)
AWS	AUTOMATIC WEATHER STATION
CAgM	COMMISSION FOR AGRICULTURAL METEOROLOGY (OF WMO)
CBS	COMMISSION FOR BASIC SYSTEMS (OF WMO)
CCL	COMMISSION FOR CLIMATOLOGY (WMO)
CEOS	COMMITTEE ON EARTH OBSERVATION SATELLITES
CGMS	COORDINATION GROUP FOR METEOROLOGICAL SATELLITES
CIMO	COMMISSION FOR INSTRUMENTS AND METHODS OF OBSERVATION (WMO)
CLiC	CLIMATE AND CRYOSPHERE PROJECT (WCRP)
CLARIS	EUROPE-SOUTH AMERICA NETWORK FOR CLIMATE CHANGE ASSESSMENT AND IMPACT STUDIES
CMA	CHINA METEOROLOGICAL ADMINISTRATION
DMI	DANISH METEOROLOGICAL INSTITUTE
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)
EUMETSAT	EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES
GAW	GLOBAL ATMOSPHERE WATCH (WMO)
GCM	GCOS COOPERATION MECHANISM
GCW	GLOBAL CRYOSPHERE WATCH
GEMS	GLOBAL AND REGIONAL EARTH-SYSTEM MONITORING USING SATELLITE AND <i>IN SITU</i> DATA
GEO	GROUP ON EARTH OBSERVATIONS
GEOSS	GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS
GHG	GREENHOUSE GAS
GMAO	GLOBAL MODELING AND ASSIMILATION OFFICE (NASA)
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
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
IPET-DRC	INTER-PROGRAMME EXPERT TEAM ON DATA REPRESENTATION AND CODES (CBS)
IPY	INTERNATIONAL POLAR YEAR
ISPD	INTERNATIONAL SURFACE PRESSURE DATA BANK

JCOMM	JOINT TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (WMO/IOC)
JMA	JAPAN METEOROLOGICAL AGENCY
NASA	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (USA)
NCDC	NATIONAL CLIMATIC DATA CENTER (USA)
NCEP	NATIONAL CENTERS FOR ENVIRONMENTAL PREDICTION (USA)
NMS	NATIONAL METEOROLOGICAL SERVICE
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
RBCN	REGIONAL BASIC CLIMATOLOGICAL NETWORKS
RO	RADIO OCCULTATION
RTH	REGIONAL TELECOMMUNICATION HUB (GTS)
SCOPE-CM	SUSTAINED COORDINATED PROCESSING OF ENVIRONMENTAL SATELLITE DATA FOR CLIMATE MONITORING
SORCE	SOLAR RADIATION AND CLIMATE EXPERIMENT (NASA)
SST	SEA-SURFACE TEMPERATURE
TIM	TOTAL IRRADIANCE MONITOR (NASA)
TOPC	TERRESTRIAL OBSERVATION PANEL FOR CLIMATE
TSI	TOTAL SOLAR IRRADIANCE
VOS	VOLUNTARY OBSERVING SHIP
VOSCLIM	VOLUNTARY OBSERVING SHIP CLIMATE PROJECT
WCC-3	WORLD CLIMATE CONFERENCE-3
WCDMP	WORLD CLIMATE DATA AND MONITORING PROGRAMME (WMO)
WCRP	WORLD CLIMATE RESEARCH PROGRAMME
WG ARO	AOPC WORKING GROUP ON ATMOSPHERIC REFERENCE OBSERVATIONS
WIGOS	WMO INTEGRATED GLOBAL OBSERVING SYSTEM
WIS	WMO INFORMATION SYSTEM
WMO	WORLD METEOROLOGICAL ORGANIZATION
WOAP	WCRP OBSERVATIONS AND ASSIMILATION PANEL
WWR	WORLD WEATHER RECORD
WWW	WORLD WEATHER WATCH

LIST OF GCOS PUBLICATIONS (SINCE 2008)*

- GCOS-119**
(WMO/TD-No. 1424) Report of the Implementation Strategy Meeting for Central America and the Caribbean (Belize City, 28-30 January 2008)
- GCOS-120**
(GOOS-No.) Report on the Meeting of "IOC Group of Experts on the Global Sea Level Observing System (GLOSS), tenth session (Paris, France, 6-8 June 2007)
- GCOS-121**
(WMO/TD-No. 1435) GCOS Reference Upper Air Network (GRUAN). Report of the GRUAN Implementation Meeting (Lindenberg, Germany, 26-28 February 2008)
- GCOS-122**
(WCRP 9/2008)
(WMO/TD-No. 1436) Fourteenth Session of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC-XIV) – Conclusions and Recommendations (Geneva, Switzerland, 21-25 April 2008)
- GCOS-123**
(WMO/TD-No. 1444) Report of the Fourth Meeting of the GCOS Cooperation Board (Bonn, Germany, 12 June 2008)
- GCOS-124**
(WMO/TD-No. 1463) Report of the Sixteenth Session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS (Geneva, Switzerland, 14-17 October 2008)
- GCOS 125**
(WCRP) Report of the WOAP-III Meeting (Boulder, CO, USA, 29 September to 1 October 2008)
- GCOS-126**
(WMO/TD No. 1464) GCOS Annual Report 2007-2008
- GCOS-127**
(WMO/TD No. 1477) Practical Help for Compiling CLIMAT Reports
- GCOS-128**
(WMO/TD No. 1488) Guidelines for the Generation of Satellite-based Datasets and Products Meeting GCOS Requirements (GCOS Secretariat, March 2009)
- GCOS-129**
(WMO/TD No. 1489) Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004-2008
- GCOS-130**
(WMO/TD No. 1490) Synthesis of National Report on Systematic Observation for Climate
- GCOS-131**
(WMO/TD No. 1492) Report of the First GCOS Reference Upper Air Network Implementation and Coordination Meeting (GRUAN ICM-1) (Oklahoma City, USA, 2-4 March 2009)
- GCOS-132**
(WCRP 6/2009)
(WMO/TD No. 1497) Fifteenth Session of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC-XV) – Conclusions and Recommendations (Geneva, Switzerland, 27-30 April 2009)

*GCOS publications may be accessed through the GCOS website at:
<http://www.wmo.int/pages/prog/gcos>

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