

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

(Geneva, Switzerland, 19-23 April 2004)

Statements of Guidance (SOGs)

1. The AOPC reiterated the importance of maintaining close links between the Panel and the CBS Expert Team on Observational Data Requirements and Redesign of the Global Observing System (ET-ODRRGOS). It requested the Chairman to ensure that AOPC is appropriately represented at ET-ODRRGOS sessions and to liaise with the Chairman of the ET-ODRRGOS to optimize future involvement of the Panel in the SOG and similar processes.
2. The AOPC requested that the SOG on Seasonal-to-Interannual Forecasts (SIA) reviewed at this session be provided to the CBS OPAG on Data Processing and Forecasting Systems (DPFS) for comment and subsequent presentation to the CBS ET-ODRRGOS, and that ownership of this SOG be formally retained by that OPAG.
3. The AOPC requested that the SOGs on Monitoring Climate Change and Monitoring Climate Variability reviewed at this session be provided to CCI for further review by appropriate CCI Expert Teams (ETs) and individuals, and subsequently be submitted through these ETs to the CBS ET-ODRRGOS. It noted that CCI was in the process of developing additional SOGs for climate applications and agreed that it should review these as appropriate as part of the process of submitting them to the ET-ODRRGOS. The Panel further recommended that formal ownership of these SOGs reside within the CCI structure.

GSN and GUAN

4. The AOPC noted the request from the WMO Commission for Basic Systems (CBS) for advice in nominating a CBS Rapporteur on GCOS Matters, to replace the former representative from the GSN Monitoring Centre at DWD. It agreed that it would be beneficial to maintain the connection between the CBS Rapporteur and the GCOS Centres and requested the Chairman to liaise with NCDC and/or other centres to solicit potential candidates to fulfill this role.
5. The AOPC recalled the benefits of the joint CBS/GCOS Expert Meeting on Coordination of the GSN and GUAN, held in Offenbach, Germany in May 2002. It recommended that such meetings of representatives of CBS and GCOS data centres be held on a regular basis and that consideration be given at the next session to the possibility of extending the scope of the centres to include additional atmospheric climate variables.
6. The AOPC noted the value of updating the Guide to the GSN-GUAN (GCOS-73) in synchronization with the completion of the Second Adequacy Report and the corresponding GCOS Implementation Plan and requested the AGG to prepare the update as soon as possible. The Panel reiterated its appreciation to the late Harold Daan for his efforts in drafting the initial version of the Guide and for his overall contributions to GCOS.
7. The AOPC welcomed the progress achieved by the Advisory Group on GSN and GUAN (AGG) through the mechanism of teleconferencing and encouraged it to continue this mode of operation, perhaps twice per year between AOPC meetings. The Panel endorsed the recommendations of the AGG proposed at this session.
8. The AOPC recognized the large effort being devoted by the GCOS Monitoring Centres (DWD, JMA, Hadley Centre, ECMWF), Analysis Centres (NCDC, Hadley Centre) and Archive (NCDC/WDC-Asheville) in fulfilling their roles, and reiterated its appreciation for their major contributions in support of GCOS.

