

INFORMATION PAPER
Systematic Observations
January 2016

This information paper provides an easy-access informal compilation of relevant decisions of the conference of the Parties (COP) and conclusions adopted by the COP and the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI) on systematic observations, provided in chronological order.

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Decisions of the COP

8/CP.3, 1997

Development of observational networks of the climate system

The Conference of the Parties,

Recalling Article 4.1(g) and Article 5 of the United Nations Framework Convention on Climate Change,

Noting the importance of the observations, analysis and research relevant to the various components of the climate system,

1. *Expresses* appreciation of the work carried out by the relevant intergovernmental organizations, particularly the development of such observational programmes as the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System;
2. *Recognizes* the concerns raised by the relevant intergovernmental organizations with regard to the long-term sustainability of these observational systems;
3. *Urges* Parties to provide the necessary resources to reverse the decline in the existing observational networks and to support the regional and global observational systems being developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriate funding mechanisms;
4. *Requests* the Subsidiary Body for Scientific and Technological Advice, with the assistance of the secretariat and in consultation with the Intergovernmental Panel on Climate Change, to consider the adequacy of these observational systems and to report on its conclusions to the Conference of the Parties at its fourth session.

14/CP.4, 1998

Research and systematic observation

The Conference of the Parties,

Recalling Article 4.1(g)-(h) and Article 5 of the United Nations Framework Convention on Climate Change, and its decision 8/CP.3,

Noting with appreciation the comprehensive report on the adequacy of the global observing systems for climate,¹ prepared and coordinated by the Global Climate Observing System secretariat in the World Meteorological Organization on behalf of organizations participating in the Climate Agenda,

Noting the conclusions of the report that, *inter alia*, in many instances global and regional coverage is inadequate,

Noting the recommendations contained in the report to improve the global observing systems for climate,

Noting the ongoing work of the agencies participating in the Climate Agenda and others in support of global observing systems for climate, including their contributions to capacity- building,

Recognizing the significant national contributions made to the global observing systems for climate,

1. *Urges* Parties to undertake programmes of systematic observation, including the preparation of specific national plans, in response to requests from agencies participating in the Climate Agenda, based on the information developed by the Global Climate Observing System and its partner programmes;

¹ Contained in document FCCC/CP/1998/MISC.2 and summarized in document FCCC/CP/1998/7.

2. *Urges* Parties to undertake free and unrestricted exchange of data to meet the needs of the Convention, recognizing the various policies on data exchange of relevant international and intergovernmental organizations;
3. *Urges* Parties to actively support capacity-building in developing countries to enable them to collect, exchange and utilize data to meet local, regional and international needs;
4. *Urges* Parties to strengthen international and intergovernmental programmes assisting countries to acquire and use climate information;
5. *Urges* Parties to actively support national meteorological and atmospheric observing systems, including measurement of greenhouse gases, in order to ensure that the stations identified as elements of the Global Climate Observing System networks, based on the World Weather Watch and Global Atmosphere Watch and underpinning the needs of the Convention, are fully operational and use best practices;
6. *Urges* Parties to actively support national oceanographic observing systems, in order to ensure that the elements of the Global Climate Observing System and Global Ocean Observing System networks in support of ocean climate observations are implemented, to support, to the extent possible, an increase in the number of ocean observations, particularly in remote locations, and to establish and maintain reference stations;
7. *Urges* Parties to actively support national terrestrial networks including observational programmes to collect, exchange and preserve terrestrial data according to the Global Climate Observing System and the Global Terrestrial Observing System climate priorities, particularly hydrosphere, cryosphere and ecosystem observations;
8. *Requests* Parties to submit information on national plans and programmes in relation to their participation in global observing systems for climate, in the context of reporting on research and systematic observation, as an element of national communications from Parties included in Annex I to the Convention (Annex I Parties) and, as appropriate, from Parties not included in Annex I to the Convention (non-Annex I Parties);
9. *Requests* the Subsidiary Body for Scientific and Technological Advice, in consultation with the agencies participating in the Climate Agenda, drawing *inter alia* on the information provided in the second national communications from Annex I Parties and, as appropriate, in the initial national communications from non-Annex I Parties, to inform the Conference of the Parties at its fifth session of developments regarding observational networks, difficulties encountered, *inter alia*, with respect to the needs of developing countries and options for financial support to reverse the decline in observational networks;
10. *Invites* the agencies participating in the Climate Agenda, through the Global Climate Observing System secretariat, to initiate an intergovernmental process for addressing the priorities for action to improve global observing systems for climate in relation to the needs of the Convention and, in consultation with the Convention secretariat and other relevant organizations, for identifying immediate, medium-term and long-term options for financial support; and *requests* the secretariat to report results to the Subsidiary Body for Scientific and Technological Advice at its tenth session.

4/CP.5, 1999

Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications

The Conference of the Parties,

Recalling the relevant provisions of the United Nations Framework Convention on Climate Change, in particular Articles 4, 6, 7.2, 9.2(b), 10.2, and 12 thereof,

Recalling its decisions 9/CP.2 and 11/CP.4 on national communications from Parties included in Annex I to the Convention,

Having considered the relevant recommendations of the Subsidiary Body for Scientific and Technological Advice and of the Subsidiary Body for Implementation,

Noting that the revised guidelines for the preparation of national communications by Parties included in Annex I to the Convention annexed to decision 9/CP.2 need to be updated to improve the transparency, consistency, comparability, completeness and accuracy of the information reported,

1. *Adopts* the guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications;¹
2. *Decides* that Parties included in Annex I to the Convention (Annex I Parties) should use Part II of the UNFCCC reporting guidelines for the preparation of their third national communications due by 30 November 2001, in accordance with decision 11/CP.4;
3. *Requests* Annex I Parties to provide a detailed report on their activities in relation to systematic observation, in accordance with the UNFCCC reporting guidelines on global climate observing systems adopted by decision 5/CP.5, in conjunction with their national communications;
4. *Urges* those Annex I Parties that have not submitted their first or second national communications, including those that were included in Annex I by decision 4/CP.3, to do so as soon as possible;¹
5. *Urges* Parties included in Annex II to the Convention to assist Annex I Parties with economies in transition, through appropriate bilateral or multilateral channels, with technical aspects of the preparation of national communications.

5/CP.5, 1999

Research and systematic observation

The Conference of the Parties,

Recalling Articles 4.1(g), 4.1(h) and 5 of the United Nations Framework Convention on Climate Change,

Recalling also its decisions 8/CP.3, 2/CP.4, and 14/CP.4,

1. *Recognizes* the need to identify the priority capacity-building needs related to participation in systematic observation;
2. *Invites* the secretariat of the Global Climate Observing System, in consultation with relevant regional and international bodies, including the Global Environment Facility, to organize regional workshops on this issue;
3. *Urges* Parties to actively support and participate in these regional workshops;
4. *Invites* the secretariat of the Global Climate Observing System to continue to assist and facilitate the establishment of an appropriate intergovernmental process to identify the priorities for action to improve global observing systems for climate and options for their financial support;

¹ See FCCC/CP/1999/7.

5. *Requests* the secretariat of the Global Climate Observing System to report on this matter to the Subsidiary Body for Scientific and Technological Advice at its twelfth session;
6. *Urges* Parties to address deficiencies in the climate observing networks and invites them, in consultation with the secretariat of the Global Climate Observing System, to bring forward specific proposals for that purpose and to identify the capacity-building needs and funding required in developing countries to enable them to collect, exchange and utilize data on a continuing basis in pursuance of the Convention;
7. *Adopts* the UNFCCC reporting guidelines on global climate observing systems;¹
8. *Invites* all Parties to provide detailed reports on systematic observation in accordance with these guidelines, for Parties included in Annex I to the Convention in conjunction with their national communications, pursuant to decision 4/CP.5, and on a voluntary basis for Parties not included in Annex I;
9. *Invites* the Convention secretariat, in conjunction with the secretariat of the Global Climate Observing System, to develop a process for synthesizing and analysing the information submitted in accordance with the UNFCCC reporting guidelines on global climate observing systems.

11/CP.9, 2003

Global observing systems for climate

The Conference of the Parties,

Recalling Article 4.1(g)–(h) and Article 5 of the Convention,

Further recalling its decisions 14/CP.4 and 5/CP.5,

Having considered conclusions of the Subsidiary Body for Scientific and Technological Advice at its fifteenth, sixteenth, seventeenth and eighteenth sessions,

Having considered and noted with appreciation The Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC,

Recognizing the importance of collaboration among the sponsoring agencies of the Global Climate Observing System,

Recognizing further the need for a clear definition of the long-term needs of the Convention and of the short-term priorities concerning the support of systematic observation and networks, in particular taking into account the needs of developing countries,

Recognizing also the value of indigenous knowledge in supplementing regional and national climate monitoring systems,

Welcoming the efforts of the ad hoc Group on Earth Observations to develop a 10-year implementation plan for a comprehensive, coordinated and sustained Earth observing system or systems,

Welcoming further the establishment of the Global Climate Observing System Cooperation Mechanism by Members of the sponsoring agencies of the Global Climate Observing System, under the guidance of the Global Climate Observing System steering committee, as well as the flexible approach that has been adopted to participation in the mechanism,

Noting that the Global Climate Observing System Cooperation Mechanism will address priority needs for improvements in global observing systems for climate in developing countries,

1. *Requests* Parties to review *The Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC* (second adequacy report) within the context of their national capabilities and to consider what actions they can take individually, bilaterally, multilaterally and through coordinated international programmes to address the findings, noting, in particular:

¹ See FCCC/CP/1999/7.

- (a) The importance of maintaining the operation of baseline stations in the long term;
 - (b) That homogeneous long-term climate records represent a national heritage and are necessary, inter alia, to improve the basis for climate assessment and adaptation measures;
 - (c) The wealth of information that can be provided through the digitization, analysis and exchange of historical information;
 - (d) The importance of adhering to applicable adopted principles of free and unrestricted exchange of data and products, especially with respect to the set of Essential Climate Variables as defined in the second adequacy report;
 - (e) The value of reporting on such actions in national communications;
2. *Requests* the Global Climate Observing System secretariat, under the guidance of the Global Climate Observing System steering committee, taking into account international and intergovernmental mechanisms, to coordinate the development of a phased 5- to 10-year implementation plan for the integrated global observing systems for climate, using a mix of high-quality satellite and in situ measurements, dedicated infrastructure and targeted capacity-building, such a plan:
- (a) To draw on the second adequacy report and the views of Parties;
 - (b) To take into consideration existing global, regional and national plans, programmes and initiatives, such as the Global Monitoring for Environment and Security programme and the Integrated Global Observing Strategy partnership;
 - (c) To be based on extensive consultations with a broad and representative range of scientists and data users;
 - (d) To include indicators for measuring its implementation;
 - (e) To identify implementation priorities, resource requirements and funding options;
3. *Invites* the Global Climate Observing System secretariat and the ad hoc Group on Earth Observations to collaborate closely in developing their respective implementation plans;
4. *Invites* the ad hoc Group on Earth Observations to treat global climate monitoring as a priority and to adopt a balanced approach to the application of in situ and remote-sensing systems for climate monitoring;
5. *Invites* the Global Climate Observing System secretariat to provide a progress report on the development of the implementation plan to the Subsidiary Body for Scientific and Technological Advice at its twentieth session;
6. *Requests* the Global Climate Observing System secretariat to conduct an open review of the implementation plan before its completion and to submit the final implementation plan to the Subsidiary Body for Scientific and Technological Advice at its twenty-first session;
7. *Invites* Parties to participate actively in the above-mentioned review process;
8. *Invites* the sponsoring agencies of the Global Climate Observing System, and in particular those of the Global Terrestrial Observing System, in consultation with other international or intergovernmental agencies, as appropriate, to develop a framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate, and associated data and products, taking into consideration possible models, such as those of the World Meteorological Organization/Intergovernmental Oceanographic Commission Joint Commission for Oceanographic and Marine Meteorology, and to submit a progress report on this issue to the Conference of the Parties at its eleventh session;
9. *Invites* the relevant national entities, in cooperation with the sponsoring agencies of the Global Climate Observing System and other international and intergovernmental agencies, to make available on a sustained basis a range of integrated climate products relevant to the needs of the Convention, as identified in the second adequacy report;

10. *Invites* the Global Climate Observing System secretariat, in conjunction with the Global Ocean Observing System secretariat, to provide information to the Subsidiary Body for Scientific and Technological Advice, at its twenty-second session, on progress made towards implementing the initial ocean climate observing system;
11. *Requests* the Subsidiary Body for Implementation, when next reviewing the guidelines for the preparation of national communications:
 - (a) To incorporate into the guidelines the supplementary reporting format developed by a group of Parties and made available to the Subsidiary Body for Scientific and Technological Advice at its thirteenth session;
 - (b) To replace the “GCOS/GOOS/GTOS Climate Monitoring Principles” contained in appendix II to chapter III of document FCCC/CP/1999/7 (page 108) with the modified set agreed by the World Meteorological Organization at its Fourteenth Congress and approved by the Committee on Earth Observation Satellites at its seventeenth plenary, to better reflect the needs and capabilities of the in situ and satellite monitoring communities;
12. *Encourages* all Parties to provide reports on systematic observation in accordance with the agreed reporting guidelines, in recognition of the importance of accurate, credible and comprehensive information on global observing systems for climate as a basis for planning and implementing priority improvements;
13. *Urges* Parties in a position to do so, in particular Parties included in Annex I to the Convention, to support, including by contributing to relevant funding mechanisms such as the Global Climate Observing System Cooperation Mechanism, the priority needs, identified in the second adequacy report and regional action plans, in developing countries, especially the least developed countries and small island developing States, noting that filling the gaps in baseline atmospheric networks is an urgent need that should be met during the next two years;
14. *Requests* the Global Climate Observing System secretariat to include information on the operation of the Global Climate Observing System Cooperation Mechanism in its regular reports to the Conference of the Parties.

5/CP.10, 2004

Implementation of the global observing system for climate

The Conference of the Parties,

Having considered the recommendations of the Subsidiary Body for Scientific and Technological Advice at its twenty-first-session,

1. *Expresses its appreciation* to the Global Climate Observing System for preparing the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (hereinafter referred to as the implementation plan);
2. *Welcomes* the emphasis given in the implementation plan to enhancing the participation of developing countries, in particular the least developed countries and small island developing States, in the global observing systems for climate;
3. *Encourages* Parties to strengthen their efforts to address the priorities identified in the implementation plan, and to implement the priority elements in the regional action plans relating to the global observing systems for climate;
4. *Encourages* Parties to enhance their work and collaboration on observation of the essential climate variables and on development of climate products to support the needs of the Convention, including through participation in the Global Climate Observing System cooperation mechanism;
5. *Invites* Parties that support space agencies involved in global observations to request these agencies to provide a coordinated response to the needs expressed in the implementation plan;
6. *Requests* the secretariat of the Global Climate Observing System to provide information to the Subsidiary Body for Scientific and Technological Advice at its twenty-third session

(November–December 2005) and, as required, at subsequent sessions, on how the actions identified in the implementation plan are being implemented.

11/CP.13,¹ 2007

Reporting on global observing systems for climate

The Conference of the Parties,

Recalling decisions 4/CP.5, 5/CP.5, 11/CP.9 and 5/CP.10,

Noting the need to revise the “UNFCCC reporting guidelines on global climate change observing systems”² in order to reflect the priorities of the Global Climate Observing System implementation plan and incorporate the reporting on essential climate variables,

Recognizing the proposals made by the secretariat of the Global Climate Observing System,

Having considered the recommendations of the Subsidiary Body for Scientific and Technological Advice on this matter at its twenty-third, twenty-fifth and twenty-seventh sessions,³

7. *Adopts* the revised UNFCCC reporting guidelines on global climate change observing systems as contained in the annex to this decision;

8. *Decides* that these revised guidelines should take effect immediately for the preparation of detailed technical reports on systematic observations in accordance with the provisions of decisions 4/CP.5 and 5/CP.5;

9. *Requests* Parties included in Annex I to the Convention to continue providing such reports in conjunction with their national communications;

10. *Invites* Parties not included in Annex I to the Convention to provide such reports on a voluntary basis.

¹ The text of decision 11/CP.13 is reproduced here together with its annex for ease of reference. The text of the decision can also be found in document FCCC/CP/2007/6/Add.1.

² See decision 5/CP.5 and document FCCC/CP/1999/7, chapter III.

³ FCCC/SBSTA/2005/10, paragraph 97; FCCC/SBSTA/2006/11, paragraph 95; and FCCC/SBSTA/2007/16, paragraph 35.

ANNEX

Revised UNFCCC reporting guidelines on global climate change observing systems¹

I. Introduction

A. Objective

1. The purpose of these guidelines for reporting on systematic observation of the global climate system for Parties included in Annex I to the Convention (Annex I Parties) and, as appropriate, Parties not included in Annex I to the Convention (non-Annex I Parties), is to assist Parties in reporting their actions with regard to global climate observing systems; development of observational networks; and, as appropriate, providing support for non-Annex I Parties, as defined in Articles 4, paragraphs 1(g) and (h), 5 and 12, paragraph 1(b), of the Convention.

