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SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
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Item 7 of the provisional agenda

COOPERATION WITH RELEVANT INTERNATIONAL ORGANIZATIONS

Global Climate Observing System: Progress report on developments in the global observing system and activities related to decision 5/CP.5

Note by the secretariat

1. At its twelfth session, the Subsidiary Body for Scientific and Technological Advice invited the Global Climate Observing System (GCOS) secretariat to report periodically on its activities related to decision 5/CP.5, as well as on developments in the global observing systems for climate at its further sessions (FCCC/SBSTA/2000/5, para. 59 (f)).

2. The GCOS secretariat submitted a report in response to the above request. In accordance with the procedure for miscellaneous documents, this submission is attached and reproduced in the language in which it was received and without formal editing.*

* In order to make this submission available on electronic systems, including the World Wide Web, this submission has been electronically imported. The secretariat has made every effort to ensure the correct reproduction of the text as submitted.

GLOBAL CLIMATE OBSERVING SYSTEM (GCOS): REPORT TO THE FIFTEENTH SESSION OF THE SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE OF THE CONFERENCE OF THE PARTIES TO THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

(Submission received on 16 August 2001)

INTRODUCTION

This report is part of a series provided to the Subsidiary Body for Scientific and Technological Advice (SBSTA) in response to its invitation at its twelfth session that the GCOS secretariat, on behalf of the agencies participating in the Climate Agenda, report periodically on recent developments in the global observing systems for climate and on progress in responding to decision 5/CP.5.

In this report, GCOS[1]:

- proposes the preparation of a second Report on the Adequacy of the Global Climate Observing Systems[2] building on the compilation and synthesis by the UNFCCC secretariat of the information on systematic observation which will be reported by Parties in response to decisions 4/CP.5 and 5/CP.5;
- provides results from recent monitoring of some key components of the GCOS which suggest several positive changes in relation to the Convention's requirements while at the same time identifying some areas where the urgent attention of the Parties is required;
- outlines significant recent developments in the global observing systems for climate; and
- discusses the ongoing response of GCOS to decision 5/CP.5 in regard to the holding of regional workshops.

1 PREPARATION OF A SECOND REPORT ON THE ADEQUACY OF THE GLOBAL CLIMATE OBSERVING SYSTEMS

Through its decision 5/CP.5, the COP adopted the UNFCCC reporting guidelines on global climate observing systems and invited all Parties to use them in preparing detailed reports on their activities in systematic observation. In addition, pursuant to decision 4/CP.5, Annex I Parties were requested to include these reports in conjunction with their next national communications under the UNFCCC, with Non Annex I countries providing such information on a voluntary basis. The Decision also invited the Convention secretariat, in conjunction with the Global Climate Observing System secretariat, to develop a process for synthesizing and analysing the information submitted in accordance with the guidelines.

At its ninth session in September 2000, the GCOS Steering Committee (SC) requested the GCOS secretariat, in consultation with the GCOS science panels and individual SC members, to develop, as a matter of urgency, possible methods which could be used to synthesize and analyse the information on systematic observations which will be submitted to the UNFCCC/COP by 30 November 2001. It further requested that this process be extended to include other information and establish a procedure for preparing a second Report on the adequacy of the global climate observing systems. The GCOS SC indicated that this process

should involve international experts in analysing the adequacy of the current global observing systems for climate in light of the stated scientific requirements and observing principles, and take account of national reports[3] and any additional relevant data and information. The analysis also should consider the conclusions of the Third Assessment Report of the IPCC. The GCOS SC view is that this report will be of significant benefit to the COP and that the proposal is consistent with Decisions 5/CP.5 and 14/CP.4.

The following is an outline of a suggested process that the GCOS secretariat would be willing to undertake subject to agreement with the UNFCCC secretariat on the requisite process to meet the requirements of Decision 5/CP.5.

Compilation and Synthesis

The UNFCCC secretariat will prepare a compilation and synthesis report drawing together the basic information from national communications received by November 2001. This will be prepared as soon as practicable after receipt of national communications as a UNFCCC document following normal Convention practice. The GCOS secretariat will assist in this process as requested in Decision 5/CP.5.