9. The AOPC expressed its appreciation to JMA and NCDC for the progress being achieved through their new role as CBS Lead Centres for GCOS (GSN) Data. The Panel recognized the very large efforts required, even within individual regions, and suggested that it might be appropriate to partition the overall global effort through nomination of Lead Centres on a regional basis. It requested that the GCOS and WMO Secretariats explore this possibility, noting that this might be effected in cooperation with the Regional Climate Centres being established through CCI. The Panel suggested that the Regional Lead Centres could continue to address the flow of CLIMAT messages in quasi-real-time (e.g. monthly) while the NCDC Lead Centre would focus on ensuring the capture of historical data from all GSN stations and promoting effective liaison among all Lead Centres.
10. The AOPC noted the advantages of simple and easy access to monthly performance charts on the GUAN Monitoring Centre (Hadley Centre) Web site and requested that the GSN Monitoring Centres (DWD, JMA) strive to imitate this presentation format. It also requested that all the centres develop and make routinely available the time histories of these and other performance indicators to demonstrate clearly and easily the progress in improving network performance.
11. The AOPC noted with appreciation that basic information on the quality of received GSN data was now being calculated by the GSN Monitoring Centres (MCs). It encouraged the MCs to highlight such performance indicators, recognizing that they should become more significant for overall performance assessment as data receipts increase.
12. The AOPC reiterated its request that the GCOS MCs and the GCOS Archive cooperate to ensure that all data available at the all centres is included in the Archive. It emphasized the strategic importance of having a formal and accessible (i.e. Web-based) archive for complete GSN and GUAN historical data sets. Such data sets should also be developed for the other atmospheric ECVs as baseline networks are established for them. The AOPC noted that, as more baseline networks are established, it would be advantageous for all historical data sets of atmospheric ECVs to be available through a single World Data Centre.
13. The AOPC reiterated the value of the provision of CLIMAT and CLIMAT TEMP messages from the GSN and GUAN stations, *inter alia* because they provided an additional level of quality assessment of the observations contributing to these reports. It noted the completion of new CBS guidance for the preparation of CLIMAT and CLIMAT TEMP reports and urged station operators to maximize their efforts to develop and provide these reports on a routine and timely basis.
14. The AOPC welcomed the development, through the combined efforts of the GCOS and WCP Secretariats, of specialized software that would assist countries who needed help to create and disseminate CLIMAT messages. It requested that this software be made available to all WMO Members as soon as possible.
15. The AOPC encouraged the GSN Lead Centres and Monitoring Centres (NCDC, DWD, JMA) to make every effort to contact non-reporting GSN stations to provide their CLIMAT reports as expected in quasi-real time (i.e. monthly).
16. The AOPC noted the progress in revitalizing priority GUAN stations through the activities of the GCOS Implementation Officer in the GCOS Secretariat. It expressed its strong appreciation to the USA, through its US National GCOS Programme, for the leadership and support they were providing for this effort, as well as to Australia, New Zealand, the UK, and other GCOS partners who were assisting in the station revitalization process. The Panel noted the procedural difficulties being encountered in implementing some of the revitalization projects and requested that the GCOS and WMO Secretariats make every effort to resolve such problems as quickly as possible.

17. The AOPC noted that, following the provision of new equipment or materials to specific GUAN or GSN sites through the revitalization program, the GCOS Implementation Officer should closely monitor the impacts of these initiatives and provide timely and continuing feedback. In particular, it would be necessary to identify sites where additional training may be required.
18. The AOPC noted the potentially large, and possibly detrimental, impacts of anticipated modifications to Vaisala radiosondes on the ability of many GUAN stations to continue regular operations. The Panel requested the Chairman to work with the GCOS Secretariat to highlight the issue with the WWW Secretariat. It also requested the AGG to monitor developments in this regard and bring them to the attention of AOPC, WWW/OSY and other entities as appropriate.
19. The AOPC requested that the issue of problems with radiosonde observations over the Indian subcontinent be addressed at the GCOS Regional Workshop for Southwest Asia in late 2004, through a formal presentation on the issue or by other appropriate means.
20. The AOPC requested that the GCOS Secretariat ensure that an appropriate response to India regarding their offer of four stations for GUAN is provided to the India Meteorological Department as soon as possible, and definitely before the GCOS Regional Workshop for Southwest Asia.
21. The AOPC expressed its strong appreciation to NCDC for the many efforts being carried out in support of GSN and GUAN in its multiple role as an Analysis Centre, Lead Centre and Archive, recognizing the large demands being placed on it and welcoming the progress being achieved.
22. The AOPC noted with appreciation the project underway at NCDC to facilitate the digitization of climate data in developing countries, and requested Panel members to help identify priority regions for this activity.
23. The AOPC reiterated the need for, and value of, national focal points for GCOS data in all countries to assist the monitoring and lead centres in carrying out their functions. It welcomed the progress in identifying such focal points through the efforts of the WMO and GCOS Secretariats and urged the continuation of these efforts, noting that a large number of focal points still remained to be identified. The Panel requested that this issue be highlighted at GCOS Regional Workshops and WMO Regional Association sessions and that all AOPC members encourage appropriate nominations through informal or other contacts. It also requested the Secretariat to make the formal call letter available to all concerned to assist in this effort.
24. The AOPC suggested that the NCDC Lead Centre make direct contact with countries that had not yet nominated GCOS focal points, noting the mandated role of Lead Centres in liaising with WMO Members. It also suggested that the issue of non-submission of historical data could be simultaneously addressed by the Lead Centre, noting that less than half of the requested historical data had been received to date by the GSN Archive.
25. The Panel suggested that the GSN Lead Centres maintain direct contact with WWW/OSY regarding the continuing update of the list of national focal points.
26. The AOPC noted the potential value of high-altitude stations for filling certain gaps in the GSN, while recognizing the great difficulty in maintaining most of these stations due to their inherent nature and surroundings. It urged the continuation of efforts to establish such stations, emphasizing the importance of having solid infrastructural support in the country in question. The Panel noted the possibility that some US Climate Reference Network (CRN) sites could fill gaps in the GSN, especially at high altitude, in spite of a lack of historical record at the site. It accepted the AGG suggestion of waiving this requirement for new GSN stations if they were

