CGMS-XXX
WMO WP-24
Prepared by WMO
Agenda item: H.3

GCOS PRINCIPLES FOR CLIMATE

(Submitted by WMO)

Summary and purpose of document

This document presents a brief summary of some recent developments in the Global Climate Observing System (GCOS) programme. It also suggests that the exchange of information between GCOS and CGMS be enhanced, for example, through the presentation of the information in reports of this nature, and through the informal liaison of common representatives in appropriate activities of CGMS and AOPC.

ACTION PROPOSED

(1) The session is invited to note the information contained in this document and comment on the suggestions for enhancement of interactions between GCOS and CGMS.

(2) CGMS is invited to consider i) a review of current practise of satellite operators with regard to the climate monitoring principles from satellite (see Appendix), and ii) to provide pertinent comments at this and subsequent CGMS meetings.

Appendix: GCOS Climate Monitoring Principles

DISCUSSION

GCOS Steering Committee: Tenth session

1. The tenth session of the GCOS Steering Committee (GCOS SC-X) was held in Farnham, UK, from 15-19 April 2002. A number of issues relating to climate observation from satellites were discussed, including a reiteration of the need to integrate satellite issues in the work of the GCOS Science Panels to ensure that proper consideration of both satellite and *in situ* observations was being taken in the development of the overall global observing system for climate. The SC was pleased that the agreed process for handling satellite matters directly through the Science Panels (rather than through a separate dedicated panel) was working to the satisfaction of all concerned. It encouraged the Panel Chairs to invite appropriate experts from space and satellite organizations to specific meetings as needed, in addition to ensuring that at least two members of each Panel have expertise on space-based observation in the relevant domain. The SC also recognized the need for strong executive-level interaction between GCOS and various space agencies and noted the advantages of having space-agency representatives on the SC as one strategy for ensuring such interaction.

2. The SC welcomed the EUMETSAT initiative to establish Satellite Application Facilities (SAFs) that produce climate-related products of benefit to GCOS. It supported the production of such products on a regular and sustained basis and encouraged the development of complementary activities in other parts of the world to generate consistent global products. The SC welcomed the review workshop planned for early 2003 relating specifically to the SAF on Climate Monitoring and recommended that international participation be sought in this activity.

3. With regard to CGMS in particular, the SC recognized the experience and achievements of CGMS in dealing with the ongoing coordination of a robust, reliable observational satellite system and requested that the GCOS Secretariat investigate the possibility of enhanced interactions between GCOS and CGMS. This sentiment was reiterated by the eighth session of the GCOS Atmospheric Observation Panel for Climate (AOPC-VIII) in May 2002, which welcomed a review of the activities and priorities of CGMS presented by Dr J. Schmetz, an AOPC member, and looked forward to the opportunity to increase AOPC/GCOS links with CGMS through the regular participation of Dr Schmetz in the CGMS forum. In this regard the current update of GCOS activities is being presented to CGMS as an initial step to enhance the desired interaction. Furthermore, it is proposed that informal liaison between the two groups be maintained for the time being through the participation of Dr Schmetz in both CGMS and AOPC meetings.

GCOS Climate Monitoring Principles

4. At the second session of the WMO Consultative Meetings on High-Level Policy on Satellite Matters, held in Geneva, 18-19 February 2002, a review of the ten basic GCOS Climate Monitoring Principles was presented, along with an adaptation of those principles directed specifically at satellite-based systems. That session fully supported the principles and suggested that they be presented to executive bodies such as the WMO Executive Council for formal endorsement. A version of the principles was developed and refined by AOPC-VIII in May 2002 and presented for consideration to WMO EC-LIV (Geneva, June 2002), which expressed its full endorsement of the principles. GCOS will submit a draft resolution for consideration by the WMO Congress in 2003 and will solicit endorsement from other sponsors as appropriate. The GCOS Climate Monitoring Principles endorsed by EC-LIV are contained in the Appendix.

Second Adequacy Report on Climate Observing Systems

5. At its third session in Kyoto in 1997, the Conference of the Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC) requested that a report be prepared to assess the adequacy of the global observing systems for climate to meet the observational needs

in support of the Convention. The Global Climate Observing System, on behalf of organizations participating in the Climate Agenda and in collaboration with the climate components of the Global Ocean Observing System (GOOS) and the Global Terrestrial Observing System (GTOS), coordinated the preparation of such a report and submitted it to COP-4 in Buenos Aires in 1998 ('Report on the Adequacy of the Global Climate Observing Systems', GCOS-48, October 1998). COP-4 noted the report with appreciation and adopted Decision 14/CP.4 in support of research and systematic observation related to the Convention.

6. The GCOS SC, at its ninth session in September 2000, requested the GCOS Secretariat to develop a Second Report on the Adequacy of the Global Observing Systems for Climate. This report was to build on the information on systematic observations submitted by Parties as part of their National Communications to COP, in accordance with reporting guidelines developed by GCOS and adopted by COP, along with other available information on climate observing systems. At its fifteenth session in Marrakesh in November 2001, the UNFCCC Subsidiary Body on Scientific and Technological Advice (SBSTA-15) endorsed the preparation of such a report addressing the needs of the Convention and invited the GCOS Secretariat, in its preparation of the report, to take into account relevant COP decisions on capacity-building, technology transfer and adaptation. It asked, in addition, that the report consider an integrated approach to global climate observing systems, including the exploitation of new and emerging methods of observation.