Adequacy Report

The GCOS secretariat proposes to build on the compilation and synthesis of reports to the UNFCCC by co-ordinating and guiding the preparation of a second Report on 'The Adequacy of the Global Observing Systems' in the light of developments since the first Adequacy Report prepared for COP-4. The goals will be to determine what progress has been made since then in defining and implementing climate observing networks and systems; to determine the degree to which these networks meet with scientific requirements and conform with stated observing principles; and to assess how well current systems and planned improvements will meet the needs of the Convention.

The Adequacy Report will draw upon scientific experts including members of the GCOS Science Panels, and will utilise data and information on operational and research observing systems from all available sources, such as national, regional and international organisations. The Report will also address new developments and emerging opportunities such as the increasing capabilities shown by satellite systems to provide long-term, calibrated climate observations, and new techniques for integrating global *in situ* and satellite observations.

This proposal aims to produce a scientific report on the state of the global observing systems for climate, with wide acceptance by all stakeholders including the Parties to the UNFCCC. It is envisaged that it will be a relatively succinct document, including supporting appendixes as required, totalling about fifty pages including a five-page executive summary.

A special Task Team of scientists covering the GCOS spectrum would prepare the Adequacy Report and would be guided by a Steering Group drawn from the GCOS Steering Committee and with participation of the UNFCCC secretariat. The Report will be considered and endorsed at an international scientific conference of representative scientists and stakeholders and be made available to Parties for comment.

Schedule

The GCOS secretariat proposes that the conclusions of the Adequacy Report be presented to COP-9 for consideration and action as appropriate. To meet this deadline, the following draft timetable is proposed.

July-October 2001	Develop process and Adequacy Report outline.
November 2001	Present the proposed Adequacy Report framework to SBSTA 15 for consideration.
January-June 2002	Contribute to preparation of the UNFCCC compilation and synthesis of national reports. Organise Task Team and compile additional information.
July-December 2002	Develop set of analyses of information from national reports and other sources; reach preliminary conclusions.
November 2002	Report progress to SBSTA.
January 2003	Distribute draft assessment to national bodies for comment.
April 2003	Hold international science conference to review the draft Adequacy Report and develop a consensus on the conclusions.
June 2003	Report preliminary findings to SBSTA.
June-October 2003	Prepare final Adequacy Report.
November 2003	Report conclusions to COP-9.
January-June 2004	Complete final reviews and publish the second Report on the Adequacy of the Global Climate Observing Systems.

2 RECENT MONITORING OF SOME KEY COMPONENTS OF THE GCOS

The GCOS was established in 1992 to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users including the UNFCCC. It addresses the total climate system including physical, chemical and biological properties, and atmospheric, oceanic, hydrologic, cryospheric and terrestrial processes.

GCOS builds upon, and works in partnership[4] with, other existing and developing observing systems and also draws upon proven networks established under research programs. GCOS integrates satellite observations provided by national and regional agencies together with surface based observations through its scientific panels and its participation in various international activities. These include the WMO Consultative Meetings on High-Level Policy on Satellite Matters and the Integrated Global Observing Strategy (IGOS[5]) Partnership, which provide fora for the coordination of global observing systems, the satellite operators, and the international research programmes.

One of the major activities of GCOS is the establishment of operational performance standards for its contributing networks. These enable GCOS to assess and report upon the actual effectiveness of those networks in meeting the needs of the climate community. As

might be expected this activity is still in its infancy and the performance criteria for most of the networks are still under development.

The following sections outline performance information in two areas.

Atmospheric climate observations

GCOS Surface and Upper Air Networks (GSN and GUAN)

The GSN and GUAN were established as sub-sets of the full Global Observing System networks of WMO's World Weather Watch (WWW) operated to GCOS standards[6]. Monitoring of the performance of the GSN and GUAN and archiving of their data, undertaken through the collaborative efforts of the Deutscher Wetterdienst, the Japan Meteorological Agency, the UK Meteorological Office, the US National Climatic Data Center, and the European Centre for Medium-range Weather Forecasts, has now been operational for two years and some results are presented in Table 1.