B. Structure

2. The information identified in these guidelines should be communicated by the Party in a single document and submitted to the Conference of the Parties (COP) through the secretariat, and shall be in one of the official languages of the United Nations. Parties may include a reference to a national focal point and/or website from which additional copies of the report may be obtained. The submitting Party may decide on the length of the report but every effort should be made to limit its length. Parties should also provide an electronic version of their reports to the secretariat.

II. Reporting

A. General approach to reporting on systematic observation

3. Parties should describe the status of their programmes for contributing observations of the essential climate variables (ECVs) to the international community² (for a complete list of the ECVs see appendix 2). The Implementation Plan³ for the Global Climate Observing System (GCOS implementation plan), which was developed specifically for the Convention, identifies those global observations of the climate system required by the Parties to the Convention. When preparing their reports, Parties should take note of the performance indicators that were included with each action contained in the GCOS implementation plan. Parties may, if they so wish, provide additional information to that covered in these guidelines, including maps of networks and details of participation in other programmes that will contribute observations of the ECVs, such as work on climate observations being undertaken in climate research programmes.

4. Parties may wish to prepare the report in five chapters. Chapter 1 would deal with a number of common elements, as outlined in paragraphs 5–11 below. Paragraphs 5, 6 and 7 deal with planning, implementation, quality control, international data exchange and data analysis. Paragraph 8 requests Annex I Parties to report on their capacity-building activities related to climate observations. Paragraph 9 requests those Parties with palaeoclimate programmes to report on their activities in setting current climatic changes within a historical context. Paragraph 10 requests information on any difficulties encountered in using these guidelines and preparing the required report. The next three chapters of the report would deal

¹ A list of acronyms used in these guidelines is given in appendix 1.

² While these guidelines focus on the global requirements, the same observations are also required to support national and regional activities.

³ Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (WMO, 2004, available at <http://www.wmo.int/pages/prog/gcos/Publications/gcos-92_GIP.pdf>). The implementation plan was prepared by the GCOS secretariat at the request of the COP at its ninth session (decision 11/CP.9) and considered by the COP at its tenth session (decision 5/CP.10).

with the technical aspects of the GCOS implementation plan; in them, Parties would provide detailed information on the ECV networks and/or systems they are operating and their response to the actions identified in the GCOS implementation plan. Chapter 2 would focus on the atmospheric ECVs as outlined in paragraphs 12–15 below. Chapter 3 would focus on the oceanic ECVs as outlined in paragraphs 16–20 below. Chapter 4 would focus on the terrestrial ECVs as outlined in paragraphs 21–25 below. The final chapter would be optional and could contain information on national climate programmes that is additional to that covered in these guidelines, such as work on climate observations being undertaken in climate research programmes and/or programmes that provide climate information at a higher resolution or frequency.

B. Chapter 1: Common issues

5. In describing their national programmes, Parties should, where relevant, report on actions they have undertaken to introduce and/or enhance national coordination, as well as planning activities for the production and adoption of their own national implementation plans for observing, archiving and analysing their national contribution of observations of the ECVs.

6. Parties should describe the efforts being undertaken to ensure that high-quality climate data records are collected, retained and made accessible for use by current and future generations of scientists and decision makers of all Parties by reporting on:

(a) Any national policy or guidance that has been promulgated relevant to the international exchange of ECV data;

(b) Any policy-level barriers to the international exchange of climate data and their provision to international data centres;

(c) Efforts undertaken to ensure that ECV-observing activities adhere to the GCOS climate monitoring principles (GCMPs) adopted by the COP in decision 11/CP.9 (see appendix 3), including efforts undertaken to ensure that inhomogeneities resulting from changes in technology and observing practices are kept to a minimum and are capable of being effectively calculated and allowed for in the long-term climate record;

(d) Difficulties encountered in protecting the integrity of their long-term climate data records and steps being taken or required to address those difficulties.

7. Parties should report on efforts undertaken to ensure that international data centres are established and/or strengthened for all the ECVs (see appendix 4). Specifically (full names and numbers of relevant actions in the GCOS implementation plan are given in quotes and parentheses):

(a) Parties with responsibility for ECV international data centres, including those with responsibility for the World Data Centres, may wish to report on actions undertaken to “prepare the data sets and meta-data, including historical data records, for climate analyses and reanalyses” (C11);

(b) Parties supporting data centres that undertake ECV analysis may wish to report on the actions undertaken to “establish sustainable systems for the routine and regular analysis of the ECVs including measures of uncertainty” (C12);

(c) Parties supporting data centres that undertake reanalysis may wish to report on steps taken to “establish a sustained capacity for global climate reanalysis and ensure coordination and collaboration between reanalysis centres” (C13);

(d) Parties supporting World Meteorological Organization (WMO) and Intergovernmental Oceanographic Commission centres for GCOS may wish to report on their experiences in diagnosing quality, availability and communications issues with climate data.

8. Parties should describe actual and/or planned activities for capacity-building in least developed countries, small island developing States and countries with economies in transition related to the collection, exchange and/or use of observations of the ECVs, including implementation of the regional action plans developed from the GCOS regional workshop programme. Included in this regard are activities undertaken through multilateral and/or

bilateral technical cooperation programmes, including participation in the GCOS cooperation mechanism as encouraged by the COP in decision 5/CP.10.

9. Recognizing the importance of setting current climatic changes within a historical context, Parties are requested to report on initiatives undertaken to acquire paleoclimate data, in particular activities to extend the data record in time and into new regions, and to improve the synthesis of these data.

10. Where information required in these guidelines cannot be provided, Parties should report on any difficulties encountered, needs that should be met to enable the reporting of such information in future, and steps being taken to improve the availability of information.

11. Multinational and international projects and organizations conducting climate observations, including multinational satellite agencies, are encouraged to report through the Party in which they are based.

C. Chapter 2: Atmospheric essential climate variables

12. Parties should, where relevant, describe their national contributions of the atmospheric ECV observations to the international community, paying special attention to the requirements outlined in the GCOS implementation plan.

13. To facilitate integration of the information contained in the national reports, Parties should complete tables 1a, 1b and 1c. These tables are designed to record information on the national contributions of observations from well-established systems and networks whose current operations can be quantified. Parties should also provide a narrative report on those atmospheric elements of the GCOS implementation plan that are less quantifiable with the aim of making changes and improvements to the climate observing system as a whole so that it meets the requirements of the Convention (see para. 15 below).

Table 1a. National contributions to the surface-based atmospheric essential climate variables

| Contributing networks specified in the GCOS implementation plan | ECVs ^a | Number of stations or platforms currently operating | Number of stations or platforms operating in accordance with the GCMPs | Number of stations or platforms expected to be operating in 2010 | Number of stations or platforms providing data to the international data centres | Number of stations or platforms with complete historical record available in international data centres |
|--|---|---|--|--|--|---|
| GCOS Surface Network (GSN) | Air temperature | | | | | |
| | Precipitation | | | | | |
| Full World Weather Watch/Global Observing System (WWW/GOS) surface network | Air temperature, air pressure, wind speed and direction, water vapour | | | | | |
| | Precipitation | | | | | |
| Baseline Surface Radiation Network (BSRN) | Surface radiation | | | | | |
| Solar radiation and radiation balance data | Surface radiation | | | | | |
| Ocean drifting buoys | Air temperature, air pressure | | | | | |
| Moored buoys | Air temperature, air pressure | | | | | |
| Voluntary Observing Ship Climate Project (VOSCLIM) | Air temperature, air pressure, wind speed and direction, water vapour | | | | | |
| Ocean Reference Mooring Network and sites on small isolated islands | Air temperature, wind speed and direction, air pressure | | | | | |
| | Precipitation | | | | | |

^a Parties should note that the list of ECVs given for each network is indicative of the expected observations from that network. A single response/data entry is expected for each network except for those networks for which precipitation is reported, where a separate response/data entry is requested owing to its particular importance with regard to the Convention.

Table 1b. National contributions to the upper-air atmospheric essential climate variables

| Contributing networks specified in the GCOS implementation plan | ECVs | Number of stations or platforms currently operating | Number of stations or platforms operating in accordance with the GCMPs | Number of stations or platforms expected to be operating in 2010 | Number of stations or platforms providing data to the international data centres | Number of stations or platforms with complete historical record available in international data centres |
|---|--|---|--|--|--|---|
| GCOS Upper Air Network (GUAN) | Upper-air-temperature , upper-air wind speed and direction, upper-air water vapour | | | | | |
| Full WWW/GOS Upper Air Network | Upper-air-temperature , upper-air wind speed and direction, upper-air water vapour | | | | | |

Table 1c. National contributions to the atmospheric composition

| Contributing networks specified in the GCOS implementation plan | ECVs | Number of stations or platforms currently operating | Number of stations or platforms operating in accordance with the GCMPs | Number of stations or platforms expected to be operating in 2010 | Number of stations or platforms providing data to the international data centres | Number of stations or platforms with complete historical record available in international data centres |
|---|--------------------------|---|--|--|--|---|
| World Meteorological Organization/ Global Atmosphere Watch (WMO/GAW) Global Atmospheric CO₂ & CH₄ Monitoring Network | Carbon dioxide | | | | | |
| | Methane | | | | | |
| | Other greenhouse gases | | | | | |
| WMO/GAW ozone sonde network^a | Ozone | | | | | |
| WMO/GAW column ozone network^b | Ozone | | | | | |
| WMO/GAW Aerosol Network^c | Aerosol optical depth | | | | | |
| | Other aerosol properties | | | | | |

^a Including SHADOZ, NDACC, remote sensing and ozone sondes.

^b Including filter, Dobson and Brewer stations.

^c Including AERONET, SKYNET, BSRN and GAWPFR.

14. Satellite observations are essential to complete the information base for atmospheric observations. Therefore, Parties with space programmes involving Earth observations should comment on their plans to ensure availability of past and future data and metadata records of the satellite measurements for the atmospheric ECVs and associated global products contained in table 2.¹

Table 2. Global products requiring satellite observations – atmospheric essential climate variables

| ECVs/ Global products requiring satellite observations | Fundamental climate data records required for product generation (from past, current and future missions) |
|--|---|
| Surface wind speed and direction Surface vector winds analyses, particularly from reanalysis | Passive microwave radiances and scatterometry |
| Upper-air temperature Homogenized upper-air temperature analyses: extended MSU-equivalent temperature record, new record for upper-troposphere and lower-stratosphere temperature using data from radio occultation, temperature analyses obtained from reanalyses | Passive microwave radiances, GPS radio occultation, high-spectral resolution IR radiances for use in reanalysis |
| Water vapour Total column water vapour over the ocean and over land, tropospheric and lower stratospheric profiles of water vapour | Passive microwave radiances, UV/VIS radiances, IR imagery and soundings in the 6.7µm band, microwave soundings in the 183 GHz band |
| Cloud properties Cloud radiative properties (initially key ISCCP products) | VIS/IR imagery, IR and microwave soundings |
| Precipitation Improved estimates of precipitation, both as derived from specific satellite instruments and as provided by composite products | Passive microwave radiances, high-frequency geostationary IR measurements, active radar (for calibration) |
| Earth radiation budget Top-of-atmosphere Earth radiation budget on a continuous basis | Broadband radiances, spectrally-resolved solar irradiances, geostationary multi spectral imagery |
| Ozone Profiles and total column of ozone | UV/VIS and IR microwave radiances |
| Aerosol properties Aerosol optical depth and other aerosol properties | VIS/NIR/SWIR radiances |
| Carbon dioxide, methane and other long-lived greenhouse gases Distribution of greenhouse gases, such as CO ₂ and CH ₄ , of sufficient quality to estimate regional sources and sinks | NIR/IR radiances |
| Upper-air wind Upper-air wind analyses, particularly from reanalysis | VIS/IR imagery, Doppler wind lidar |
| Atmospheric reanalyses | Key FCDRs and products identified in this report, and other data of value to the analyses |

15. Parties are also requested to provide a narrative description of any actions they have taken in response to the following recommended actions on the atmospheric ECVs contained in the GCOS implementation plan (numbers of relevant actions in the plan are given in parentheses):

- (a) Applying the GCMPs to all surface climate networks (A3);
- (b) Incorporating atmospheric pressure sensors into drifting buoy programmes (A5);
- (c) Ensuring availability of three-hourly mean sea level pressure and wind speed and direction data from GSN stations (A10);
- (d) Implementing a reference network of high-altitude, high-quality radiosondes (A16);

¹ Derived from the document entitled *Systematic Observation Requirements for Satellite-based Products for Climate: Supplemental Details to the Satellite-based Component of the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, WMO, 2006.

- (e) Operating the WWW/GOS radiosonde network in full compliance with the GCMPs and coding conventions (A17);
- (f) Submitting metadata records and inter-comparisons for radiosonde observations to the specified international data centres (A18);
- (g) Developing a network of ground-based Global Positional System (GPS) receivers for measuring water vapour (A21);
- (h) Sustained measurements of the atmospheric composition ECVs, supplementary to those activities implicit in table 1c.

D. Chapter 3: Oceanic essential climate variables

16. Parties should, where relevant, describe their national contributions of oceanographic ECV observations to the international community, paying special attention to the requirements outlined in the GCOS implementation plan.

17. A brief narrative report is requested on their actions in nominating national focal points for implementation of the oceanic observing system for climate and establishing partnerships between the ocean research and operational communities.

To facilitate integration of the information contained in the national reports, Parties should complete tables 3a and 3b. These tables are designed to record information on the national contributions of observations from well-established systems and networks whose current operations can be quantified. Parties should provide a narrative report on those oceanic elements of the GCOS implementation plan that are less quantifiable with the aim of making changes and improvements to the climate observing system as a whole so that it meets the requirements of the Convention (see para. 20 below).

Table 3a. National contributions to the oceanic essential climate variables – surface

| Contributing Networks specified in the GCOS implementation plan | ECVs | Number of stations or platforms currently operating | Number of stations or platforms operating in accordance with the GCMPs | Number of stations or platforms expected to be operating in 2010 | Number of stations or platforms providing data to the international data centres | Number of stations or platforms with complete historical record available in international data centres |
|---|--|---|--|--|--|---|
| Global surface drifting buoy array on 5x5 degree resolution | Sea surface temperature, sea level pressure, position-change-based current | | | | | |
| GLOSS Core Sea-level Network | Sea level | | | | | |
| Voluntary observing ships (VOS) | All feasible surface ECVs | | | | | |
| Ship of Opportunity Programme | All feasible surface ECVs | | | | | |

Table 3b. National contributions to the oceanic essential climate variables – water column

| Contributing Networks specified in the GCOS implementation plan | ECVs | Number of stations or platforms currently operating | Number of stations or platforms operating in accordance with the GCMPs | Number of stations or platforms expected to be operating in 2010 | Number of stations or platforms providing data to the international data centres | Number of stations or platforms with complete historical record available in international data centres |
|---|---|---|--|--|--|---|
| Global reference mooring network | All feasible surface and subsurface ECVs | | | | | |
| Global tropical moored buoy network | All feasible surface and subsurface ECVs | | | | | |
| Argo network | Temperature, salinity, current | | | | | |
| Carbon inventory survey lines | Temperature, salinity, ocean tracers, biogeochemistry variables | | | | | |

18. Satellite observations are essential to complete the information base for oceanic ECV observations. Therefore, Parties with space programmes involving Earth observations should comment on their plans to ensure availability of past and future data and metadata records of the satellite measurements for the oceanic ECVs and associated global products contained in table 4.¹

Table 4. Global products requiring satellite observations – oceans

| ECVs/ Global products requiring satellite observations | Fundamental climate data records required for product generation (from past, current and future missions) |
|---|--|
| Sea Ice Sea ice concentration | Microwave and visible imagery |
| Sea Level Sea level and variability of its global mean | Altimetry |
| Sea Surface Temperature Sea surface temperature | Single and multi-view IR and microwave imagery |
| Ocean Colour Ocean colour and oceanic chlorophyll-a concentration derived from ocean colour | Multi-spectral VIS imagery |
| Sea State Wave height and other measures of sea state (wave direction, wavelength, time period) | Altimetry |
| Ocean Salinity Research towards the measurement of changes in sea surface salinity | Microwave radiances |
| Ocean Reanalyses Altimeter and ocean surface satellite measurements | Key FCDRs and products identified in this report, and other data of value to the analyses |

¹ Derived from the document entitled *Systematic Observation Requirements for Satellite-based Products for Climate: Supplemental Details to the Satellite-based Component of the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, WMO, 2006.