located in important and otherwise data-sparse areas, as had been previously decided for new AWS stations. It welcomed the offer of Mauna Loa to the GSN.

27. The AOPC confirmed the establishment of a WG on Reconciliation of Surface and Free Atmosphere Temperature Trends (WG-TT) and welcomed the suggestion that it be led by Peter Thorne of the UK Met Office. It endorsed the draft Terms of Reference developed at this session and requested that these be finalized in coordination with the proposed WG Chairman.
28. The AOPC welcomed the progress in addressing the issue of reconciling temperature trends at the Asheville workshop in October 2003 and the plans for a follow-on workshop in the UK (13-17 September 2004), as well as a NOAA Climate Monitoring Working Group (CMWG) workshop in 2005. The Panel requested that AOPC maintain close cooperation these activities through the newly-formed WG-TT.
29. The AOPC emphasized the need for highly-accurate sonde measurements of water vapour in the upper troposphere and lower stratosphere. Noting that fewer measurements could be tolerated in the middle stratosphere compared with the troposphere, given the larger correlation scales in the stratosphere, the Panel endorsed the concept of selecting a subset of GUAN as a GCOS reference network for highly-accurate measurements of water vapour and stratospheric temperature. Sondes from this subset of stations would be required routinely to reach 5 hPa and would include water vapour instrumentation similar to that used at the Boulder reference station, for example. The Panel requested the Chairman, the WG-TT and the AGG to liaise with the relevant scientists and agencies to assist in the implementation of this concept. Consistent with this approach, the Panel agreed that the target requirement for sounding height from the GUAN network in general should now be 30 hPa, and requested that this adjustment be incorporated in the next revision of the Guide to the GSN and GUAN (GCOS-73).
30. The AOPC recognized the benefits of establishing a limited network of upper-air stations at which releases of high-quality radiosondes would be coordinated with satellite overpasses, and encouraged the continuation of efforts toward this end. Such a 'Satellite Upper-Air Network' could provide continuing opportunities to inter-compare sonde and satellite measurements for the benefit of both climate and NWP communities. The Panel noted that such a network, if established, could be co-located with GUAN stations in some cases by arranging for the release of supplementary sondes as needed, thereby taking advantage of existing technical skills for high-quality observations in a cost-effective manner. It nevertheless emphasized that the arrangement for additional soundings must not disturb the routine operation of those stations for GUAN purposes. The Panel also noted that humidity measurements from such a network should be of adequate accuracy to be useful for the simulation of radiances with radiative transfer models.
31. The AOPC noted the progress by the Secretariat in identifying the blockages to atmospheric and hydrological data exchange in response to the request from UNFCCC SBSTA-18 and looked forward to reviewing the findings of the completed document prior to its submission to SBSTA-20.

Marine Issues

32. The AOPC welcomed the overview of OOPC activities presented by its Chairman and the progress achieved on a wide range of issues. It looked forward to continuing close cooperation with the OOPC on issues involving marine surface observations, analyses and reanalyses.
33. The AOPC noted the activities of the Surface Pressure Working Group (WG-SP) and encouraged it to continue its efforts leading to improved historical surface pressure analyses and their use.