Table 1: Status of GCOS Surface and Upper Air Networks (GSN & GUAN) for 2000; by WMO Region (corresponding figures for 1999 are given in brackets)

	WMO Region	No of stations	Percentage providing at least 90% of reports	Percentage providing from 50- 89% of reports	Percentage providing from 1-49% of reports	Percentage of "silent" stations
GSN Monitoring period: 2000	I - Africa	155	8 (8)	18 (33)	31 (12)	43 (47)
	II - Asia	262	25 (37)	22 (26)	19 (2)	33 (35)
	III - South America	120	28 (33)	20 (16)	9 (8)	43 (43)
	IV - North & Central America	157	76 (72)	12 (9)	3 (10)	9 (9)
	V - South-West Pacific	155	31 (35)	30 (14)	17 (8)	22 (43)
	VI - Europe	120	53 (51)	9 (9)	6 (3)	33 (37)
	Antarctica	20	35 (50)	35 (20)	5 (0)	25 (30)
	Global	989	35 (39)	20 (19)	15 (6)	30 (36)
GUAN Monitoring period: 2000	I - Africa	23	9 (9)	48 (57)	30 (17)	13 (17)
	II - Asia	26	38 (62)	23 (11)	19 (0)	19 (27)
	III - South America	17	18 (24)	41 (35)	12 (6)	29 (35)
	IV - North & Central America	20	35 (40)	20 (10)	5 (5)	40 (45)
	V - South-West Pacific	37	70 (62)	8 (16)	0 (0)	22 (22)
	VI - Europe	15	67 (60)	13 (14)	13 (13)	7 (13)
	Antarctica	12	75 (75)	0 (8)	0 (0)	25 (17)
	Global	150	45 (47)	22 (22)	11 (6)	22 (25)

They show, by WMO Region and globally: number of stations; the percentage of "good" stations (i.e. those from which at least 90 per cent of required reports were received at the relevant monitoring Centre); the percentage of "inadequate" stations (i.e. those from which between 50 and 89 percent were received); the percentage of "unsatisfactory" stations (i.e. those from which between 1 and 49 percent were received); and the percentage of "silent" stations (i.e. those from which no data were received. This does not mean that all of these stations are not operational; they may be making some daily observations but for different reasons their climate reports have not been received.).

Table 1 shows continuing deterioration of the GSN and GUAN in several regions and while there has been a slight decrease in the percentage of "silent" stations in these Regions, a disturbingly high number remains in this category.

Comparison with the corresponding data for 1999 suggests two possible trends: an overall decrease in the percentage of both "good" and "silent" stations. The former may indicate that Parties operating these stations are finding it even more difficult to maintain operations full time to ensure a "good" performance. At the same time, the reductions in the number of "silent" stations may indicate improvements in communications or in systems at the monitoring centres as experience is gained. Nevertheless, the monitoring statistics continue to suggest that the receipt of these essential observations is not satisfactory. Furthermore, continuing monitoring of the *quality* of those data that have been received indicates that they are not all to GCOS standards. It is apparent that these networks are still inadequate for the purposes of climate and that more focused resources are needed.

There are several reasons for the problems identified above. Some developing countries have difficulties in maintaining stations because funds are inadequate for equipment, consumables, and ongoing operations. Other problems are caused by inadequate communications systems and lack of qualified staff. Some of these may be reduced as feedback from the monitoring centres is provided to the stations concerned. As one specific approach toward overcoming some of these problems, GCOS has begun to focus on significant areas of the globe within which all or most of the GUAN stations are underperforming (e.g., are silent) and to identify the reasons for this underperformance. Once such stations are suitably identified, support will be sought from appropriate agencies or Parties who might be willing to provide direct assistance through a 'twinning' arrangement or equivalent approach.

Global Atmosphere Watch

The WMO Global Atmosphere Watch (GAW) system was established in 1989 and has integrated a number of WMO's research and monitoring activities in the field of the atmospheric environment established in the 1960s and 1950s. It supports key atmospheric components of GCOS and it is anticipated that the operational needs for monitoring and prediction of the carbon cycle will lead to refinements in the measurement programs at GAW sites. GAW also provides the framework for surface observations of stratospheric ozone, complementing measurements from satellites.

The main objective of GAW is to provide data and other information on the chemical composition and related physical characteristics of the atmosphere and their trends, required to improve understanding of the behaviour of the atmosphere and its interactions with the oceans and the biosphere. The data collected at the GAW monitoring stations are essential to understand the relationship between changing atmospheric composition and changes of global and regional climate.

The WMO World Data Centre for Greenhouse Gases (WDCGG), operated by Japan, collects and distributes data on the concentrations of greenhouse (CO_2, CH_4, CFCs, N_2O, etc.) and related (CO, NO_x, SO_2, VOC, etc.) gases in the atmosphere and the ocean. The WDCGG collects data from the GAW observing network, research organisations, and other co-operative programmes. At December 2000, 180 stations in forty-five countries had

contributed relevant data to the WDCGG (Table 2). The WDCGG publishes printed data reports, catalogues and summaries and provides similar information as well on CD-ROM and via its Web site[7].