19. Parties are also requested to provide a narrative description of any actions they have taken in response to the following recommended actions on the oceanic ECVs contained in the GCOS implementation plan (numbers of relevant actions in the plan are given in parentheses):

(a) Improving metadata acquisition and data management for the VOSCLim subset of the VOS (O6);

(b) Ensuring that high-frequency (hourly or less) sea level observations are available for all coastal tide gauges, including historical records, are corrected for sea level pressure and are submitted to the specified international data centres (O13);

(c) Including sea level objectives in the capacity-building programmes of GOOS, JCOMM, WMO, other related bodies and the system-improvement programme of GCOS (O14);

(d) Developing a robust programme to observe sea surface salinity, to include VOS ships, research ships, reference moorings and drifting buoys (O15);

(e) Implementing a programme for measuring surface pCO₂ (O17);

(f) Implementing a wave measurement component as part of the Surface Reference Mooring Network (O19);

(g) Improving in situ sea ice observations from buoys, visual surveys (Ship of Opportunity Programme (SOOP) and aircraft) and upward-looking sonars, and implementing observations in the Arctic and Antarctic (O23);

(h) Conducting the systematic global full-depth water column sampling of 30 sections repeated every 10 years (including ocean carbon inventory change) (O25);

(i) Performing the 41 SOOP XBT/XCTD trans-oceanic sections (O26);

(j) Developing capability for systematic measurement of biogeochemical and ecological ECVs (O30);

(k) Supporting data rescue projects and implementing regional, specialized and global data and analysis centres (O36 and O37);

(l) Developing plans and pilot projects for the production of global products based on data assimilation into models for all possible ECVs, including undertaking pilot projects of reanalysis of ocean data (O24, O41 and O40).

E. Chapter 4: Terrestrial essential climate variables

20. Parties should, where relevant, describe their national contributions of terrestrial ECV observations to the international community, paying special attention to the requirements outlined in the GCOS implementation plan.

21. As part of their report describing their national programmes, Parties should, where relevant, report on their efforts to introduce national coordination and planning of terrestrial programme activities.

22. To facilitate integration of the information contained in the national reports, Parties should complete table 5. This table is designed to record information on the national contributions of observations from well-established systems and networks whose current operations can be quantified. Parties should also provide a narrative report on those terrestrial elements of the GCOS implementation plan that are less quantifiable with the aim of making changes and improvements to the climate observing system as a whole so that it meets the requirements of the Convention (see para. 25 below).

Table 5. National contributions to the terrestrial domain essential climate variables

| Contributing networks specified in the GCOS implementation plan | ECVs | Number of stations or platforms currently operating | Number of stations or platforms operating in accordance with the GCMPs | Number of stations or platforms expected to be operating in 2010 | Number of stations or platforms providing data to the international data centres | Number of stations or platforms with complete historical record available in international data centres |
|--|---|--|---|---|---|--|
| GCOS baseline river discharge network (GTN-R) | River discharge | | | | | |
| GCOS Baseline Lake Level/Area/Temperature Network (GTN-L) | Lake level/area/temperature | | | | | |
| WWW/GOS synoptic network | Snow cover | | | | | |
| GCOS glacier monitoring network (GTN-G) | Glaciers mass balance and length, also ice sheet mass balance | | | | | |
| GCOS permafrost monitoring network (GTN-P) | Permafrost borehole-temperatures and active-layer thickness | | | | | |

23. Satellite observations are essential to complete the information base for terrestrial ECV observations. Therefore, Parties with space programmes involving Earth observations should comment on their plans to ensure availability of past and future data and metadata records of the satellite measurements for the terrestrial ECVs and their associated global products contained in table 6.¹

¹ Derived from the document entitled *Systematic Observation Requirements for Satellite-based Products for Climate: Supplemental Details to the Satellite-based Component of the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, WMO, 2006.

Table 6. Global products requiring satellite observations – terrestrial

| ECVs/ Global products requiring satellite observations | Fundamental climate data records required for product generation (from past, current and future missions) |
|---|--|
| Lakes Maps of lakes, lake levels, surface temperatures of lakes in the Global Terrestrial Network for Lakes | VIS/NIR imagery and radar imagery, altimetry, high-resolution IR imagery |
| Glaciers and ice caps Maps of the areas covered by glaciers other than ice sheets, ice sheet elevation changes for mass balance determination | High-resolution VIS/NIR/SWIR optical imagery, altimetry |
| Snow cover Snow areal extent | Moderate-resolution VIS/NIR/IR and passive microwave imagery |
| Albedo Directional hemispherical (black sky) albedo | Multispectral and broadband imagery |
| Land cover Moderate-resolution maps of land-cover type, high-resolution maps of land-cover type, for the detection of land-cover change | Moderate-resolution multispectral VIS/NIR imagery, high-resolution multispectral VIS/NIR imagery |
| fAPAR Maps of fAPAR | VIS/NIR imagery |
| LAI Maps of LAI | VIS/NIR imagery |
| Biomass Research towards global, above-ground forest biomass and forest biomass change | L band/P band SAR, Laser altimetry |
| Fire disturbance Burnt area, supplemented by active fire maps and fire radiated power | VIS/NIR/SWIR/TIR moderate-resolution multispectral imagery |
| Soil moisture^a Research towards global near-surface soil moisture map (up to 10 cm soil depth) | Active and passive microwave |

^a Soil moisture is not listed as an ECV, but has been recognized in the GCOS implementation plan as an emerging ECV.

24. Parties are also requested to provide a narrative description of any actions they have taken in response to the following recommendations on the terrestrial ECVs contained in the GCOS implementation plan (numbers of relevant actions in the plan are given in parentheses):

- (a) Developing a global network of approximately 30 sites based on a progressive evolution of existing reference sites to monitor key biomes and provide the observations required for the calibration and validation of satellite data (T3);
- (b) Maintaining and expanding programmes for monitoring groundwater and aquifers;
- (c) Archiving and disseminating information related to irrigation and water resources (T9);
- (d) Strengthening existing sites for observing snow cover and snowfall and recovering and submitting historical data to the specified international data centres (T10);
- (e) Maintaining sites for observing glaciers and adding additional sites and infrastructure in Africa, the Himalayas, New Zealand and South America (T13);
- (f) Adding the 150 additional permafrost sites identified by GTN-P to cover the high mountains of Asia, Europe and the southern hemisphere, and the North American alpine lands and lowlands, and providing data to the specified international data centres (T16);
- (g) Reanalysing historical data concerning the terrestrial ECVs.

F. Chapter 5: Additional information

25. Parties may, if they wish, provide additional information on their national climate programmes that contribute observations of the ECVs not reported elsewhere in their reports, such as climate observations being undertaken in climate research programmes and/or programmes that provide climate information at a higher resolution or frequency.

Appendix 1

Definition of acronyms used in the guidelines

| | |
|---------|--|
| AERONET | Aerosol Robotic Network |
| AOPC | Atmospheric Observation Panel for Climate |
| Argo | Global Array of Profiling Floats |
| ASDAR | aircraft to satellite data acquisition and relay |
| AVHRR | Advanced Very High Resolution Radiometer |
| BSRN | Baseline Surface Radiation Network |
| CAS | Commission for Atmospheric Sciences of the WMO |
| CBS | Commission for Basic Systems of the WMO |
| CCI | Commission for Climatology of the WMO |
| CDIAC | Carbon Dioxide Information Analysis Center |
| CEOS | Committee on Earth Observation Satellites |
| CGMS | Coordination Group for Meteorological Satellites |
| CHy | Commission for Hydrology of the WMO |
| DWD | Deutscher Wetterdienst (German Meteorological Service) |
| ECMWF | European Centre for Medium-Range Weather Forecasts |
| ECVs | essential climate variables |
| ETHZ | Eidgenössische Technische Hochschule Zürich (Swiss Federal Institute of Technology Zurich) |
| FAGS | Federation of Astronomical and Geophysical Data Analysis Services |
| fAPAR | Fraction of Absorbed Photosynthetically Active Radiation |
| FCDR | fundamental climate data record |
| GAW | Global Atmosphere Watch of the WMO |
| GAWPFR | Global Atmosphere Watch Precision Filter Radiometer network |
| GCMPs | GCOS Climate Monitoring Principles |
| GCOS | Global Climate Observing System |
| GDPFS | Global Data-Processing and Forecasting Systems of the WWW |
| GEO | Group on Earth Observations |
| GEOSS | Global Earth Observation System of Systems |
| GLOSS | Global Sea Level Observing System |
| GOOS | Global Ocean Observing System |
| GOS | Global Observing System of the WWW |
| GPCC | Global Precipitation Climatology Centre |
| GPS | Global Positioning System |
| GRDC | Global Runoff Data Centre |
| GSICS | Global Space-based Inter-Calibration System |
| GSN | GCOS Surface Network |
| GTN-G | Global Terrestrial Network – Glaciers |
| GTN-L | Global Terrestrial Network – Lakes |
| GTN-P | Global Terrestrial Network – Permafrost |
| GTN-R | Global Terrestrial Network – Rivers |
| GTSP | Global Temperature-Salinity Profile Program |
| GTOS | Global Terrestrial Observing System |
| GUAN | GCOS Upper Air Network |
| ICODAS | International Comprehensive Ocean–Atmosphere Data Set |
| ICSU | International Council for Science |
| IDC | international data centre |
| IGBP | International Geosphere–Biosphere Programme |
| IOC | Intergovernmental Oceanographic Commission |
| IOCCG | International Ocean-Colour Coordinating Group |
| IOCCP | International Ocean Carbon Coordination Project |
| IPCC | Intergovernmental Panel on Climate Change |
| IP | implementation plan |
| IR | infrared |
| ISCCP | International Satellite Cloud Climatology Project |
| JCOMM | Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology |
| JMA | Japan Meteorological Agency |

| | |
|---------|--|
| JRC | Joint Research Centre |
| LAI | leaf area index |
| MSC | Meteorological Service of Canada |
| MSU | microwave sounding unit |
| NASA | National Aeronautics and Space Administration |
| NCDC | National Climatic Data Center |
| NDACC | Network for the Detection of Atmospheric Composition Change |
| NIR | near-infrared |
| NOAA | National Oceanic and Atmospheric Administration |
| NSIDC | National Snow and Ice Data Center |
| RA | Regional Association of the WMO |
| RO | radio occultation |
| SAR | synthetic aperture radar |
| SHADOZ | Southern Hemisphere Additional Ozonesondes |
| SKYNET | Sky Radiometer Network |
| SLP | sea level pressure |
| SOOP | Ship of Opportunity Programme |
| SST | sea surface temperature |
| SWIR | short-wave infrared |
| TCDR | thematic climate data record |
| TIR | thermal infrared |
| UNEP | United Nations Environment Programme |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UV | ultraviolet |
| VIS | visible |
| VOS | voluntary observing ship |
| VOSclim | Voluntary Observing Ship Climate Project |
| WCRP | World Climate Research Programme |
| WDC | World Data Centre |
| WDC-GG | World Data Center for Greenhouse Gases |
| WGMS | World Glacier Monitoring Service |
| WMO | World Meteorological Organization |
| WOAP | WCRP Observation and Assimilation Panel |
| WODC | World Ocean Database Centre |
| WOUDC | World Ozone and Ultraviolet Radiation Data Centre |
| WRDC | World Radiation Data Centre |
| WWW | World Weather Watch of the WMO |
| XBT | expendable bathythermograph |
| XCTD | expendable conductivity, temperature and depth system |

Appendix 2

Essential climate variables

Table 7. Essential climate variables that can be feasibly measured globally and are highly relevant to the Convention

| Domain | Essential climate variables |
|--|--|
| Atmospheric (over land, sea and ice) | <p>Surface: Air temperature, precipitation, air pressure, surface radiation budget, wind speed and direction, water vapour</p> <p>Upper-air: Earth radiation budget (including solar irradiance), upper-air temperature (including MSU radiances), wind speed and direction, water vapour, cloud properties</p> <p>Composition: Carbon dioxide, methane, ozone, other long-lived greenhouse gases,^a aerosol properties</p> |
| Oceanic | <p>Surface: Sea surface temperature, sea surface salinity, sea level, sea state, sea ice, current, ocean colour (for biological activity), carbon dioxide partial pressure</p> <p>Sub-surface: Temperature, salinity, current, nutrients, carbon, ocean tracers, phytoplankton</p> |
| Terrestrial^b | River discharge, water use, groundwater, lake levels, snow cover, glaciers and ice caps, permafrost and seasonally-frozen ground, albedo, land cover (including vegetation type), fraction of absorbed photosynthetically active radiation (fAPAR), leaf area index (LAI), biomass, fire disturbance |

^a Including nitrous oxide, chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, sulphur hexafluoride and perfluorocarbons.

^b Includes run-off ($\text{m}^3 \text{s}^{-1}$), groundwater extraction rates ($\text{m}^3 \text{yr}^{-1}$) and location, snow cover extent (km^2) and duration, snow depth (cm), glacier/ice cap inventory and mass balance ($\text{kg m}^{-2} \text{yr}^{-1}$), glacier length (m), ice sheet mass balance ($\text{kg m}^{-2} \text{yr}^{-1}$) and extent (km^2), permafrost extent (km^2), temperature profiles and active layer thickness, above-ground biomass (t ha^{-1}), burnt area (ha), date and location of active fire, burn efficiency (percentages of vegetation burned per unit area).

Appendix 3

Global Climate Observing System climate monitoring principles

26. Effective monitoring systems for climate should adhere to the following principles:¹

- (a) The impact of new systems or changes to existing systems should be assessed prior to implementation;
- (b) A suitable period of overlap for new and old observing systems is required;
- (c) 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;
- (d) The quality and homogeneity of data should be regularly assessed as a part of routine operations;
- (e) Consideration of the needs for environmental and climate-monitoring products and assessments, such as Intergovernmental Panel on Climate Change assessments, should be integrated into national, regional and global observing priorities;
- (f) Operation of historically-uninterrupted stations and observing systems should be maintained;
- (g) High priority for additional observations should be focused on data-poor regions, poorly-observed parameters, regions sensitive to change, and key measurements with inadequate temporal resolution;
- (h) Long-term requirements, including appropriate sampling frequencies, should be specified to network designers, operators and instrument engineers at the outset of system design and implementation;
- (i) The conversion of research observing systems to long-term operations in a carefully-planned manner should be promoted;
- (j) Data management systems that facilitate access, use and interpretation of data and products should be included as essential elements of climate monitoring systems.

27. Furthermore, operators of satellite systems for monitoring climate need to:

- (a) Take steps to make radiance calibration, calibration-monitoring and satellite-to-satellite cross-calibration of the full operational constellation a part of the operational satellite system;
- (b) Take steps to sample the Earth system in such a way that climate-relevant (diurnal, seasonal, and long-term interannual) changes can be resolved.

28. Thus satellite systems for climate monitoring should adhere to the following specific principles:

- (a) Constant sampling within the diurnal cycle (minimizing the effects of orbital decay and orbit drift) should be maintained;

¹ The 10 basic principles (in paraphrased form) were included as an appendix to the UNFCCC reporting guidelines on global climate change observing systems which were adopted by decision 5/CP.5. The complete set of principles was adopted by the Congress of the World Meteorological Organization through Resolution 9 at its fourteenth session in May 2003, and agreed by the Committee on Earth Observation Satellites at its 17th Plenary Meeting in November 2003. The Conference of the Parties, by its decision 11/CP.9, requested that the 10 basic principles (in paraphrased form) be replaced by the complete set of principles in the UNFCCC reporting guidelines on global climate change observing systems

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- (b) A suitable period of overlap for new and old satellite systems should be ensured for a period adequate to determine inter-satellite biases and maintain the homogeneity and consistency of time-series observations;
 - (c) Continuity of satellite measurements (i.e. elimination of gaps in the long-term record) through appropriate launch and orbital strategies should be ensured;
 - (d) Rigorous pre-launch instrument characterization and calibration, including radiance confirmation against an international radiance scale provided by a national metrology institute, should be ensured;
 - (e) On-board calibration adequate for climate system observations should be ensured and associated instrument characteristics monitored;
 - (f) Operational production of priority climate products should be sustained and peer-reviewed new products should be introduced as appropriate;
 - (g) Data 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;
 - (h) Use of functioning baseline instruments that meet the calibration and stability requirements stated above should be maintained for as long as possible, even when these exist on decommissioned satellites;
 - (i) Complementary in situ baseline observations for satellite measurements should be maintained through appropriate activities and cooperation;
 - (j) Random errors and time-dependent biases in satellite observations and derived products should be identified.

Appendix 4

International data centres

International data centres have been established for many of the essential climate variables networks and systems. Additional centres will be added over time. The Global Climate Observing System (GCOS) secretariat maintains a current list of all international data centres associated with GCOS together with a list of current contacts at those centres.