7. SBSTA-15 also noted the need to complete the Second Adequacy Report in the shortest possible time to provide a framework for further work to improve global monitoring systems. It therefore asked the GCOS Secretariat to prepare an interim report on the synthesis and analysis of the national reports from Parties for consideration by SBSTA-16 in June 2002, and to complete the final report by SBSTA-18 (June 2003) in order for it to be considered by COP-9 in November 2003. That Interim Report included a number of additional recommendations from the tenth session of the GCOS SC in April 2002, as well as the plan for completion of the Second Adequacy Report and a proposal to involve experts previously engaged in the work of the Intergovernmental Programme for Climate Change (IPCC). SBSTA-16 welcomed the report and the process proposed for developing the Second Adequacy Report.

Objectives and Procedure

8. The goals of the Second Adequacy Report are to:

- Determine what progress has been made in defining and implementing climate observing networks and systems since the First Adequacy Report prepared for COP-4 in 1998;
- Determine the degree to which these networks meet with scientific requirements and conform with associated observing principles;
- Assess how well current systems, together with planned improvements, will meet the needs of the Convention.

9. The report will:

- Be based on detailed reports and National Communications by Parties to the UNFCCC Conference of Parties;
- Utilise data and information on operational and research observing systems from all available sources;
- Draw upon a balanced range of scientific experts to develop the specific analyses;
- Take into account relevant COP decisions on capacity building, technology transfer and adaptation;

- Incorporate an integrated approach to global climate observing systems, including the exploitation of new and emerging methods.

10. Preparation of the report will be under the overall direction of the GCOS Steering Committee, acting through its Chairman. The Chairs of the GCOS Science Panels will organise the analyses to meet the goals of the report. Scientific experts, including those previously engaged in the work of the IPCC, will refine the objectives and define the metrics for analysis in light of the needs of the Convention in preparation for development of the specific analyses. A draft of the report will be made available for open review through the GCOS Web site, presentations at international scientific conferences, and other appropriate distribution methods.

Key Milestones

- 1-3 July 2002 in Melbourne Australia: GCOS Science Panel chairs to finalise the information base and define critical questions for meeting with IPCC experts.

- 12-14 August 2002 in Boulder Colorado USA: Meeting with IPCC experts on needs of the Convention for observing systems as in the IPCC Third Assessment Report (TAR) and to develop appropriate metrics for adequacy analyses.

- 14-18 October 2002 in Farnham U.K.: Meeting of authors to review, organise, and assemble initial adequacy analyses.

- Dec 2002-Mar 2003: Open comment period on the draft report to develop a consensus on the conclusions - e.g., GCOS homepage, presentations at international meetings.

- April 2003: Review of draft report by GCOS SC.

- June 2003: Report available to SBSTA-18.

Conclusions

11. The session is invited to take note of the information contained in this report and endorse the interaction between CGMS and AOPC/GCOS through the regular participation of Dr J. Schmetz in both fora.

12. In view of the increasing use and importance of operational meteorological satellite data for climate research and monitoring, CGMS is invited i) to consider a review of current practise of satellite operators with regard to the Climate Monitoring Principles from satellites (see the Appendix), and ii) to provide pertinent reports at the next CGMS meeting.

GCOS CLIMATE MONITORING PRINCIPLES

*Effective monitoring systems for climate should adhere to the following principles *:*

1. The impact of new systems or changes to existing systems should be assessed prior to implementation.

2. A suitable period of overlap for new and old observing systems is required.

3. The details and history of local conditions, instruments, operating procedures, data processing algorithms and other factors pertinent to interpreting data (i.e., metadata) should be documented and treated with the same care as the data themselves.

4. The quality and homogeneity of data should be regularly assessed as a part of routine operations.

5. Consideration of the needs for environmental and climate-monitoring products and assessments, such as IPCC assessments, should be integrated into national, regional and global observing priorities.

6. Operation of historically-uninterrupted stations and observing systems should be maintained.

7. High priority for additional observations should be focussed on data-poor regions, poorly-observed parameters, regions sensitive to change, and key measurements with inadequate temporal resolution.

8. Long-term requirements should be specified to network designers, operators and instrument engineers at the outset of system design and implementation.

9. The conversion of research observing systems to long-term operations in a carefully-planned manner should be promoted.

10. Data management systems that facilitate access, use and interpretation of data and products should be included as essential elements of climate monitoring systems.

Furthermore, satellite systems for monitoring climate should adhere to the following specific principles:

11. Rigorous station-keeping should be maintained to minimize orbital drift.

12. Overlapping observations should be ensured for a period sufficient to determine inter-satellite biases.

13. Satellites should be replaced within their projected operational lifetime (rather than on failure) to ensure continuity (or in-orbit replacements should be maintained).

14. Rigorous pre-launch instrument characterization and calibration should be ensured.

15. Adequate on-board calibration and means to monitor instrument characteristics in space should be ensured.

16. Development and operational production of priority climate products should be ensured.

17. Systems needed to facilitate user access to climate products, metadata and raw data, including key data for delayed-mode analysis, should be established and maintained.

18. Continuing use of still-functioning baseline instruments on otherwise de-commissioned satellites should be considered.

19. The need for complementary in-situ baseline observations for satellite measurements should be appropriately recognized.

20. Network performance monitoring systems to identify both random errors and time-dependent biases in satellite observations should be established.

** The ten basic principles were adopted (in paraphrased form) by the Conference of the Parties to the UN Framework Convention on Climate Change through Decision 5/CP.5 of COP-5 at Bonn in November, 1999.*