The GAW secretariat is presently undertaking a comprehensive review of the measurements at the GAW stations. Data relating to the twenty two Global GAW stations are now being entered into a searchable database that will ultimately reside on the GAW website as the "GAW Station Information System (GAWSIS)". Information will be available on station site and access information, contact persons including principal station personnel, and measurement programme information including GAW parameters measured, analytical methods used, and summaries of the data archived into GAW World Data Centres. Later, GAWSIS will include information for the more than 300 Regional GAW stations.

Table 2: Number of GAW stations reporting to the WDCGG as of December 2000

Region*→ / ↓Species	I	II	III	IV	V	VI	ANTARCTIC	SHIP & AIRCRAFT	TOTAL
CO_2	9	21	4	19	12	29	7	11	112
CH_4	7	12	3	22	10	18	6	17	95
N_2O		4		3	2	5		1	15
CFCs		2		3	2	5		1	13
CO	4	6	1	14	7	14	3	2	51
NO_2				1		35			36
SO_2						37			37
TOTAL	9	22	4	26	15	71	10	23	180

*** see Table 1**

Ocean Climate Observations

The Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM), established by the Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO), will provide an integrated management function for operational ocean measurements. JCOMM will be a critical body for the Parties since it provides a mechanism for addressing weaknesses in the ocean observing system for climate and for implementing new strategies and approaches. The JCOMM will place emphasis on observing networks, data management, services and capacity building.

At its first session, held in June 2001 in Iceland, JCOMM agreed to establish a JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS), to be based initially on existing co-ordination mechanisms for ocean data buoy and operational upper ocean monitoring programmes. This centre will co-ordinate and facilitate the provision of essential data as well as provide a valuable mechanism for monitoring the performance of relevant networks. Until these systems are established, the regular GCOS reports to the UNFCCC will provide information on the basic atmospheric/ ocean surface variables, by major ocean basin, similar to those provided to SBSTA-11/COP-5 and SBSTA-13/COP-6.

Based on products provided to JCOMMOPS by France, the data in Table 3 represent the range of daily average percentages of the World Weather Watch (WWW) requirements met for each

variable for a recent period; for these data, GCOS requirements are not likely to be much different. (These requirements have been also specified in relation to calibrations for satellite observations of key elements such as sea surface temperature.) Since most of the observations are derived from voluntary observing ships (VOS) and drifting or moored buoys, there is considerable variation even within each ocean basin, and the table reflects this. The apparent excessive coverage in the North Atlantic applies only in very limited areas, usually close to coasts or in much-used shipping lanes, or where some ocean buoys are reporting every hour.

Table 3: Information on the status of selected oceanographic data by ocean basin. (Based on monitoring during May 2001; figures for 2000 in brackets.)

Ocean Basin	Surface air pressure (percent WWW requirements)	Surface air temperature (percent WWW requirements)	Surface wind (percent WWW requirements)	Sea surface temperature (percent WWW requirements)
Arctic[8]	0-40	0-100	<10	<10
North Atlantic	15-150 (25-150)	40-200 (40-200)	20-150 (20-100)	40-200 (40-100)
South Atlantic	0-20 (10-50)	0-20 (0-25)	0-20 (0-20)	15-70 (15-70)
North Pacific	10-60 (5-50)	20-60 (20-60)	20-70 (20-70)	40-100 (40-100)
South Pacific	<10[9] (<10)	0-25 (5-25)	0-10 (0-15)	10-70 (10-70)
Indian	10-60 (15-70)	0-20 (0-30)	0-20 (0-20)	20-40 (10-50)
Southern	<5 (<10)	<5 (<5)	<5 (<5)	<10 (<10)

JCOMM considered the state of all operational networks. In each case there was mixed progress. From an analysis of these and similar results, it is clear that the availability of data from the oceans is far from satisfactory at the present time. Though performance is relatively consistent for most regions, there are vast oceanic regions of the southern hemisphere - a key region for the global climate system - that remain almost completely devoid of data. There is increasing resource pressure on several networks, such as those for global sea level, somewhat similar to that being experienced for atmospheric observations. The Parties will need to address the resource problems to maintain priority operational oceanic networks.