Table 8. International data centres and archives – atmospheric domain

| Network or system | International data centres and archives | Coordinating bodies |
|--|---|---------------------|
| Atmosphere surface | | |
| GCOS Surface Network (GSN) | GSN monitoring centre (DWD, JMA), GSN analysis centre (NCDC, Hadley Centre), GSN archive (WDC Asheville), CBS GCOS lead centres (JMA, NCDC and others), Global Precipitation Climatology Centre (GPCC, DWD) | AOPC with CBS |
| Full WWW/GOS synoptic network | Integrated Surface Hourly (WDC Asheville), Global Precipitation Climatology Centre (DWD) | CBS |
| National surface networks | National responsibility; submission to WDC, Global Precipitation Climatology Centre (DWD) | CCI, CBS, RAs |
| Baseline Surface Radiation Network (BSRN) | World Radiation Monitoring Centre (ETHZ) | WCRP |
| Solar radiation and radiation balance data | World Radiation Data Centre (WRDC St Petersburg) | CAS |
| Atmosphere upper-air | | |
| GCOS Upper Air Network (GUAN) | GUAN monitoring centres (ECMWF, Hadley Centre), GUAN analysis centres (Hadley Centre, NCDC), GUAN archive (WDC Asheville), CBS GCOS lead centre (NCDC) | AOPC with CBS |
| Full WWW/GOS Upper-Air Network | GDPFS world centres, GDPFS regional/specialized meteorological centres, WDC Asheville | CBS |
| Reference network high-altitude radiosondes | GUAN centres (proposed) | AOPC with WCRP |
| Aircraft (ASDAR etc.) | GDPFS world centres, GDPFS regional/specialized meteorological centres, WDC Asheville | CBS |
| Profiler (radar) network | GDPFS world centres, GDPFS regional/specialized meteorological centres, WDC Asheville | CBS |

Table 8 (continued)

| Network or system | International data centres and archives | Coordinating bodies |
|---|--|---------------------|
| Ground-based GPS receiver network | | |
| Atmosphere composition | | |
| GAW CO ₂ and CH ₄ monitoring network | WDC-GG (JMA), Carbon Dioxide Information Analysis Center (Oak Ridge National Laboratory) | CAS |
| WMO/GAW Ozone sonde Network WMO/GAW Column Ozone Network | WOUDC (MSC), NDACC archive, Norwegian Institute for Air Research, Southern Hemisphere Additional Ozone sondes (SHADOZ – NASA) archive | CAS |
| WMO/GAW Aerosol Network | AERONET, SKYNET, BSRN and GAWPFR data centres, World Data Centre for Aerosols (JRC Ispra) | CAS |

Table 9. International data centres and archives – oceanic domain

| Network or system | International data centres and archives | Coordination bodies |
|--|--|------------------------|
| Surface drifting buoys | NCDC | JCOMM, ICOADS |
| Moored buoys | NCDC, WODC | JCOMM, ocean sites |
| Voluntary observing ships | VOSclim Data Centre, NCDC | JCOMM, ICOADS, VOSclim |
| Delayed-mode monthly and annual mean tide gauges | Permanent Service for Mean Sea Level, Proudman Laboratory | JCOMM, GLOSS |
| Real-time tide gauges | University of Hawaii Sea Level Center | JCOMM, GLOSS |
| Argo floats | Argo data centres, GTSP, WODC | Argo science team |
| Repeat XBT sections | GTSP, WODC | JCOMM, GTSP |
| Repeat hydrography/carbon sections | WODC, CDIAC | IOCCG, GCOS, WCRP |
| Sea ice variables | NSIDC | JCOMM, GCOS, WCRP |
| Ocean colour | None at present (GLOB COLOUR Pilot Project) | IOCCP |

Table 10. International data centres and archives – terrestrial domain

| Network or system | International data centre and archives | Coordinating bodies |
|---|--|--------------------------------------|
| Global Terrestrial Network – Glaciers | WGMS, NSIDC | ICSU, FAGS |
| Global Terrestrial Network – Lakes | None designated ^a | CHy |
| Global Terrestrial Network – Permafrost | NSIDC | International Permafrost Association |
| Global Terrestrial Network – Rivers | GRDC | CHy |
| Snow cover (WWW/GOS synoptic network) | NCDC, NSIDC | CBS |

^a International data centre responsibilities are in the process of being developed.

9/CP.15, 2009

Systematic climate observations

The Conference of the Parties,

Recalling Article 4, paragraph 1(g–h), and Article 5 of the Convention,

Further recalling decisions 8/CP.3, 14/CP.4, 5/CP.5, 11/CP.9, 5/CP.10 and 11/CP.13,

Having considered the conclusions of the Subsidiary Body for Scientific and Technological Advice at its thirtieth session,

Noting the important role of the Global Climate Observing System in meeting the need for climate observation under the Convention,

1. *Expresses its appreciation:*

(a) To the secretariat and sponsoring agencies of the Global Climate Observing System for preparing the report on progress with the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (hereinafter referred to as the Global Climate Observing System implementation plan);

(b) To the secretariat and sponsoring agencies of the Global Terrestrial Observing System for developing a framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate;

(c) To the Committee on Earth Observation Satellites for its coordinated response, on behalf of Parties that support space agencies involved in global observations, to the needs expressed in the Global Climate Observing System implementation plan;

2. *Recognizes* the significant progress made during 2004–2008 in improving the observing systems for climate relevant to the Convention;

3. *Notes* that, despite the progress made, only limited advances have been made in achieving long-term continuity for several in situ observing systems and that there are still large areas, in Africa for example, for which in situ observations and measurements are not available;

4. *Also notes* that not all climate information needs under the Convention are being met;

5. *Urges* Parties to work towards addressing the priorities and gaps identified in the report on progress with the Global Climate Observing System implementation plan, in particular the implementation of the regional action plans that were developed during 2001–2006, and ensuring sustained long-term operation of essential in situ networks, especially for the oceanic and terrestrial domains, including through provision of the necessary resources;

6. *Invites* relevant United Nations agencies and international organizations to do the same;

7. *Encourages* Parties in a position to do so to support activities aimed at sustaining climate observations over the long term in developing countries, especially the least developed countries and small island developing States;

8. *Invites* the Global Climate Observing System secretariat, under the guidance of the Global Climate Observing System Steering Committee, to update, by the thirty-third session of the Subsidiary Body for Scientific and Technological Advice, the Global Climate Observing System implementation plan, taking into account emerging needs in climate observation, in particular those relating to adaptation activities;

9. *Encourages* the secretariat and the sponsoring agencies of the Global Terrestrial Observing System to implement the framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate, as a joint terrestrial framework mechanism between relevant agencies of the United Nations and the International Organization for Standardization;

10. *Encourages* the Committee on Earth Observation Satellites to continue coordinating and supporting the implementation of the satellite component of the Global Climate Observing System;

11. *Urges* Parties that support space agencies involved in global observations to enable these agencies to continue to implement, in a coordinated manner through the Committee on Earth Observation Satellites, the actions identified in the updated report of the Committee on Earth Observation Satellites,¹ in order to meet the relevant needs of the Convention, in particular by ensuring long-term continuity of observations and data availability.

11/CP.17, 2011

Report of the Global Environment Facility to the Conference of the Parties and additional guidance to the Global Environment Facility

The Conference of the Parties,

Recalling decisions 12/CP.2, 3/CP.16, 5/CP.16 and 7/CP.16,

Also recalling decision 5/CP.7, paragraph 7(a)(iv),

Taking note with appreciation of the annual report of the Global Environment Facility to the Conference of the Parties, which provides detailed and useful information on the wide variety of steps that the Global Environment Facility has taken to implement the guidance of the Conference of the Parties,²

Recognizing the progress made by the Global Environment Facility in areas such as piloting an approach to broaden the range of agencies and entities that are able to access resources directly from the Global Environment Facility Trust Fund and improving the effectiveness and efficiency of the allocation of funding,

Reiterating decision 7/CP.16, paragraph 5, urging the Global Environment Facility, as an operating entity of the financial mechanism of the Convention, to increase access to funding for activities related to Article 6 of the Convention,

Encouraging the Global Environment Facility to continue pursuing reforms to facilitate the successful implementation of its fifth replenishment cycle,

Taking note of the information provided by the secretariat of the Global Environment Facility on financial support provided for the preparation of national communications from Parties not included in Annex I to the Convention,³

Also taking note of the need to compile and consolidate past guidance provided to the Global Environment Facility by the Conference of the Parties,

Further taking note that the Global Environment Facility, in its annual report to the Conference of the Parties, affirms that its mandate under the Least Developed Countries Fund and the Special Climate Change Fund covers activities with regard to research and systematic observation,

1. *Requests* the Global Environment Facility, as an operating entity of the financial mechanism of the Convention:

(a) To continue to work with its implementing agencies to further simplify its procedures and improve the effectiveness and efficiency of the process through which Parties not included in Annex I to the Convention (non-Annex I Parties) receive funding to meet their obligations under Article 12, paragraph 1, of the Convention, with the aim of ensuring the timely disbursement of funds to meet the agreed full costs incurred by developing country Parties in complying with these obligations and to avoid gaps between the enabling activities of current and subsequent national communications, recognizing that the process of preparation of national communications is a continuous cycle;

(f) To continue to enhance the transparency of the project review process throughout the project cycle;

¹ FCCC/SBSTA/2008/MISC.11.

² FCCC/CP/2011/7 and Add.1 and 2 and Corr.1.

³ FCCC/SBI/2010/INF.10 and FCCC/CP/2010/5 and Add.1.

(g) To clarify the concept of additional costs as applied to different types of adaptation projects under the Least Developed Countries Fund and the Special Climate Change Fund which seek to respond to climate change risks;

(h) To continue to provide financial resources to developing countries for strengthening existing and, where needed, establishing national and regional systematic observation and monitoring networks under the Least Developed Countries Fund and the Special Climate Change Fund;

2. *Invites* the Global Environment Facility, in the context of technology needs assessments,¹ to continue to provide financial support to other² non-Annex I Parties as appropriate to conduct or update their technology needs assessments, noting the availability of the updated *Handbook for Conducting Technology Needs Assessments for Climate Change*;³

3. *Requests* the Global Environment Facility, in its regular report to the Conference of the Parties, to include information on the steps it has taken to implement the guidance provided in paragraphs 1 and 2 above;

4. *Requests* the Subsidiary Body for Implementation at its thirty-sixth session to consider the information submitted by the Global Environment Facility to the Conference of the Parties at its seventeenth session on the implementation of decision 7/CP.7, paragraph 2(a–d);

5. *Invites* Parties to submit to the secretariat annually, and no later than 10 weeks prior to the subsequent session of the Conference of the Parties, their views and recommendations in writing on the elements to be taken into account in developing guidance to the Global Environment Facility.

¹ FCCC/SBI/2011/7, paragraph 135.

² Noting that progress has been made in providing technical and financial support to assist 36 non-Annex I Parties in developing and updating their technology needs assessments and that many non-Annex I Parties expressed their interest to conduct or update their technology needs assessment.

³ <<http://unfccc.int/ttclear/pdf/TNA%20HANDBOOK%20EN%2020101115.pdf>>.

Conclusions adopted by COP

COP 15, 2009

(FCCC/CP/2009/11)

82. The COP noted with appreciation the outcome of World Climate Conference-3,¹ organized by the World Meteorological Organization and its partner organizations and held in Geneva, Switzerland, from 31 August to 4 September 2009, in particular the decision to establish a Global Framework for Climate Services to strengthen the production, availability, delivery and application of science-based climate prediction and services.

COP 18, 2012

(FCCC/CP/2012/8)

50. The Chair of the SBSTA also reported that the SBSTA had recommended at its thirty-seventh session draft conclusions² on research and systematic observation for adoption by the COP.

55. The COP, acting upon a recommendation by the SBSTA,³ adopted, conclusions on research and systematic observation, as follows, “The Conference of the Parties noted with appreciation the outcome of the Extraordinary Session of the World Meteorological Congress, held in Geneva, Switzerland, from 29 to 31 October 2012, regarding the further implementation of the Global Framework for Climate Services,⁴ which aims to strengthen the production, availability, delivery and application of science-based climate prediction and services”.

¹ <http://www.wmo.int/pages/gfcs/index_en.html>.

² FCCC/SBSTA/2012/L.25/Add.1 and see paragraph 55 below.

³ FCCC/SBSTA/2012/L.25/Add.1.

⁴ See <http://www.wmo.int/pages/gfcs/index_en.php>.

Conclusions adopted by SBSTA and SBI

SBSTA 11, 1999

(FCCC/SBSTA/1999/14)

105. At its 10th meeting, on 1 November, having considered a proposal by the Chairman, the SBSTA adopted the following conclusions:

(a) The SBSTA took note of the information provided by the secretariat on research and systematic observation in documents FCCC/SBSTA/1999/10, FCCC/SBSTA/1999/13/Add.2 and FCCC/SBI/1999/11;

(b) The SBSTA recommended a draft decision for adoption by the COP at its fifth session (FCCC/CP/1999/L.4 and Add.1). For the final text of the decision adopted by the COP, see decision 5/CP.5; and

(c) The SBSTA took note with appreciation of the statements made by the representatives of the GCOS, the GOOS and the GEF.

SBSTA 12, 2000

(FCCC/SBSTA/2000/5)

59. At its 7th meeting, on 16 June, having considered a proposal by the Chairman, the SBSTA adopted the following conclusions:

(a) The SBSTA welcomed the statement made by the Chairman of the IPCC on the status of preparation of the Third Assessment Report and key conclusions from the special report on emission scenarios. It noted the progress made in the preparation of the Third Assessment Report, and expressed appreciation to the IPCC for organizing a number of informative side events and presentations of special reports, as well as for its valuable contribution to the official SBSTA meetings;

(b) The SBSTA urged Parties and organizations in a position to do so to continue their financial support to the IPCC, to enable it to complete the Third Assessment Report in a timely manner. It also urged Parties to ensure the scientific integrity of the IPCC process;

(c) The SBSTA welcomed the report made by the Director of the GCOS secretariat, on behalf of the agencies participating in the Climate Agenda, on progress in responding to decision 5/CP.5 and on recent developments in the global observing systems;

(d) The SBSTA noted the efforts already made by the GCOS secretariat to organize regional workshops in the South Pacific and Africa to identify priority capacity-building needs of developing countries related to their participation in systematic observation. The SBSTA expressed appreciation to those Parties and organizations which provided support to the workshops;

(e) The SBSTA welcomed the information provided by the GCOS secretariat in response to the invitation contained in decision 5/CP.5, to consider the need for an intergovernmental process for global observing systems. It noted the recommendation that no new intergovernmental mechanism is needed at this time, but that the existing intergovernmental mechanisms, including those available to GCOS and its partners, should be used more efficiently;

(f) The SBSTA invited the 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. It noted the appeal for additional resources by the GCOS secretariat. The SBSTA urged Parties to contribute financial support to the work of the GCOS secretariat to enable it to continue its activities, in response to decision 5/CP.5;

(g) The SBSTA welcomed the cooperation between the secretariat and United Nations bodies and other conventions. It noted with appreciation the reports by representatives of the WHO, the Ramsar Convention, and the UNDP;

(h) The SBSTA requested the secretariat to continue to explore areas of cooperation on substantive matters with these and other United Nations agencies and conventions, and to inform it at subsequent sessions of progress achieved.

SBSTA 14, 2001

(FCCC/SBSTA/2001/2)

Cooperation with scientific organizations

(a) The SBSTA took note of the completion of the IPCC Third Assessment Report (TAR) and commended the IPCC on the high quality of its scientific work. It also expressed its appreciation for the special presentations on the findings of the TAR made during the resumed sixth session of the COP. It requested the secretariat to put the TAR and the IPCC synthesis report on the agenda of the fifteenth session of the SBSTA;

(b) The SBSTA took note of the report made by the Director of the Global Climate Observing System (GCOS) Secretariat, on behalf of the agencies participating in the Climate Agenda, on activities relating to decision 5/CP.5.¹ It noted that support is needed for GCOS workshops that are planned for the Caribbean and Central America and Asia regions in 2002. The SBSTA took note of the prospectus provided by the GCOS secretariat on a second assessment of the adequacy of the global climate observing system;

SBSTA 15, 2001

(FCCC/SBSTA/2001/8)

41. At its 5th meeting, on 6 November, having considered a proposal by the Chairman, the SBSTA adopted the following conclusions:

Cooperation with scientific organizations

(a) The SBSTA welcomed the statement by the Director of the Global Climate Observing System (GCOS) secretariat, on behalf of the agencies participating in the Climate Agenda, regarding its activities relating to decisions 14/CP.4 and 5/CP.5. It further noted the information provided by GCOS contained in document FCCC/SBSTA/2001/MISC.9;

(b) The SBSTA noted with concern the ongoing deterioration of global observation systems for climate, as was also emphasised in the IPCC TAR. It encouraged GCOS to continue to address this problem, working with its sponsors and its partners in global observation systems as well as through capacity-building programmes such as the System for Analysis, Research and Training (START);

(c) The SBSTA endorsed the preparation by the GCOS secretariat of a second report on the adequacy of the global climate observing systems. It noted the necessity for the report to address the needs of the Convention for climate-relevant observations, including those associated with the development of adaptation strategies. The SBSTA invited the GCOS secretariat, in its preparation of the adequacy report, to take into account relevant decisions of the Conference of the Parties on capacity building, technology transfer and adaptation. It also invited the GCOS secretariat to consider in its report an integrated approach to global climate observations systems, including the exploitation of new and emerging methods of observation;

(d) The SBSTA noted the need to complete the adequacy report in the shortest possible time in order to provide a framework for further work to improve global monitoring systems. It invited the GCOS secretariat to prepare, in time for consideration by the SBSTA at its sixteenth session, an interim report on the synthesis and analysis of national reports from

¹ For the full text of the decision adopted by the Conference of the Parties at its fifth session, see document FCCC/CP/1999/6/Add.1.