34. The AOPC noted the efforts of the JCOMM Ship Operations Team to support the Volunteer Observing Ship (VOS) programme. It emphasized the importance of a strong VOS programme to the success of the VOSCLim project, which should ideally involve at least 200-or-so ships. The Panel urged continuing support of the programme by National Meteorological Services, particularly regarding the number and quality of Port Meteorological Officers. The Panel also noted the crucial need for VOS metadata in electronic form in support of the VOSCLim project, as well as ongoing support from WMO for metadata collation and distribution.
35. The AOPC recommended that support be provided to ensure that the initial WRAP line could be maintained on a long-term operational basis, and that additional WRAP lines eventually be implemented in the Pacific and Southern Oceans.
36. The AOPC reiterated its endorsement for a global surface drifting buoy array consisting of about 1250 uniformly distributed drifters measuring both SST and SLP, as well as for the proposed sparse global network of air-sea reference quality time series moorings.
37. The AOPC reiterated its interest in an evaluation of the uncertainty of historical sea ice analyses and in recommendations for actions to be taken to improve the historical record, noting that OOPC would have discussions on this topic at its ninth session in June 2004.
38. The AOPC noted the establishment of the CLIVAR Global Synthesis and Observations Project (GSOP), the first workshop planned for November 2004, and the initial focus on ocean climate analysis and reanalysis. It noted also the establishment by WCRP of a Working Group on Observations and Assimilation (WGOA) and a Working Group on Surface Fluxes, and looked forward to working with all three groups on issues involving the analysis of marine surface conditions.

Atmospheric Forcing

39. The AOPC noted with appreciation the completion and acceptance by all concerned of the GCOS-WCRP agreement formally designating the WCRP/GEWEX Baseline Surface Radiation Network (BSRN) as the GCOS global baseline surface radiation network. It noted that determining full global surface radiation analyses would require the integration of both BSRN and satellite data.
40. The AOPC recognized the need for additional observations to meet the requirements for monitoring the global radiation budget. It requested the Chairman to contact the GEWEX Radiation Panel and/or other appropriate scientists with a view to advancing the issue at or prior to the next AOPC session.
41. The AOPC welcomed the progress in identifying subsets of the Global Atmosphere Watch (GAW) comprehensive CO₂ networks which could eventually serve as a GCOS baseline CO₂ network. It requested the Chairman to liaise with the GAW Secretariat (Len Barrie) and NOAA/CMDL (Jim Butler) towards developing a detailed proposal for such a network, noting that it could also serve as a baseline network for CH₄ in view of the commonality of measurements at most of the sites in question.
42. The AOPC noted the ongoing activities of the World Data Centre for Greenhouse Gases (WDCGG) at JMA and suggested that time series of data availability should be routinely presented on the WDCGG Web site.
43. The AOPC noted the excellent progress in completing the Integrated Global Atmospheric Chemistry Observation (IGACO) report for submission to the IGOS Partnership, and looked forward to implementation of IGACO in conjunction with the GCOS Implementation Plan.

Satellite Issues

44. The AOPC noted the plans for a workshop (Hamburg, Germany, 19-21 July 2004) being organized by the Satellite Application Facility on Climate Monitoring (CM-SAF), focused on developing global homogeneous climate products from satellite data. It confirmed its designation of P. Arkin as the AOPC representative at the meeting.
45. The AOPC noted with appreciation the action items agreed at CGMS-XXXI aimed specifically at supporting GCOS needs. It welcomed in particular CGMS efforts to develop globally-consistent, homogeneous data products (such as surface albedo) from satellite and related *in situ* data and encouraged the continuation of these efforts for other products.
46. The AOPC strongly endorsed the re-processing of Atmospheric Motion Vectors (AMVs) with common state-of-the-art algorithms to provide homogeneous data in support of re-analyses at NWP centres and for other climate analyses. It recognized that each satellite operator was performing its own reprocessing of AMVs, and stressed the need for the AMV products be globally consistent and homogeneous. The Panel noted that developments over previous years carried out by the International Winds Working Group under the auspices of CGMS had made considerable progress in that regard.
47. The AOPC supported the selection of surface albedo as a parameter for developing a prototype climate data set from geostationary satellite observations. It welcomed the considerable progress being made by members of CGMS toward this end and requested an update on developments at its next session. The Panel noted that the reprocessing involved began with Level-1 data and thus provided an improved Level-1b data set that was useful for other applications.
48. The AOPC noted that while the surface albedo product from geostationary satellites necessitated the reprocessing of visible channel data, it would be useful also to develop selected products requiring the reprocessing of thermal infrared data. Convective indices were suggested for that purpose because they are uniquely observed from geostationary orbit, scientifically interesting, and simple enough in terms of retrieval algorithms; they also present the necessary challenges that need to be considered in reprocessing image data from the archive.
49. The AOPC noted the ongoing activities in NESDIS for developing and distributing products based on satellite data and encouraged continuation. It endorsed the proposal to produce globally-consistent homogeneous Aerosol Optical Depth products through reprocessing of AVHRR data.