3 SIGNIFICANT RECENT DEVELOPMENTS IN GLOBAL OBSERVING SYSTEMS FOR CLIMATE

Oceanic Climate Observations

GCOS is an IGOS Partner and reported at SBSTA 13 on the development of an Ocean Theme by the Partnership. The final Ocean Theme Report has now been completed. For the first time, there is agreement on the key remote sensing systems and on their proper integration with *in situ* measurement networks. Through the involvement of the Ocean Observing Panel for Climate, cosponsored by GCOS/GOOS/WCRP, there is proper recognition of the importance of climate variability and change and the need to implement systems so that these requirements are met. Progress has been made integrating sea surface temperature measurements from various platforms. Major challenges remain with respect to surface topography (altimeter) and surface wind measurements, principally because of the lack of long-term commitments to continuity of observations.

There have been major steps forward with both surface and subsurface observations. There is now recognition that climate variability and change require observations of the highest quality and that, moreover, data sets that are integrated and continuous in space and time have

additional, high value. JCOMM has initiated an analysis of the volunteer observing ships seeking a subset of ships that can be used to deliver high-quality observations. Where possible, ships will be used for both surface and subsurface observations. At the same time, progress has been made in establishing a set of surface reference stations that will deliver high quality air-sea flux data and be fully integrated with operational analysis centres. The major challenge is to sustain and develop support for these key climate platforms.

Argo, an international initiative to build a global network of autonomous profiling floats, each taking measurements of salinity and temperature from 2000 m to the surface every ten days, has progressed well. Existing commitments have established good coverage in the North Atlantic and, more recently, in the North Pacific. Commitments for the next three years suggest there is a good chance that the full global array (some 3000 floats in all) will be in place by 2005. The major challenge, as always, is to ensure that coverage is truly global and that the important Southern Hemisphere regions are adequately covered. The First Adequacy Report, as have more recent analyses, highlighted the importance of directing resources into the remote regions to properly monitor and understand climate change.

Atmospheric Satellite Systems

There has been increasing recognition of the value of an integrated observing strategy whereby the combination of satellite and ground-based measurements forms a mutually supporting and complementary system spanning a wide range of temporal and spatial scales.

The National Research Council of the USA has recently published a peer reviewed report on *Reconciling Observations of Global Temperature Change*[10]. The Panel, which prepared the report, consisting of scientific experts from the USA and Europe, was asked to examine apparent inconsistencies between trends in surface and upper air temperatures, and between radiosonde and satellite records.

The report made several important recommendations:

- The nations of the world should implement a substantially improved temperature monitoring system that ensures the continuity and quality of critically important data sets.
- The scientific community should perform a more comprehensive analysis of the uncertainties inherent in the surface, radiosonde, and satellite data sets.
- Natural as well as human-induced changes should be taken into account in climate model simulations of atmospheric temperature variability on the decadal time scale.
- The scientific community should explore the possibility of exploiting the sophisticated protocols that are now routinely used to ensure the quality control and consistency of the data ingested into operational numerical weather prediction models, to improve the reliability of the data sets used to monitor global climate change.

A follow on report[11] augmented the first by advising on actions that might improve the utility of upper air temperature measurements for the purpose of long-term climate monitoring. It suggested actions to improve the quality of both satellite and ground-based records by more explicit recognition of monitoring principles similar to those incorporated into the UNFCCC Reporting Guidelines[12].

Integrated Global Atmospheric Chemistry Observations

A recent report on the Ozone "Pathfinder" Project[13] of the Committee on Earth Observation Satellites (CEOS) and the WMO's Global Atmosphere Watch considered the integration of satellite and ground-based observations of ozone and related key atmospheric variables. The project demonstrated that satellite and ground-based measurements, when combined, form a mutually supportive and complementary system capable of quantifying the global distribution of ozone and its temporal evolution. The report makes specific proposals for improvements to existing ground-based and space systems and procedures.

The WMO, in co-operation with other IGOS Partners, is now developing a strategy for Integrated Global Atmospheric Chemistry Observations (IGACO) for monitoring global distributions of the chemical composition and related physical characteristics of the atmosphere which relate to climate variability and change. The strategy will consider the user requirements of the scientific community, meteorological services, environmental agencies, and international assessment groups and utilize existing (and planned) measurement programmes from space, ground, balloon and aircraft.