Parties provided in accordance with decision 5/CP.5. It encouraged the GCOS secretariat to complete the final adequacy report by the eighteenth session of the SBSTA in order to enable substantive consideration of the report to take place at the ninth session of the COP;

(e) The SBSTA also noted the completion of two regional workshops in the South Pacific and Africa to identify priority capacity-building needs of developing countries in relation to their participation in systematic observation. It invited the GCOS secretariat to make the follow-up regional action plans available to the SBSTA for consideration at its sixteenth session, with a view to recommending a draft decision on this matter for consideration by the COP at its eighth session. It encouraged the GCOS secretariat, through continued collaboration with the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF), to expedite the remaining programme of regional workshops;

(f) The SBSTA urged Parties to work in collaboration with the GCOS secretariat in formulating project proposals to correct deficiencies in global observing systems for climate, including related data management;

Cooperation with other conventions

(a) The SBSTA reaffirmed the need for enhanced cooperation between the UNFCCC, the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD), with the aim of ensuring the environmental integrity of the conventions and promoting synergies under the common objective of sustainable development, in order to avoid duplication of effort and use available resources more efficiently;

(b) The SBSTA took note of the information provided in documents FCCC/SBSTA/2001/MISC.7 and FCCC/SBSTA/2001/MISC.8 and Add.1 and 2. It welcomed an oral report provided by the secretariat relating to the work of a joint liaison group between the secretariats of the UNFCCC, the CBD and the UNCCD, and the information provided by the representatives of the CBD and UNCCD secretariats. The SBSTA also welcomed information on the pilot assessment of the interlinkages between climate change and biological diversity which was launched by the CBD last March, and expressed its interest in learning about how this work is proceeding;

(c) The SBSTA noted with appreciation the report provided by the IPCC on the preparations under way to develop a technical paper, in response to a request from the CBD, on the interlinkages between climate change, biodiversity and desertification. It encouraged the IPCC to make the findings of this report available to the SBSTA at its next session;

SBSTA 16, 2002

(FCCC/SBSTA/2002/6)

48. At its 7th meeting, on 13 June, having considered a proposal by the Chair, the SBSTA adopted the following conclusions:

(a) The SBSTA took note of the interim report by the GCOS secretariat on the synthesis and analysis of national reports on global climate observing systems from Parties, and other information relevant to the implementation of decision 5/CP.5 provided in document FCCC/SBSTA/2002/MISC.10;

(b) The SBSTA urged Annex I Parties and invited non-Annex I Parties that have not yet done so to submit their detailed reports on systematic observation.¹ The initial analysis of national reports drew attention to several themes such as the importance of establishing national coordination mechanisms for systematic observations across all climate regimes, including for terrestrial observing systems. The SBSTA also noted that many Parties had found the process of preparing the national reports to be a useful means of drawing attention to both the deficiencies in observing systems in key areas and the diversity of data and systems that do exist, many established for research purposes. The SBSTA encouraged Parties to give continuing operational support to relevant research systems;

¹ In accordance with the reporting guidelines contained in document FCCC/CP/1999/7.

(c) The SBSTA welcomed the involvement of a broader range of experts, particularly from developing countries, including those associated with the IPCC, in the preparation by GCOS of the second report on the adequacy of the global climate observing systems. The SBSTA stressed the importance of achieving an integrated global climate observing system that would facilitate identification of observed trends and changes in the global climate system and inform key policy decisions;

(d) The SBSTA noted the information submitted by the GCOS secretariat on the progress made in the implementation of the programme of regional workshops to address priority capacity-building needs of developing countries in relation to their participation in systematic observation and the follow-up regional action plans. The SBSTA urged the GCOS secretariat to complete the remaining programme of regional workshops¹ as early as possible;

(e) The SBSTA welcomed the submission of action plans emanating from the regional workshops and noted the urgency of moving these plans forward into implementation. It encouraged Parties in cooperation with the GCOS secretariat to explore the full range of funding options that might assist the implementation of the plans, including the GEF, donor support such as through partnership arrangements, and international aid programmes directed at capacity-building, technology transfer, education and training, and recommended the involvement of representatives of potential funding bodies in the development of the implementation plans. The SBSTA invited the GEF to report on its progress and/or plans in this regard, including on the provision of financial support, in the context of its report to the Conference of Parties at its eighth and subsequent sessions;

(f) The SBSTA noted, on the basis of the preliminary analysis of national reports, the outcomes of the regional workshops and the information provided by the GCOS Science Panels, that serious deficiencies continue to exist in global observing systems for climate. The SBSTA urged Parties to give priority to:

(i) Remedying first the deficiencies in traditional monitoring systems, and also taking advantage of the increasing contribution of new and emerging technologies, such as space-based systems, as a complementary source of climate data;

(ii) Adhering to the climate monitoring principles provided in the UNFCCC guidelines for reporting;

(iii) Exchanging data, providing data to international data centres and securing access to data and products from international data centres;

(iv) Enhancing capacity to access, communicate and use data to inform decision-making processes;

(g) The SBSTA urged Annex I Parties to contribute support for addressing the priority requirements to improve the deficiencies in global observing systems for climate. In this context, the SBSTA welcomed the announcement by the Government of the United States of America of a contribution of US\$ 4 million to improving climate observing systems in developing countries.

SBSTA 17, 2002

(FCCC/SBSTA/2002/13)

45. At its 6th meeting, on 29 October, having considered a proposal by the Chair, the SBSTA adopted the following conclusions:

(a) The SBSTA took note of the information provided in document FCCC/SBSTA/2002/INF.17 and of submissions from Parties contained in document FCCC/SBSTA/2002/MISC.15 and Add.1;

¹ The regional workshop programme is as follows: completed workshops: Pacific Island (2000), Southern and Eastern Africa (2001), Caribbean and Central America (2002); planned workshops: South-East Asia (late 2002), West Africa, South America, South-West Asia, Mediterranean basin, Eastern and Central Europe and Central Asia. Refer to the GCOS web site http://www.wmo.ch/web/gcos/GCOS_RWP.htm for further information.

(b) The SBSTA noted the statement made by the Global Climate Observing System (GCOS) secretariat and the progress being made on activities relating to decision 5/CP.5;

(c) The SBSTA welcomed the statements made by the representatives of the World Climate Research Programme, the International Geosphere–Biosphere Programme and the International Human Dimensions Programme on Global Environmental Change, and by the Chair of the IPCC, on the current activities of their organizations. The SBSTA also took note with appreciation of the presentations made by the representatives of these organizations, the International Group of Funding Agencies and the IEA, and by IPCC experts, at the special side event;

(d) The SBSTA welcomed the exchange of views during the special side event. The following main issues were recognized as being important in the context of a dialogue among the IPCC, the international research programmes represented at the meeting, and the SBSTA:

(i) The independence of the IPCC and those international research programmes, and their willingness to respond to the scientific challenges posed by the Convention and the Third Assessment Report (TAR);

(ii) The role of the IPCC in conducting regular assessments of climate change knowledge, and in providing the results of these to the SBSTA;

(iii) The increased collaboration among international research programmes;

(iv) The needs for stronger links between international and regional research programmes, and to enhance the contribution of developing country scientists to research efforts;

(v) The timeline for new research in the context of the Fourth Assessment Report of the IPCC, notably the aim to make the report available in 2007;

(e) The SBSTA noted that the special side event demonstrated that considerable research was being undertaken by the international research community to address the research recommendations of the IPCC TAR. However, the special side event highlighted that a more coordinated and multidisciplinary approach was needed to address research on cross-cutting issues such as the relationship between climate change, sustainable development and equity, stabilization of atmospheric greenhouse gas concentrations, and uncertainty, noting that Parties have raised other important research issues as reported in document FCCC/SBSTA/2002/MISC.15 and Add.1, and synthesized in document FCCC/SBSTA/2002/INF.17;

(f) The SBSTA noted the importance of an integrated international effort on research and systematic observation and of assessments by the IPCC to provide information for the ongoing work of the Convention. The SBSTA agreed on the need to engage developing country scientists more actively in climate change research efforts. The SBSTA noted, and decided to consider at future sessions, the need to support endogenous capacity-building for research and systematic observation in developing countries. It invited the SBI to take note of, and consider at future sessions, such needs, particularly in the context of decision 2/CP.7;

(g) The SBSTA decided to regularly consider issues related to research on climate change at its future sessions in order:

(i) To inform Parties about on-going and planned activities of the international and intergovernmental research programmes through periodic briefings;

(ii) To provide a forum for consideration of research needs and priorities and ways and means for addressing them;

(iii) To communicate these research needs and priorities to the scientific community. As a first step, the SBSTA requested the secretariat to forward documents FCCC/SBSTA/2002/INF.17, and FCCC/SBSTA/2002/MISC.15 and Add.1 to the international, intergovernmental and regional research programmes and the IPCC for their information and consideration, and to invite their views;

(h) The SBSTA welcomed the first compilation and synthesis of the national reports on global observing systems for climate from Annex I Parties, provided in document

FCCC/SBSTA/2002/INF.15. It encouraged Parties which have not done so to submit their national reports as soon as possible;

(i) The SBSTA requested the secretariat to organize intersessional consultations, immediately before SBSTA 18, on the second report on the adequacy of the global climate observing systems under preparation by the GCOS secretariat. These consultations should facilitate the exchange of views on the use of this report, together with the national reports, for identifying gaps and priorities for actions to improve global observing systems for climate. It also requested the secretariat to report on the results of the consultations at its eighteenth session. The SBSTA recalled its conclusions at its fifteenth session to have substantive consideration of the adequacy report at the ninth session of the COP;

(j) The SBSTA noted that regional workshops organized by the GCOS secretariat on the implementation of decision 5/CP.5 are leading to specific proposals to address the deficiencies in global observing systems for climate in developing countries. It invited the SBI to take note of the need to fund those aspects of the proposals relating to the global system and to consider at future sessions possible financial implications of such needs, including in its guidance to the financial mechanism of the Convention;

(k) The SBSTA took note of a proposal from Australia for a voluntary GCOS fund to support high priority needs relating to global observing systems for climate. It noted that many of these needs are in developing countries. The SBSTA encouraged the GCOS steering committee to explore this proposal at its future sessions.

SBSTA 18, 2003

(FCCC/SBSTA/2003/10)

39. At its 5th meeting, on 12 June, having considered a proposal by the Chair, the SBSTA adopted the following conclusions:¹

(a) The SBSTA welcomed the second adequacy report prepared under the guidance of the GCOS steering committee, and acknowledged the work of those involved in its preparation;

(b) The SBSTA took note of document FCCC/SBSTA/2003/9 and welcomed the oral report of the Chair of the SBSTA on the exchange of views and the presentations given at the pre-sessional consultations organized by the secretariat;

(c) The SBSTA noted that the second adequacy report provides an opportunity to build momentum among governments to improve the global observing systems for climate, but that work remains to be done to identify priorities for actions, to remedy deficiencies within the domain-based networks, and to estimate the cost implications. It noted that approaches to establishing these priorities should involve a wide range of user communities, and that the GCOS provides the global-scale context for regional and national activities;

(d) The SBSTA noted that the GCOS steering committee report² to the SBSTA at its eighteenth session identified four overarching and equally high-priority recommendations relating to observing standards and data exchange, integrated global climate-quality products, capacity-building and systems improvements, and the issue of reporting by Parties, and agreed to consider these recommendations in its further work;

(e) The SBSTA noted that there have been improvements and progress in implementing global observing systems for climate, especially in the use of satellite information and in the provision of some ocean observations. Many components of the global terrestrial networks are, however, still not fully implemented, the global ocean networks lack full coverage and commitment to sustained operation, and the global atmospheric networks are not operating with the required global coverage and quality;

¹ Adopted as FCCC/SBSTA/2003/L.4.

² *Report to SBSTA 18 from the GCOS steering committee regarding the Second Report on the Adequacy of the Global Observing Systems for Climate*, available at <http://www.wmo.ch/web/gcos/gcoshome.html>.

(f) The SBSTA noted that the generation and exchange of high-quality data and products are essential to meeting the needs of the Convention. It urged Parties to address, as a high priority, the following two types of problem that affect the availability of data, as identified in the second adequacy report:

(i) Many data are not being collected or, if collected at the national level, are not being received by global data centres;

(ii) Valuable historical data sets exist, but have not been digitized and quality-controlled;

(g) To better understand the barriers to improving the receipt, at global data centres, of data from atmospheric and hydrological networks, the SBSTA invited the GCOS secretariat to prepare, in consultation with the World Meteorological Organization (WMO), an analysis of specific problems and of options to remedy them, for consideration by the SBSTA at its twentieth session. The SBSTA further invited the GCOS secretariat to comment, in its report, on the accessibility of data from global data centres;

(h) The SBSTA also noted that the global observing systems for climate are not designed to meet all of the needs of the community concerned with climate change impacts. To address this and related issues, future planning activities by Parties and intergovernmental organizations should examine the potential to enhance links with, or establish, specialized networks in regions vulnerable to climate change;

(i) The SBSTA requested Parties to submit to the secretariat, by 15 September 2003, views on the priorities for actions arising from the second adequacy report, with particular reference to the above-mentioned GCOS steering committee report to the SBSTA at its eighteenth session, as a further step towards the development by the GCOS secretariat of an implementation plan for integrated global observations for climate, and requested the secretariat to compile these submissions. The SBSTA also requested the GCOS secretariat to prepare a synthesis of these submissions and to forward this synthesis to the secretariat for consideration by the SBSTA at its nineteenth session;

(ii) The SBSTA agreed to consider, at its nineteenth session, a draft decision,¹ with the aim of forwarding it for adoption by the COP at its ninth session;

(iii) The SBSTA recalled its conclusions at its seventeenth session (FCCC/SBSTA/2002/13, para. 45 (g) (iii)) to invite views from the scientific community on activities relating to the research priorities identified in documents FCCC/SBSTA/2002/INF.17 and FCCC/SBSTA/2002/MISC.15 and Add.1. It requested the secretariat to contact relevant organizations and invite them to provide the requested information to the SBSTA at its nineteenth session.²

SBSTA 19, 2003

(FCCC/SBSTA/2003/15)

40. At its 5th meeting, on 9 December, having considered a proposal by the Chair, the SBSTA adopted the following conclusions:³

(a) The SBSTA took note of document FCCC/SBSTA/2003/MISC.10 and Add.1, containing submissions from Parties on priorities for actions arising from *The Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC* (second adequacy report)⁴ and the related GCOS steering committee report¹ to the SBSTA at its eighteenth session;

¹ Adopted as FCCC/SBSTA/2003/L.4/Add.1 as amended orally at the 5th meeting. For final text see FCCC/SBSTA/2003/10/Add.1.

² During the closing plenary, upon a request by the Chair, this paragraph, which was forwarded by the contact group under agenda item 3, was included in the conclusions of this item.

³ Adopted as FCCC/SBSTA/2003/L.17.

⁴ Available as report no. GCOS-82 at <http://www.wmo.ch/web/gcos/gcoshome.html>

(b) The SBSTA also took note of the synthesis of the above-mentioned submissions prepared by the GCOS secretariat and contained in document FCCC/SBSTA/2003/MISC.12;

(c) The SBSTA requested the secretariat to organize, at the twentieth session of the SBSTA, a side event, similar to that held at the seventeenth session of the SBSTA, on ongoing and planned research initiatives to address the research recommendations of the Third Assessment Report (TAR) of the IPCC. It requested the secretariat to invite active participation of representatives of the IPCC and international research programmes and bodies, such as the World Climate Research Programme (WCRP), the International Geosphere–Biosphere Programme (IGBP) and the International Human Dimensions Programme (IHDP);

(d) Recalling the conclusions of its seventeenth session, the SBSTA invited the Subsidiary Body for Implementation (SBI), in considering funding options, including its guidance to the financial mechanism of the Convention, to give appropriate consideration to addressing the priority needs identified in the regional action plans in relation to global observing systems for climate;

(e) The SBSTA recommended a draft decision on this subject (FCCC/SBSTA/2003/L.17/Add.1) for adoption by the COP at its ninth session.²

SBSTA 20, 2004

(FCCC/SBSTA/2004/6)

96. The SBSTA recognized with appreciation the progress made by the Global Climate Observing System (GCOS) secretariat, under the guidance of the GCOS steering committee, in the development of the 5- to 10-year implementation plan for the integrated global observing systems for climate,³ in particular the publication of the draft implementation plan for open review.⁴ It urged the GCOS secretariat, in finalizing this plan, to clearly identify priorities for actions, taking into account the views expressed by Parties and relevant international programmes and bodies.