Synthesized Products and Reanalysis

50. The AOPC noted the progress in developing high-resolution global rainfall analyses from surface rain gauges at the Global Precipitation Climatology Centre (GPCC). It urged publication and exploitation of the results of this work as soon as possible.
51. The AOPC welcomed the ongoing development of precipitation products through integration of satellite and *in situ* data within the GPCP and looked forward to a report on the latest status at its next session.
52. The AOPC noted the positive response of the international reanalysis centres to the suggestion from AOPC for establishing a coordination mechanism for global reanalysis activities. The Panel requested the Chairman to pursue this initiative in liaison with WCRP and its newly-established Working Group on Observations and Assimilation, recognizing the common interests and requirements of AOPC and WCRP in this regard.

53. The AOPC welcomed the report on the US 'Workshop on Ongoing Analysis of the Climate System', and the initiative to establish a US national program to provide a retrospective and ongoing physically consistent synthesis of earth observations. It noted the plans to develop an Implementation Report for such a programme through a workshop in mid-2004 and looked forward to progress in this activity. The Panel requested that it be kept informed of developments in coordination with the planned interaction with WCRP activities and reanalysis efforts.
54. The AOPC welcomed the recent commencement of the JRA-25 reanalysis activity, recognizing the strong links and positive feedback with NWP data assimilation and performance. It also recognized the importance of reprocessing input observations for reanalyses and welcomed the extent of JMA efforts in this regard. The Panel noted in particular the digitization of China snow depth data from 1979 and welcomed JMA plans to make these data openly available, noting the importance of making reprocessed data freely available to all centres.
55. The AOPC noted with satisfaction the recent studies suggesting that the ERA-40 reanalysis reproduces the observed land surface air temperature trends over recent decades.
56. The AOPC noted that serious deficiencies are evident in synoptic datasets available for periods prior to about 1970 and agreed that rectification of these, and augmentation where necessary, would be extremely beneficial. It recommended that a data recovery and reprocessing effort be conducted on the surface synoptic database before next generation of reanalysis is begun.
57. The AOPC recommended the reprocessing of historical satellite data to support future reanalyses.
58. The AOPC recommended that future reanalysis exercises should incorporate changes in atmospheric constituents (greenhouse gases, ozone, aerosols, etc.) and also reprocessed assessments of changes in albedo and land surface characterization.

Climate Indices, Paleoclimatology, Other Issues

59. The AOPC welcomed the plans for several additional regional climate analysis workshops in the coming year, noting the benefits of these meetings both for generating awareness and capabilities in developing countries as well as for the value of the data analyses and statistics in themselves. It also noted with satisfaction the completion of the fifth in the series of APN workshops that have provided the framework for workshops of this type.
60. The AOPC reiterated the value of establishing an open Web site presenting a selected group of climate indices and requested the Chairman to liaise with Chris Folland to complete this initiative.
61. The AOPC welcomed the presentation by Phil Jones on the science behind paleoclimate reconstructions for the last two millennia and looked forward to publication of the results of this work.
62. The AOPC recognized the great value of the NCDC paleoclimate archive and recommended that all paleoclimate data, including original measurements and reconstructions, should be lodged in the archive.
63. The AOPC noted the progress in the 'Snow Cover Changes over Northern Eurasia' (SCCONE) project, aimed at quantifying trends in snow cover parameters over regions of the former Soviet Union in conjunction with those for north-western Europe. It looked forward to completion of the project in 2005 and the subsequent availability of the data through the World Data Centre for Snow and Ice in Boulder, USA.

64. The AOPC welcomed the suggestion of the GCOS Steering Committee that a GCOS international implementation symposium be held in 2006, following completion and acceptance of the GCOS Implementation Plan. It looked forward to participating fully in the planning and organization of this symposium, noting that this activity would fulfil the objectives envisaged for an AOPC Implementation Conference and hence render such a separate meeting unnecessary in the near term.
65. The AOPC confirmed the usefulness of completing an abridged version of the GCOS Plan for Atmospheric Observations and requested that the Chairman and the Secretariat arrange for publication of the draft completed at the session as soon as possible.

Next Session

66. The Eleventh Session of the AOPC was planned to be held from 11-15 April 2005, tentatively in Geneva, Switzerland or Exeter, UK.