World-wide Recurring ASAP Project

An important milestone in climate monitoring was reached in 2001 with the initiation of the Worldwide Recurring ASAP Project (WRAP) which extends the long established ASAP (Automated Shipboard Aerological Programme) into the remote oceanic regions of the southern hemisphere. The first WRAP vessel was fitted out in the UK with US supplied equipment. In addition to the normal surface weather reports, the vessel also provides two radiosonde soundings per day while *en route* between Europe - Cape of Good Hope - Australia - New Zealand - Cape Horn - Brazil - Europe. Each voyage lasts around 85 days, of which 55 days are spent in the southern hemisphere.

Hydrological Climate Observations

In June 2001, Germany hosted a meeting to develop an implementation strategy for an initial Global Terrestrial Network-Hydrology (GTN-H), to define a common approach to implementing the GTN-H, to identify specific actions for the initial implementation and to propose a robust framework for co-ordination and administration of GTN-H. The meeting had significant participation by experts from major international centres responsible for the collection, quality control and archiving of hydrological data, and for preparation of operational global hydrological products. A major goal of the GTN-H, for which Canada has agreed to provide the initial co-ordinator, will be to produce global products for key hydrological variables.

The GTN-H will be implemented by building on existing networks as much as possible and define deficiencies in current networks; using current national and regional data and product development centres; and increasing coherence among participants, including encouraging common measurement protocols and sharing of techniques and products. It will operate in a global domain but accommodate regional and national programs.

Terrestrial Carbon

GCOS reported to SBSTA-13/COP-6 that the IGOS Partners were developing an Integrated Global Carbon Observation (IGCO) Theme to provide the information needed to document and understand the global carbon cycle and its changes at various time and space scales. A phased approach has been taken first building on the Terrestrial Carbon Observation (TCO) component encompassing land and atmosphere and also undertaking companion work on ocean carbon observations as the main aspects of an integrated global strategy. Besides GCOS, other key partners include IGBP, WCRP, GOOS, GTOS, FAO, UNESCO and a number of national space agencies. The IGCO Theme will build upon relevant assessment work undertaken by the IPCC.

The TCO component team has completed its planning reports and is beginning implementation, with an initial focus on *in situ* observation issues. The companion planning effort on ocean observations has been completed and the task of integrating the terrestrial, ocean and atmospheric components has begun.

4 GCOS'S REGIONAL WORKSHOPS PROGRAMME

A Regional Workshop Programme began in 2000 in response to an invitation by the Conference of the Parties in Decision 5/CP.5 for the GCOS secretariat, in consultation with relevant regional and international bodies, including the Global Environment Facility, to organise regional workshops "to identify the priority capacity-building needs related to participation in systematic observation" by developing countries. GCOS's report to SBSTA-13 gave an account of the first workshop, that for Pacific Island Countries. A follow-up meeting to begin preparation of a regional Action Plan for the Pacific Island region is planned for late 2001 with the further objective of finalising the Plan for that region by early 2002.

The second workshop of the 10-workshop Programme will be held in October 2001 in Kenya for the twenty five countries of eastern and southern Africa. The Drought Monitoring Centre in Nairobi is the principal regional partner. Concurrently, planning is beginning for the third regional workshop for Caribbean and Central America countries, to be organised in partnership with the Organization of American States, the Caribbean Meteorological Organization, and WMO. This workshop will take place in the first half of 2002. Planning has also commenced for a workshop next year in the Asian region.

Funding for the Regional Workshop Programme remains an issue. GCOS received initial funding from the Global Environment Facility (GEF) for the pilot phase of the Programme (the first two workshops) and is working closely with the UNDP/GEF National Communications Support Programme to ensure that the Non-Annex I climate change teams are closely involved. In addition, contributions to one or both of the two pilot phase workshops were made by UNEP, WMO, the United States, and Australia. The GCOS secretariat is now preparing a full proposal to UNDP/GEF to fund a portion of the costs of the remaining eight workshops; matching funds will be sought from other potential donors.