97. The SBSTA noted the progress made by the ad hoc Group on Earth Observations (GEO) to develop a 10-year implementation plan for a global Earth observation system of systems (GEOSS). It welcomed the collaboration between GCOS and GEO in developing their respective implementation plans and urged both bodies to integrate them to the extent possible. The SBSTA emphasized the need to treat global climate monitoring as a priority within GEOSS.

98. The SBSTA welcomed the progress made in the regional workshop programme run by the GCOS secretariat. It encouraged Parties to continue to pursue the implementation of elements of the regional action plans developed under this programme.

99. The SBSTA invited the GCOS secretariat to report on progress made in implementing the regional action plans in relation to global observing systems for climate, including support from the financial mechanism of the Convention and other bilateral and multilateral agencies and mechanisms, for consideration by the SBSTA at its twenty-first session and subsequent sessions as appropriate.

100. The SBSTA noted the ongoing development of the GCOS Cooperation Mechanism to address priority needs for improvements in global observing systems for climate in developing countries, in particular the plans to develop an inventory of donor activities relating to global observing systems for climate.

101. The SBSTA noted the preliminary report on data exchange problems provided by the GCOS secretariat.⁵ Reinforcing its conclusions at its eighteenth session, the SBSTA invited

¹ *Report to SBSTA-18 from the GCOS Steering Committee regarding the Second Report on the Adequacy of the Global Observing Systems for Climate*, available at <http://www.wmo.ch/web/gcos/gcoshome.html>

² For the text as adopted, see document FCCC/CP/2003/6/Add.1, decision 11/CP.9.

³ See decision 11/CP.9.

⁴ The draft *Implementation Plan for the Global Observing Systems for Climate* is available from the web site of the GCOS secretariat at <http://www.wmo.ch/web/gcos/gcoshome.html>.

⁵ The preliminary summary report *Analysis of Data Exchange Problems in Global Atmospheric and*

the GCOS secretariat, in consultation with the World Meteorological Organization (WMO), to provide the full report on this issue for consideration by the SBSTA at its twenty-second session. The SBSTA particularly encouraged the inclusion of options to remedy existing data exchange problems and advice on problems associated with the accessibility of data by and from global data centres.

102. The SBSTA welcomed the exchange of views among representatives of government research programmes and international programmes and bodies during the event requested by the SBSTA,¹ and held at the twentieth session of the SBSTA, on research in response to the recommendations of the Third Assessment Report of the IPCC. The following were noted as requiring further consideration:

- (a) The need to assess the adequacy of research activities and their international coordination to meet the needs of the Convention
- (b) The importance of social as well as natural sciences, and the interaction between the two, in responding to the research needs arising from the assessment reports of the IPCC
- (c) The enhancement of the capacity of developing countries to contribute to and participate in global climate change research efforts, such as those coordinated by the World Climate Research Programme (WCRP), the International Geosphere–Biosphere Programme (IGBP), the International Human Dimensions Programme (IHDP) and DIVERSITAS.

103. The SBSTA requested Parties to submit to the secretariat, by 15 September 2004, their views on how to adequately address the main issues arising from the event requested by the SBSTA,² in particular those mentioned in paragraph 102 above, for consideration by the SBSTA at its twenty-first session. The SBSTA requested Parties to submit to the secretariat additional views on this subject by 24 January 2005 for consideration by the SBSTA at its twenty-second session. It requested the secretariat to compile both sets of submissions into miscellaneous documents and to prepare a synthesis of all the views of Parties for consideration by the SBSTA at its twenty-second session.

SBSTA 21, 2004

(FCCC/SBSTA/2004/13)

100. The SBSTA took note of document FCCC/SBSTA/2004/MISC.14 containing views from Parties on issues from the research event at the twentieth session of the SBSTA. The SBSTA agreed to consider in depth at its twenty-second session (May 2005) the issues relating to the research needs of the Convention.

101. The SBSTA welcomed document FCCC/SBSTA/2004/MISC.16 containing the executive summary of the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (hereinafter referred to as the implementation plan) prepared by the Global Climate Observing System (GCOS) secretariat under the guidance of the GCOS steering committee.³ According to this plan, priority for climate should be given to the following actions:

- (a) Improving in situ and key satellite observation networks
- (b) Generating integrated global climate products for atmospheric, oceanic and terrestrial domains
- (c) Enhancing the participation of the least developed countries and small island developing States
- (d) Improving access by all Parties to global climate data for essential climate variables and climate products

Hydrological Networks is available from the web site of the GCOS secretariat at <<http://www.wmo.ch/web/gcos/gcoshome.html>>.

¹ See document FCCC/SBSTA/2003/15, paragraph 40 (c).

² See document FCCC/SBSTA/2003/15, paragraph 40 (c).

³ Available as report no. GCOS-92 at: <<http://www.wmo.ch/web/gcos/gcoshome.html>>.

(e) Strengthening national, regional and international infrastructure relating to global observing systems for climate.

102. The SBSTA stressed that effective implementation of this plan, including the full consideration of the needs of developing countries to enhance their capacity to effectively use observation data and climate products, can provide relevant information on climate variability and climate change that would contribute to developing adaptation and mitigation responses. It emphasized that coordinated and concentrated efforts by governments and relevant international organizations are required to fully implement this plan.

103. The SBSTA invited the GCOS secretariat, in conjunction with the GCOS sponsoring agencies,¹ to report to the SBSTA at its twenty-third session (November 2005) and, as required, at subsequent sessions, on how the actions identified in the implementation plan have been incorporated in the agencies' own plans and actions. It also invited the GCOS secretariat to prepare a synthesis report on this matter by the twenty-fourth session of the SBSTA (May 2006).

104. The SBSTA encouraged Parties to incorporate actions supporting the implementation of the implementation plan in their national plans and actions relating to global climate observing systems.

105. The SBSTA invited all Parties to report on their activities as specified in paragraph 104 above, including those in relation to the priorities referred to in paragraph 101 above, in their detailed reports on systematic observation, in accordance with the guidelines contained in document FCCC/CP/1999/7, and pursuant to decision 5/CP.5. It also encouraged Parties to provide additional information in accordance with the supplementary reporting format.²

106. The SBSTA welcomed the emphasis given by the implementation plan to enhancing the participation of developing countries in the global observing systems for climate. It noted that this is consistent with actions identified in decision 5/CP.7 in relation to the adverse effects of climate change.

107. The SBSTA welcomed the progress made in the programme of the GCOS regional workshops. It encouraged Parties to continue to pursue the implementation of priority elements of the regional action plans developed under this programme, taking into account priorities identified in the implementation plan, and referred to in decision 4/CP.9.

108. The SBSTA welcomed the progress made by the ad hoc Group on Earth Observations (GEO) to develop a 10-year implementation plan for a Global Earth Observation System of Systems (GEOSS); it appreciated the collaboration and encouraged the continuation of the essential coordination between GCOS and GEO. It noted that governments and international organizations involved in GEO have recognized the need to give coordinated attention to the needs and capacity of developing countries to access earth observation data and products. The SBSTA invited GEO, in cooperation with the GCOS secretariat, to incorporate the relevant actions in the implementation plan into the GEOSS 10-year implementation plan. The SBSTA noted that participation in GEO is open to all Parties.

109. The SBSTA decided to forward a draft decision on the implementation of the global observing system for climate (FCCC/SBSTA/2004/L.24/Add.1) for adoption by the COP at its tenth session.³

SBSTA 22, 2005

(FCCC/SBSTA/2005/4)

74. The SBSTA took note of documents FCCC/SBSTA/2004/MISC.14 and FCCC/SBSTA/2005/MISC.1 containing views on issues from the research event at the

¹ The World Meteorological Organization, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, UNEP and the International Council for Science.

² The supplementary reporting format can be found at: <<http://www.wmo.ch/web/gcos/Supp-Guidance-2000.pdf>>.

³ For the text as adopted, see document FCCC/CP/2004/10/Add.1, decision 5/CP.10.

twentieth session of the SBSTA, and document FCCC/SBSTA/2005/3 containing a synthesis of these views.

75. The SBSTA welcomed efforts of the national, regional and international global change research programmes to further promote and coordinate research in response to the needs of the Convention, and invited them to provide periodic updates on their scientific activities. In this respect, the SBSTA also welcomed the establishment of the Earth System Science Partnership by the International Geosphere–Biosphere Programme, the International Human Dimensions Programme on Global Environmental Change, the World Climate Research Programme and DIVERSITAS, and the efforts of these programmes and of regional institutions and networks including, but not limited to, the Asia–Pacific Network for Global Change Research and the Inter American Institute for Global Change Research.

76. The SBSTA also welcomed the endorsement of the 10-year Implementation Plan at the third Earth Observation Summit in February 2005 which established the Global Earth Observation System of Systems as an important development in systematic observation to contribute to the enhancement of climate change research, as well as the continuing contribution of the Global Climate Observing System (GCOS) to this process.

77. The SBSTA invited Parties to submit to the secretariat, by 15 January 2006, information on identified research needs and priorities relating to the Convention, including information relating to the enhancement of the capacity of developing countries to contribute to and participate in climate change research.

78. The SBSTA requested the secretariat to prepare a synthesis report of the research needs and priorities relating to the Convention, identified in documents FCCC/SBSTA/2002/INF.17 and FCCC/SBSTA/2005/3, in submissions by Parties referred to in paragraph 77 above, in national communications, and in the Third Assessment Report of the IPCC and to make this synthesis report available to Parties and to relevant regional and international climate change research programmes before the twenty-fourth session of the SBSTA (May 2006).

79. The SBSTA agreed to consider the synthesis report referred to in paragraph 78 above at its twenty-fourth session.

80. The SBSTA requested the secretariat to organize a special side event during its twenty-fourth session with the objective of enhancing communication between climate change research organizations and the SBSTA. It requested the secretariat to invite Parties and relevant climate change research programmes and institutions to the special side event to inform participants on their activities relating to addressing the research needs of the Convention, including activities to enhance the participation of developing countries in climate change research.

81. The SBSTA stressed the need to continue to work towards enhancing the research capacity of developing countries and hence their contribution to national, regional and international climate change research efforts. The SBSTA welcomed activities by governments, including those undertaken on a bilateral basis, and by organizations, aimed at enhancing the contributions by experts from developing countries to international climate change research, and called for furthering such efforts.

82. The SBSTA noted that improved scientific understanding of climate change can inform the development of technologies for mitigation and adaptation being addressed by the SBSTA as part of its consideration of matters relating to technology development and transfer and elsewhere under the Convention.

83. The SBSTA decided to recommend a draft decision¹ on research needs relating to the Convention for adoption by the COP at its eleventh session (December 2005).

87. The SBSTA expressed its gratitude to the IPCC and to the TEAP of the Montreal Protocol for the completion of the IPCC/TEAP special report.² The SBSTA noted with appreciation the high quality of this report.

88. The SBSTA noted that the IPCC/TEAP special report:

¹ FCCC/SBSTA/2005/L.6/Add.1. For the final text see FCCC/SBSTA/2005/4/Add.1, pages 32–33.

² This report was prepared in response to an invitation in decision 12/CP.8.

(a) Provides a comprehensive and balanced assessment of the effects of ozone-depleting substances and their hydrofluorocarbon/perfluorocarbon substitutes on the global climate system and the ozone layer;

(b) Provides useful information regarding halocarbons, ozone depletion and climate change; the production, banks and emissions of ozone-depleting substances and their substitutes; and the reduction of GHG emissions through a variety of options, including improved containment of substances, reduced charge of substances in equipment, end-of-life recovery and recycling or destruction of substances, increased use of alternative substances with a reduced or negligible global warming potential, and not-in-kind technologies.

89. The SBSTA encouraged Parties to use the information contained in the IPCC/TEAP special report when developing and implementing national climate change strategies.

90. The SBSTA recalled decision 12/CP.8, which encouraged Parties to work towards continuing research and development of technologies that safeguard the ozone layer while at the same time contributing to the objectives of the Montreal Protocol and the Convention. The SBSTA noted the continuing need for research, measurement and systematic observation relevant to the ozone layer, the global climate system and potential interrelations.

91. The SBSTA welcomes information, as appropriate, by its twenty-fourth session (May 2006), from the secretariat for the Vienna Convention for the Protection of the Ozone Layer and for its Montreal Protocol, on any consideration of the IPCC/TEAP special report by the Meeting of the Parties to the Montreal Protocol.

92. The SBSTA invited Parties to submit to the secretariat, by 13 February 2006, their views on aspects of the IPCC/TEAP special report relevant to the objective of the Convention. It requested the secretariat to compile these views into a miscellaneous document for consideration at its twenty-fourth session with a view to finalizing the consideration of this agenda item.

93. The SBSTA welcomed the report on progress made towards implementing the initial ocean climate observing system, prepared by the secretariat of the Global Ocean Observing System of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, in cooperation with the GCOS, and presented in document FCCC/SBSTA/2005/MISC.5.

94. The SBSTA also welcomed the final report on the analysis of data exchange issues in global atmospheric and hydrological networks¹ provided by the GCOS secretariat in consultation with the World Meteorological Organization.

95. The SBSTA agreed to consider the reports referred to in paragraphs 100 and 101 above in the context of its consideration of the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* at its twenty-third session (December 2005). It invited Parties to submit to the secretariat, by 15 September 2005, their views on these reports, and requested the secretariat to compile these submissions into a miscellaneous document.

SBSTA 23, 2005

(FCCC/SBSTA/2005/10)

87. The SBSTA took note of the submissions from Parties on the report on progress made towards implementing the initial ocean climate observing system, and on the final report on the analysis of data exchange issues in global atmospheric and hydrological networks, contained in document FCCC/SBSTA/2005/MISC.15 and Add.1.

88. The SBSTA welcomed with appreciation the report from the Global Climate Observing System (GCOS) secretariat on progress with the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (hereinafter referred to as the GCOS implementation plan) contained in document FCCC/SBSTA/2005/MISC.14; the report from the Committee on Earth Observation Satellites (CEOS) on preparing a coordinated response

¹ Available as document WMO/DT 1255 GCOS96 at <<http://www.wmo.int/web/gcos/gcoshome.html>>.

from space agencies involved in global observations to the needs expressed in the GCOS implementation plan, contained in document FCCC/SBSTA/2005/MISC.17/Rev.1; and a progress report on developing a framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate, prepared by the Global Terrestrial Observing System (GTOS) secretariat and contained in document FCCC/SBSTA/2005/MISC.16.

89. The SBSTA noted that there is now an excellent foundation upon which to improve the global observing systems for climate. It urged Parties to further implement the GCOS implementation plan, including the capacity-building elements.

90. The SBSTA urged those Parties that have not already done so to designate GCOS national coordinators and GCOS national focal points.

91. The SBSTA welcomed the information in document FCCC/SBSTA/2005/MISC.14, that almost all of the international agencies identified in the GCOS implementation plan have formally or informally acknowledged their roles in the GCOS implementation plan and are actively engaged in developing and/or refining their specific work plans. This commitment to action represents a substantial degree of international consensus and support for the GCOS implementation plan.

92. The SBSTA welcomed and accepted the offer from the CEOS, on behalf of the Parties supporting space agencies involved in global observations, to provide a detailed report on a coordinated response to the needs expressed in the GCOS implementation plan at SBSTA 25 (November 2006).

93. The SBSTA welcomed the efforts by the GTOS secretariat to develop a framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate and encouraged the GTOS to continue its work. It also called on the GTOS secretariat to assess the status of the development of standards for each of the essential climate variables in the terrestrial domain. The SBSTA invited the GTOS secretariat to report on its progress by SBSTA 26 (May 2007).

94. The SBSTA requested the GCOS secretariat to provide a comprehensive report at its thirtieth session (June 2009) on progress with the GCOS implementation plan, in addition to the regular reporting requested by the COP in decision 5/CP.10.

95. The SBSTA noted that the report referred to in paragraph 94 would be heavily dependent upon obtaining timely information on national implementation activities. Therefore, the SBSTA invited Parties to submit to the secretariat, by 15 September 2008, additional information on their national activities with respect to implementing the plan.

96. The SBSTA welcomed the ongoing efforts of the Group on Earth Observations (GEO) and invited the GCOS and the GEO to continue to coordinate closely on the implementation of the GCOS implementation plan and the Global Earth Observation System of Systems (GEOSS) 10-year implementation plan. The SBSTA encouraged Parties included in Annex I to the Convention (Annex I Parties) to facilitate the participation of developing country Parties in implementation activities wherever possible.

97. The SBSTA agreed to revise the “UNFCCC reporting guidelines on global climate change observing systems”¹ in order to reflect priorities of the GCOS implementation plan and incorporate the reporting on essential climate variables. Parties also noted the need to revise the more comprehensive supplementary reporting format.² The SBSTA agreed to consider this issue at its twenty-fifth session. It invited the GCOS secretariat to submit to the SBSTA, by September 2006, a proposal on ways and means to address these needs.

98. The SBSTA noted the importance of the oceanic observations in contributing to meeting the needs of the Convention. The SBSTA requested Parties in a position to do so to address the need for continued, sustained and enhanced support for the implementation of the global ocean observing system for climate. It noted in particular the need for sustained support

¹ FCCC/CP/1999/7, chapter III.

² FCCC/SBSTA/2000/14, paragraph 59. The supplementary reporting format can be found at <<http://www.wmo.ch/web/gcos/Supp-Guidance-2000.pdf>>.

to operationalize the system and need for the collection and archiving of marine data and metadata.

99. The SBSTA reiterated that data exchange is fundamental to the needs of the Convention. It noted with concern that many of the problems of data exchange, as referred to in the final report on the analysis of data exchange issues in global atmospheric and hydrological networks,¹ still remain. The SBSTA urged Parties to implement the possible remedy options identified in that report.

100. The SBSTA urged Parties and invited relevant intergovernmental organizations and international bodies, such as the World Meteorological Organization and the International Council for Science, to provide active support to international data centres in their efforts to obtain permission from countries for the release of the data and the rescue of historical climate records.

101. The SBSTA noted that the regional workshop programme will be completed in early 2006. It invited the GCOS secretariat, in cooperation with the Regional Workshop Advisory Committee, to report on the results of the programme at its twenty-fifth session.

102. The SBSTA reiterated the need to strengthen capacities in the field of climate observations, data analysis and data management. The SBSTA also reiterated the importance of, and continued need for, capacity-building, including through the GEO, the GCOS cooperation mechanism, and regional activities, to enable developing countries to apply climate observations, inter alia, for impact assessment and preparation for adaptation.

SBSTA 24, 2006

(FCCC/SBSTA/2006/5)

38. The SBSTA took note of document FCCC/SBSTA/2006/MISC.3 and Add.1 containing views from Parties on identified research needs and priorities relating to the Convention, including information relating to the enhancement of the capacity of developing countries to contribute to and participate in climate change research. It also took note of document FCCC/SBSTA/2006/INF.2 containing a synthesis on research needs and priorities relating to the Convention identified in the above-mentioned document, in documents FCCC/SBSTA/2002/INF.17 and FCCC/SBSTA/2005/3, in national communications, and in the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

39. The SBSTA expressed its appreciation to the regional and international climate change research programmes for the information provided during the special side event on research needs relating to the Convention held during its twenty-fourth session.

40. The SBSTA noted the information provided² by these programmes on their current activities to address the research needs of the Convention, including ongoing efforts to enhance the capacity and participation of developing countries in climate change research.

41. In this regard, and as reflected in decision 9/CP.11, the SBSTA invited these programmes to provide, together or separately, to the SBSTA, before its twenty-fifth session (November 2006), a short summary report or reports drawing on the above-mentioned special side event, including identification of any gaps in their research programmes with respect to the research needs of the Convention, as viewed by Parties, for example in document FCCC/SBSTA/2006/INF.2, and considering options for addressing these needs.

42. Recognizing the important role that regional networks can play, and are playing, in the Americas and the Asia-Pacific in strengthening engagement of developing countries in climate change research, the SBSTA noted with appreciation the ongoing efforts to establish a regional

¹ Available as document GCOS-96 (WMO/TD No.1255) at <http://www.wmo.int/web/gcos/gcoshome.html>.

² The presentations provided by the regional and international research programmes can be found on the UNFCCC website at: http://unfccc.int/methods_and_science/research_and_systematic_observation/items/3461.php.

climate change research network for Africa, and encouraged Parties to support and further develop these regional networks.

43. The SBSTA recognized the importance of improving the quality, availability and exchange of data from systematic observation and their integration into data sets appropriate for research activities. The SBSTA recalled the need for all Parties to continue supporting and strengthening systematic observation.

44. The SBSTA noted the continued need to improve communication of scientific information on climate change to policymakers and the general public.

45. The SBSTA also noted the need for enhancing two-way communication and cooperation between the Parties and regional and international research programmes to meet the research needs of the Convention.

46. The SBSTA agreed to explore how it might facilitate a more effective dialogue between Parties and the regional and international climate change research programmes, in the context of decision 9/CP.11. The SBSTA invited Parties and these programmes to submit to the secretariat, by 23 February 2007, their views on this subject, for consideration by the SBSTA at its twenty-sixth session (May 2007). To further facilitate the development of the dialogue, the SBSTA asked the secretariat to organize a meeting for an informal discussion among Parties at the twenty-sixth session of the SBSTA and to invite the representatives of these programmes and the IPCC to participate. The SBSTA noted that consideration should be given, inter alia, to holding a workshop by or during the twenty-eighth session of the SBSTA (June 2008) to facilitate an in-depth exchange of views on the research needs of the Convention.

SBSTA 25, 2006

(FCCC/SBSTA/2006/11)

95. The SBSTA expressed its appreciation to the GCOS secretariat for preparing a proposal for the possible revision of the “UNFCCC reporting guidelines on global climate change observing systems” (FCCC/SBSTA/2006/MISC.12) to reflect priorities of the GCOS implementation plan.¹ The SBSTA noted the usefulness of this proposal and its extensive review by scientific and government experts, and agreed to consider the revised guidelines² at its twenty-seventh session, for adoption by the COP at its thirteenth session.

96. The SBSTA noted with appreciation the report on the results of the regional workshop programme submitted by the GCOS secretariat (FCCC/SBSTA/2006/MISC.13). It welcomed the considerable achievement that finalization of the regional action plans produced under this programme constitutes, and the excellent basis they provide for further action at the regional level. The SBSTA encouraged Parties and relevant organizations to make use of the results of the regional workshop programme, and to continue to advance the implementation of the actions outlined in the regional action plans. It urged Parties and relevant organizations in a position to do so to continue to mobilize resources to address priorities identified in those plans.

97. The SBSTA re-emphasized the importance of in-situ observation networks and activities that deliver sustained observation infrastructure and encouraged collaboration with, inter alia, national meteorological and hydrological services, including for the implementation of the regional action plans referred to in paragraph 96 above.

98. The SBSTA took note of the information provided by the GCOS secretariat on the follow-up African implementation strategy meeting organized by the GCOS secretariat in April 2006 in Addis Ababa, Ethiopia. It recognized that this meeting has resulted in the creation of an integrated, multipartner programme (Climate for Development in Africa) addressing climate observation, climate risk management and climate policy needs in Africa.³ It encouraged

¹ <[http://www.wmo.ch/web/gcos/Implementation_Plan_\(GCOS\).pdf](http://www.wmo.ch/web/gcos/Implementation_Plan_(GCOS).pdf)>.

² As contained in FCCC/SBSTA/2006/MISC.12 or in any updated version of this document, as appropriate, based on further comments provided to the GCOS secretariat by scientific and government experts.

³ <http://www.wmo.ch/web/gcos/scXIV/26_Addis_Ababa_Report.pdf>.

Parties in a position to do so to contribute to the implementation of this programme and urged that similar activities and research, as appropriate, be extended in a timely manner to other regions where activity has been slow to begin.

99. The SBSTA welcomed the report submitted by the United States of America on behalf of CEOS (FCCC/SBSTA/2006/MISC.14), which describes the coordinated response by space agencies involved in global observations to the needs expressed in the GCOS implementation plan. The SBSTA invited the Parties that support space agencies to enable these agencies to implement, to the extent possible, the actions identified in the CEOS report and to continue responding in a coordinated manner through CEOS to the efforts to meet these needs. The SBSTA encouraged the GCOS and CEOS to continue their partnership for linking space-based capabilities with global climate observing requirements and encouraged Parties to improve access to space-based climate observations to all interested Parties.

100. The SBSTA reiterated the increasing importance of further integration and coordination of earth observations in order, inter alia, to allow for integrated global analysis products for monitoring climate change, and to provide the input to, and validation of, climate models that would enable improved climate change projections. These elements will advance the scientific basis for Parties to respond to climate change, including through adaptation.

101. The SBSTA encouraged Parties to further promote their national activities related to GCOS and the Global Earth Observation System of Systems, and to note the close relationship among those activities.

SBSTA 26, 2007

(FCCC/SBSTA/2007/4)

42. The SBSTA took note of the views from Parties on how the SBSTA might facilitate a more effective dialogue between Parties and regional and international climate change research programmes in the context of decision 9/CP.11 (FCCC/SBSTA/2007/MISC.7). It expressed its appreciation to the regional and international climate change research programmes and organizations for their views on this subject (FCCC/SBSTA/2007/MISC.8) and for the summary reports provided in response to the invitation of the SBSTA (FCCC/SBSTA/2006/5, para. 41), drawing on the special side event on research needs relating to the Convention that was held during the twenty-fourth session of the SBSTA (FCCC/SBSTA/2006/MISC.15) and on the synthesis report on research needs and priorities, which includes views by Parties on this matter (FCCC/SBSTA/2006/INF.2).

43. The SBSTA welcomed the exchange of views among Parties, the representatives of regional and international climate change research programmes and organizations¹ and the IPCC during the informal meeting held on 8 May 2007 in Bonn, Germany, on how the SBSTA might facilitate a more effective dialogue between Parties and regional and international climate change research programmes and organizations (hereinafter referred to as research programmes and organizations) in the context of decision 9/CP.11. The SBSTA re-emphasized that the IPCC remains the primary provider of scientific, technical and socio-economic information to the Convention through its full range of reports.

44. The SBSTA agreed to develop and maintain the dialogue between Parties and research programmes and organizations, in the context of decision 9/CP.11. The SBSTA would welcome the continued participation by the Earth System Science Partnership and its member programmes, and by regional climate change research programmes and organizations in this dialogue.

45. The SBSTA further agreed that its role in this context should be facilitative and not prescriptive. In this regard, the SBSTA acknowledged the independence of research programmes and organizations in setting their research priorities. It also agreed that various

¹ Earth System Science Partnership, World Climate Research Programme, International Geosphere–Biosphere Programme, International Human Dimensions Programme on Global Environmental Change, START (Global Change System for Analysis, Research and Training), Inter-American Institute for Global Change Research and Asia–Pacific Network for Global Change Research.

approaches, within and outside the UNFCCC process (e.g. informal events, workshops, side events), could be used to ensure the effectiveness and flexibility of this dialogue.

46. The SBSTA noted the importance of this dialogue also to identify research gaps and research capacity constraints in developing countries and to consider possible opportunities to address these gaps and capacity constraints in order to enable developing countries to play a more active role in regional and international climate change research.

47. The SBSTA invited relevant research programmes and organizations to regularly inform the SBSTA of developments in research activities relevant to the needs of the Convention, including:

- (a) Emerging scientific findings;
- (b) Research planning activities, including those undertaken in response to key uncertainties and research needs identified by the IPCC or raised by Parties;
- (c) Research priorities, and gaps in the implementation of these priorities;
- (d) Research capacity-building activities, particularly in developing countries;
- (e) Regional climate change research networks;
- (f) Relevant communication issues.

The SBSTA requested the secretariat to invite these research programmes and organizations to consider these issues in an informal discussion at the twenty-eighth session of the SBSTA (June 2008).

48. The SBSTA again urged Parties to further strengthen the activities of research programmes and organizations, and encouraged Parties to consider the research priorities as identified by research programmes and organizations in developing their national programmes.

49. The SBSTA noted the importance of research activities that contribute to the work of the Convention, including activities undertaken as part of the Nairobi work programme, such as the in-session workshop on climate modelling, scenarios and downscaling to be held at the twenty-eighth session of the SBSTA.

50. The SBSTA welcomed the oral statement delivered on behalf of the GTOS secretariat and the progress reports by the GTOS secretariat on the development of a framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate, and on the assessment of the status of development of standards for each of the essential climate variables in the terrestrial domain (FCCC/SBSTA/2007/MISC.6). The SBSTA agreed to consider these reports, as well as any updates received by the GTOS secretariat, at its twenty-seventh session when it considers issues relating to systematic observation.¹

SBSTA 27, 2007

(FCCC/SBSTA/2007/16)

33. The SBSTA noted with appreciation the oral statements by the Chair of the Steering Committee of the GCOS and the Director of the GTOS secretariat.

34. The SBSTA expressed its gratitude to the GCOS secretariat for its updated proposal² for the possible revision of the “UNFCCC reporting guidelines on global climate change observing systems”.

35. Having considered the GCOS proposal, the SBSTA decided to recommend a draft decision containing revised UNFCCC reporting guidelines on global climate change observing

¹ In line with the recommendations by the Subsidiary Body for Implementation at its twenty-fourth session (FCCC/SBI/2006/11, para. 109 (a)), the topics under the research and systematic observation item are differentiated and considered by the SBSTA on an alternating basis.

² FCCC/SBSTA/2007/MISC.26.

systems for adoption by the COP at its thirteenth session (for the text of the decision, see FCCC/SBSTA/2007/L.14/Add.1).¹

36. The SBSTA recalled its request² to the GCOS secretariat to provide, for consideration by the SBSTA at its thirtieth session, a comprehensive report on progress with the GCOS implementation plan. It also recalled its invitation to Parties³ to submit to the secretariat, by 15 September 2008, additional information on their national activities with respect to implementing the plan, and encouraged Parties to use the guidelines mentioned in paragraph 35 above when providing that information.

37. The SBSTA expressed concern that the regional action plans developed under the GCOS regional workshop programme remain largely unimplemented, and encouraged international organizations and development partners to provide further technical and financial support through existing bilateral and multilateral cooperation programmes in order to advance implementation of priority elements identified in the GCOS regional action plans.

38. The SBSTA encouraged the GCOS secretariat, when preparing the report mentioned in paragraph 36 above, to consider, as appropriate, information on progress in implementing the regional action plans.

39. The SBSTA welcomed the progress report on the assessment of the status of the development of standards for each of the essential climate variables in the terrestrial domain prepared by the GTOS secretariat in response to an invitation by the SBSTA at its twenty-third session.⁴ The SBSTA encouraged the GTOS secretariat and the sponsoring agencies of GTOS to finalize the assessment and invited the GTOS secretariat to report to the SBSTA on progress at its twenty-ninth session.

40. The SBSTA welcomed the efforts by the GTOS secretariat to develop a framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate, in response to decision 11/CP.9. The SBSTA welcomed the progress report by the GTOS secretariat on this matter and took note of the different options for such a framework presented therein.⁵ The SBSTA encouraged the GTOS secretariat and the sponsoring agencies of GTOS to continue developing the framework in the way they consider most appropriate, making use of existing institutional bodies and processes, where appropriate, and taking into account that such a framework should meet the following criteria:

- (a) Standards should be developed on a scientifically sound basis;
- (b) The framework should provide for the involvement of governments in the development of standards and guidance materials and in their implementation;
- (c) Access to those standards and guidance materials should be free and unrestricted;
- (d) The process for developing the standards and guidance materials and the operation of the framework should be cost-effective and sustainable and take into account existing standards and guidance materials;
- (e) The framework should be flexible in view of future needs and developments in this area.

41. The SBSTA commended the Committee on Earth Observation Satellites (CEOS) and the Parties supporting space agencies on the progress made in 2007 in implementing actions in response to the GCOS implementation plan, and looks forward to continued progress during 2008. The SBSTA invited the CEOS to provide an updated progress report by its twenty-ninth session. The SBSTA noted the continued close working relationship between GCOS and the CEOS for linking space-based capabilities with global climate observing requirements.

¹ For the text as adopted, see document FCCC/CP/2007/6/Add.1, decision 11/CP.13.

² FCCC/SBSTA/2005/10, paragraph 94

³ FCCC/SBSTA/2005/10, paragraph 95.

⁴ As mandated, the GTOS secretariat provided a progress report on this matter to the SBSTA at its twenty-sixth session (FCCC/SBSTA/2007/MISC.6). It provided an update to this report prior to the twenty-seventh session of the SBSTA (FCCC/SBSTA/2007/MISC.27).

⁵ See footnote 1

42. The SBSTA welcomed the Cape Town Declaration¹ adopted at the Group on Earth Observations Ministerial Summit, which recognizes the important contribution the Global Earth Observation System of Systems can make in response to the needs of the Convention and the growing need to further enhance such contributions. The SBSTA noted that such contributions will be made mainly through GCOS.

43. The SBSTA noted that systematic and continuous observations have significantly contributed to the key findings of the AR4 of the IPCC and play an integral and increasingly important role in monitoring and assessing impacts of, and in supporting adaptation to, climate change, as well as in contributing to the reduction of uncertainties. The SBSTA noted the importance of robust scientific information derived from the state-of-the-art observing technologies as well as conventional observations for supporting scientific assessment to inform action to address climate change.