ACRONYMS & ABBREVIATIONS

ASAP	Automated Shipboard Aerological Programme
CEOS	Committee on Earth Observation Satellites
GAWSIS	GAW Station Information System
GSN	GCOS Surface Network
GUAN	GCOS Upper Air Networks
GAW	Global Atmosphere Watch
GCOS	Global Climate Observing System
GTN-H	Global Terrestrial Network-Hydrology
GTOS	Global Terrestrial Observing System
GOOS	Global Ocean Observing System
IGACO	Integrated Global Atmospheric Chemistry Observations
IGCO	Integrated Global Carbon Observation
IGOS	Integrated Global Observing Strategy
IGBP	International Geosphere-Biosphere Programme
JCOMMOPS	JCOMM in situ Observing Platform Support Centre
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology
NCs	national communications
SC	Steering Committee
TCO	Terrestrial Carbon Observation
VOS	voluntary observing ships
WCRP	World Climate Research Programme
WDCGG	World Data Centre for Greenhouse Gases
WRAP	Worldwide Recurring ASAP Project

NOTES:

[1] GCOS is co-sponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU).

[2] The first REPORT ON THE ADEQUACY OF THE GLOBAL CLIMATE OBSERVING SYSTEMS, prepared by GCOS for COP-4 (1998) is available at http://www.unfccc.int/resource/docs/cop4/misc02.pdf.

[3] The term "national reports" includes both the summary information provided by Annex I Parties on systematic observation in accordance with the UNFCCC guidelines and the detailed reports on systematic observation that were invited from all Parties.

[4] The GCOS Partners include the World Weather Watch (WWW), the Global Atmosphere Watch (GAW), and WMO's Hydrology and Water Resources Programme (HWRP); the Global Ocean Observing System (GOOS); the Global Terrestrial Observing System (GTOS); the Global Environmental Monitoring System (GEMS); the Global Resource Information Database (GRID); the World Climate Programme (WCP, including data and monitoring, applications and services, impacts and responses, and WCP-Water); the World Climate Research Programme (WCRP); the International Geosphere-Biosphere Programme (IGBP): the Intergovernmental Panel on Climate Change (IPCC); the Committee on Earth Observation Satellites (CEOS); the Integrated Global Observing Strategy Partners (IGOS-P); and the United Nations Framework Convention on Climate Change (UNFCCC).

[5] GCOS is a Partner in the Integrated Global Observing Strategy (IGOS), which takes a strategic view across all Earth observing requirements, i.e. it considers the observing needs of multiple users, including climate. Based on the capabilities of current and planned satellite and surface-based observing systems, IGOS Partners develop strategies to meet the user requirements, organised by theme or category. The IGOS Partners include:

- The Committee on Earth Observation Satellites (CEOS), which co-ordinates national agencies launching satellites.
- International agencies sponsoring global observations, including the Food and Agriculture Organization of the United Nations (FAO), Intergovernmental Oceanographic Commission of UNESCO (IOC), International Council for Science (ICSU), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Environment Programme (UNEP), and World Meteorological Organization (WMO).
- The Global Ocean Observing System (GOOS) and the Global Terrestrial Observing System (GTOS) as well as GCOS, which organise global-scale operational observations of the climate, oceans and land surface.
- Integrated research programmes on global change within the World Climate Research Programme (WCRP) and the International Geosphere-Biosphere Programme (IGBP).
- The International Group of Funding Agencies for Global Change Research (IGFA).

[6] Identical to the GCOS/GOOS/GTOS Climate Monitoring Principles included as Appendix 2 to the UNFCCC Reporting Guidelines on Global Climate Observing Systems (see FCCC/CP/1999/7). GCOS best practices for the GSN and GUAN are given in the WMO Manual on the Global Observing System, sections 2.10.3.17 and 2.10.4.9 respectively.

[7] Web Site address: http://gaw.kishou.go.jp/wdcgg.html

[8] Information for this region not included in previous reports

[9] Except in limited areas

[10] *Reconciling Observations of Global Temperature Change*, Panel on Reconciling Temperature Observations, National Research Council, USA. 104 pages, 2000 (http://www.nap.edu/catalog/9755.html)

[11] *Improving Atmospheric Temperature Monitoring Capabilities: Letter Report*, Panel on Reconciling Temperature Observations, Climate Research Committee, Board on Atmospheric Sciences and Climate, National Research Council, USA. 18 pages (2000) (available at http://www.nap.edu/catalog/9968.html)

[12] Appendix 2 to the UNFCCC reporting guidelines on global climate observing systems (http://www.unfccc.de/resource/docs/cop5/07.pdf, page 108)

[13] WMO/CEOS Report on a strategy for integrating satellite and ground-based observations of ozone, WMO TD No 1046, 128pp, WMO Geneva

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