44. The SBSTA was informed of the workshop organized by GCOS, the World Climate Research Programme and the International Geosphere–Biosphere Programme,² held in Sydney, Australia, in October 2007, which examined, among other issues, requirements for future systematic observations resulting from the findings of the IPCC AR4. The workshop reinforced the importance of sustaining the long-term operation of the climate observing systems which provide the essential climate variables set down in the GCOS implementation plan and highlighted the need for Parties to share their data freely. The SBSTA noted that such efforts are particularly urgent in developing countries; however, it was noted that a number of areas also need to be addressed in developed countries.

SBSTA 29, 2008

(FCCC/SBSTA/2008/13)

52. The SBSTA noted with appreciation the oral statement delivered by the Director of the GTOS secretariat and the statement delivered on behalf of the CEOS. The SBSTA also noted with appreciation a statement delivered by the Chair of the GCOS Steering Committee.

53. The SBSTA welcomed the report prepared by the GTOS secretariat on progress made in assessing the status of the development of standards for each of the essential climate variables in the terrestrial domain, which includes information on the framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate.³ The SBSTA also welcomed the updated report submitted by CEOS on progress made by space agencies involved in global observations in implementing actions in response to the GCOS implementation plan.⁴

54. The SBSTA agreed to defer consideration of these reports to its thirtieth session, when it will also consider the comprehensive report on progress with the GCOS implementation plan that the GCOS secretariat is expected to provide to the SBSTA at that session. The SBSTA recalled its invitation to Parties to provide additional information on their national activities with respect to implementing the GCOS implementation plan.⁵ It noted that 21 Parties have provided such information⁶ and encouraged those that have not yet done so to submit this information by 30 January 2009.

¹ Available at <<http://earthobservations.org/>>.

² Workshop titled “Future climate change research and observations: GCOS, WCRP and IGBP learning from the IPCC Fourth Assessment Report”.

³ FCCC/SBSTA/2008/MISC.12.

⁴ FCCC/SBSTA/2008/MISC.11.

⁵ See FCCC/SBSTA/2005/10, paragraphs 94 and 95, and FCCC/SBSTA/2007/16, paragraph 36.

⁶ Information received by Parties has been posted on the UNFCCC website at <http://unfccc.int/methods_and_science/research_and_systematic_observation/items/4499.php>.

SBSTA 30, 2009

(FCCC/SBSTA/2009/3)

47. The SBSTA expressed its appreciation to the regional and international climate change research programmes and organizations (hereinafter referred to as research programmes and organizations) and to the IPCC for the valuable updated information on developments in research activities and on emerging scientific findings relevant to the Convention. This information was provided during the meeting that took place during SBSTA 30 as part of the research dialogue in the context of decision 9/CP.11¹ and in the submissions compiled in document FCCC/SBSTA/2009/MISC.5. The SBSTA took note of a list prepared by the secretariat of international and regional programmes and organizations active in areas of research relevant to climate change.²

48. The SBSTA affirmed the valuable role of the research dialogue in providing new scientific information that emerges from climate change research in between publication of the IPCC Assessment Reports. It also noted the importance of such information for informing deliberations within the UNFCCC process. The SBSTA invited the research programmes and organizations to continue to provide, as part of the research dialogue, information on developments in the research activities outlined in document FCCC/SBSTA/2007/4, paragraph 47 (a–f). It requested the secretariat to make the presentations that are given as part of the dialogue available on the UNFCCC website in such a way that they can be reached by a wide audience.

49. The SBSTA agreed that meetings under this dialogue should be continued, during the thirty-second and subsequent sessions of the SBSTA, and organized in such a way that more time is devoted both to in-depth consideration by Parties of new scientific findings and developments in research activities and to presentations by Parties. The SBSTA requested the secretariat to make arrangements accordingly when organizing meetings under the dialogue.

50. The SBSTA invited Parties to provide to the secretariat, by 22 March 2010, their views on topics to be discussed at the dialogue meeting to take place during SBSTA 32, taking into account developments in research activities outlined in document FCCC/SBSTA/2007/4, paragraph 47 (a–f).

51. The SBSTA welcomed the information from the IPCC regarding its plans for the Fifth Assessment Report (AR5). It recalled its conclusions from its twenty-ninth session, which noted that Parties may provide information on scientific and technical questions that they wish to be considered in the AR5 process through their IPCC focal points.³

52. The SBSTA encouraged the research programmes and organizations to continue to undertake further studies to enhance the understanding of climate change and to address key uncertainties identified in the Fourth Assessment Report of the IPCC, and to enhance their efforts towards greater integration of climate-related research across all disciplines. It also encouraged the research programmes and organizations to further enhance their activities relating to developing countries.

53. The SBSTA encouraged Parties and research programmes and organizations to enhance their existing efforts to build capacity for research in developing countries, in particular those aimed at supporting adaptation efforts such as those identified as part of the ongoing activities of the Nairobi work programme.

¹ Alongside the IPCC, the following research programmes and organizations were represented at the meeting: the Earth System Science Partnership, the World Climate Research Programme, the International Geosphere-Biosphere Programme, the International Human Dimensions Programme on Global Environmental Change, DIVERSITAS, the International Alliance of Research Universities, START (Global Change System for Analysis, Research and Training), the Inter-American Institute for Global Change Research, the Asia-Pacific Network for Global Change Research and the Seventh Framework Programme of the European Community and associated countries. Further information and presentations are available at <<http://unfccc.int/3461.php>>.

² Available at <<http://unfccc.int/3461.php>>.

³ FCCC/SBSTA/2008/13, paragraph 85.

54. The SBSTA expressed its appreciation for the report on progress with the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (hereinafter referred to as the GCOS implementation plan) prepared by the secretariat of GCOS under the guidance of the GCOS Steering Committee, and for the synthesis report on national information on systematic observations for climate.¹ It noted the significant progress made in the implementation of the various observing systems relevant to the Convention, but also noted that limited progress has been made in filling gaps in in-situ observing systems in developing countries and that the funding available for many important systems is small in relation to what is needed. The SBSTA noted that according to the GCOS progress report, priority should be given over the next five years to the following:

- (a) The urgent need for funding support for implementation of the GCOS regional action plans developed during 2001–2006;
- (b) Immediate attention to the design and implementation of the national and local-scale networks needed for impact assessment and adaptation to climate change;
- (c) The appointment of GCOS national coordinators in many more than the present 14 countries that have well-established national coordination arrangements for climate observations;
- (d) Much stronger and higher-level commitment of Parties to the GCOS cooperation mechanism for supporting GCOS implementation in developing countries;
- (e) Finding new mechanisms for ensuring sustained long-term operation of essential in situ networks, especially for the oceanic and terrestrial domains, that are presently supported by project-timescale research funding;
- (f) Strong support for the further development and promulgation of observational standards for the full range of terrestrial climate variables;
- (g) Continued encouragement for the coordinated implementation and long-term continuity of the cross-cutting space-based component of GCOS;
- (h) Strong support for the observational and research-based “Global Framework for Climate Services” proposed for endorsement by World Climate Conference-3;
- (i) Reaffirmation of the value of detailed national reports on systematic observations under the UNFCCC as a mechanism for fostering, focusing and guiding GCOS implementation at the national level.

55. The SBSTA urged Parties and invited relevant United Nations agencies and international organizations to take steps to address the priorities and gaps identified in the GCOS progress report, in particular the implementation of the GCOS regional action plans, and ensuring a sustained long-term operation of in situ networks, especially for the oceanic and terrestrial domains.

56. The SBSTA stressed that addressing these priorities would help countries to adapt to climate change on a basis of sound data and information.

57. The SBSTA noted that an updated GCOS implementation plan that takes into account emerging priorities, such as the need for data for adaptation, may assist in continuing progress with GCOS implementation. It therefore invited the GCOS secretariat to prepare, under the guidance of the GCOS Steering Committee, an update of the GCOS implementation plan before its thirty-third session.

58. The SBSTA invited the GCOS secretariat to include, in this updated GCOS implementation plan, a breakdown of costs involved. The costs should be broken down by region, observing system and between developed and developing countries. The SBSTA invited the GCOS secretariat to provide a provisional updated implementation plan in conjunction with a provisional estimation of costs, before COP 15, and requested the secretariat to make this information available as a miscellaneous document.

59. The SBSTA welcomed the support given to the GCOS secretariat. The SBSTA noted the overall expected increase in workload for the GCOS secretariat that would emerge from

¹ FCCC/SBSTA/2009/MISC.7 and Add.1.

addressing the priorities and gaps identified in the GCOS progress report. It therefore invited all of the GCOS sponsoring agencies¹ to consider ways to provide adequate resources for supporting this work.

60. The SBSTA expressed its appreciation for the updated progress report by the secretariat of GTOS on progress made in assessing the status of the development of standards for each of the essential climate variables (ECVs) in the terrestrial domain and on the framework for the preparation of guidance materials, standards and reporting guidelines for terrestrial observing systems for climate² which was further developed following the guidance of the SBSTA at its twenty-seventh session.³

61. The SBSTA welcomed the proposal contained in the updated progress report for a joint terrestrial framework mechanism between relevant agencies of the United Nations and the International Organization for Standardization, and encouraged the GTOS secretariat and the GTOS sponsoring agencies to implement the framework. The SBSTA also invited the GTOS secretariat and the GTOS sponsoring agencies to elaborate a work plan for developing observational standards and protocols for the 13 terrestrial ECVs assessed. It invited the GTOS secretariat to report on the results of the implementation of the framework and its elaboration of the work plan at SBSTA 33.

62. The SBSTA expressed its appreciation for the updated report provided by CEOS, on behalf of Parties that support space agencies involved in global observations, to the SBSTA at its twenty-ninth session.⁴ It welcomed the progress made by those agencies in responding to the GCOS implementation plan and the support of CEOS to the space-based observations of GCOS. The SBSTA further welcomed the commitment by CEOS member agencies to work towards improved availability of current and future data for forest carbon monitoring, as expressed in a statement delivered by a representative of CEOS.

63. The SBSTA encouraged coordinated implementation of the cross-cutting space-based components of GCOS to continue over the long term, including the continued coordinated response to the needs identified in the GCOS implementation plan through CEOS. It also encouraged CEOS and the Parties that support space agencies involved in global observations to continue and if possible accelerate development of methodologies, and validation and inter-comparison of satellite-based applications for the terrestrial domain. The SBSTA invited CEOS to report at its thirty-third session on progress made in its efforts to meet the relevant needs of the Convention.

64. The SBSTA invited the participants of the forthcoming World Climate Conference-3, to be held in Geneva, Switzerland, from 31 August to 4 September 2009, to take note of the needs of the Convention, in particular with respect to research and systematic observation. It invited WMO to provide information on the outcome of the conference to inform the work under the Convention.

65. The SBSTA invited the AWG-LCA to note the importance of research and systematic observation in underpinning the implementation of the Convention. The SBSTA also invited the AWG-LCA to note that such research and systematic observation needs to be strengthened, particularly in developing countries. The SBSTA emphasized that any enhanced action on adaptation should take into account the need to strengthen adaptation-related research and systematic observation. The AWG-LCA is invited to take into account such needs in its deliberations.

66. The SBSTA agreed to recommend a draft decision on this matter for adoption by the COP at its fifteenth session.⁵

¹ WMO, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, the United Nations Environment Programme and the International Council for Science.

² FCCC/SBSTA/2009/MISC.8, which supersedes FCCC/SBSTA/2008/MISC.12.

³ FCCC/SBSTA/2007/16, paragraph 40.

⁴ FCCC/SBSTA/2008/MISC.11.

⁵ FCCC/SBSTA/2009/L.6/Add.1. For the final text see FCCC/SBSTA/2009/3/Add.1.

SBSTA 31, 2009

(FCCC/SBSTA/2009/8)

39. The SBSTA noted with appreciation the oral statements delivered by the Deputy Secretary-General of WMO, the Chair of the GCOS Steering Committee, and the statement delivered on behalf of CEOS.

40. The SBSTA welcomed the provisional updated *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*,¹ provided by the secretariat of GCOS in response to an invitation by the SBSTA at its thirtieth session.²

41. The SBSTA also welcomed the information on the outcome of World Climate Conference-3,³ held in Geneva, Switzerland, from 31 August to 4 September 2009, provided by WMO in response to an invitation by the SBSTA at the same session.⁴

42. The SBSTA decided to recommend draft conclusions on this matter for adoption by the COP at its fifteenth session.⁵

SBSTA 32, 2010

(FCCC/SBSTA/2010/6)

45. The SBSTA took note of the views submitted by Parties on topics for discussion at the research dialogue meeting convened during SBSTA 32⁶ and expressed its appreciation to Parties for providing, during that dialogue meeting, their views on research needs and priorities, in particular those related to reducing uncertainties and gaps in scientific knowledge relevant to the needs of the Convention.

46. The SBSTA welcomed the updated information on developments in research activities and emerging scientific findings relevant to the needs of the Convention provided by the regional and international climate change research programmes and organizations (hereinafter referred to as research programmes and organizations), as well as the information provided by the IPCC on its activities, in particular on the process leading to the IPCC Fifth Assessment Report (AR5) and its Synthesis Report.⁷

47. The SBSTA recalled the valuable role that the research dialogue is playing in informing deliberations within the UNFCCC process, and agreed that it should be continued at SBSTA 34 and beyond. It encouraged research programmes and organizations to continue to provide, for consideration under the research dialogue in the future, information on developments in research activities outlined in document FCCC/SBSTA/2007/4, paragraph 47 (a–f), taking into account views expressed by Parties, priorities emerging within the UNFCCC process and activities undertaken in support of the IPCC towards the preparation of the AR5.

48. The SBSTA noted the need to further enhance interaction between the science and policy communities by strengthening the research dialogue. Possible ways to enhance the effectiveness of the dialogue in the future may include:

¹ FCCC/SBSTA/2009/MISC.12.

² FCCC/SBSTA/2009/3, paragraphs 57 and 58.

³ <http://www.wmo.int/pages/gfcs/index_en.html>.

⁴ FCCC/SBSTA/2009/3, paragraph 64.

⁵ For the text as adopted, see document FCCC/CP/2009/11, chapter VII. G.

⁶ FCCC/SBSTA/2010/MISC.4.

⁷ This information was provided in submissions contained in document FCCC/SBSTA/2010/MISC.6, as well as in the presentations given during the research dialogue meeting. The IPCC and the following research programmes and organizations were represented at the meeting: the Earth System Science Partnership, the World Climate Research Programme, the International Geosphere–Biosphere Programme, the International Human Dimensions Programme on Global Environmental Change, START (Global Change System for Analysis, Research and Training), the Asia-Pacific Network for Global Change Research and the Seventh Framework Programme of the European Union and associated countries. Presentations and further information are available at <<http://unfccc.int/items/5609.php>>.

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- (a) Better identification and communication of research themes and topics of interest to policymakers;
 - (b) Greater opportunities for developing countries to present research results and related capacity-building activities;
 - (c) Further activities to share information;
 - (d) Identification of additional ways to communicate research outcomes and findings to Parties.

49. In this regard, the SBSTA requested the secretariat to:

- (a) Organize a workshop, in conjunction with its thirty-fourth session, subject to the availability of resources and under the guidance of the Chair of the SBSTA, to allow further in-depth consideration to be given to issues addressed in the research dialogue, and to prepare a report on the workshop to be made available for consideration by the SBSTA at its thirty-fourth session;
- (b) Consider ways to make available on its website information from the research programmes and organizations.

50. The SBSTA invited Parties to provide to the secretariat, by 20 September 2010, their views on the issues referred to in paragraphs 48 (a–d) and 49 (a) and (b) above, and requested the secretariat to make these available as a miscellaneous document by SBSTA 33. It further requested the secretariat to provide information to Parties prior to SBSTA 34 on the themes to be presented at the research dialogue meeting and at the workshop referred to in paragraph 49 (a) above.

51. The SBSTA invited research programmes and organizations to provide updated information on emerging scientific findings and research outcomes at SBSTA 33.

52. The SBSTA noted the challenges of communicating research results, including indication of level of confidence and uncertainty, effectively to end-users and to a wider audience, including the media and the public. In this regard, the SBSTA welcomed the progress made in the development of the Global Framework for Climate Services (GFCS) under WMO and its partner organizations. It invited WMO to report, under the research dialogue, on progress made in the development of the GFCS.

53. The SBSTA recognized the need to engage observation programmes in the research dialogue.

54. The SBSTA encouraged the enhancement of existing efforts by Parties and research programmes and organizations to build research capacity in developing countries, including by strengthening research at regional climate centres.

SBSTA 33, 2010

(FCCC/SBSTA/2010/13)

38. The SBSTA noted with appreciation the statements delivered by representatives of the GCOS, GTOS and GOOS, as well as the statement delivered by Brazil on behalf of CEOS.

39. The SBSTA welcomed the *Update of the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (hereinafter referred to as the 2010 updated GCOS implementation plan),¹ submitted by the secretariat of GCOS and prepared under the guidance of the GCOS Steering Committee.²

40. The SBSTA noted the sound assessment of requirements for climate-related observations that this plan provides and its enhanced focus on adaptation, in particular the

¹ A summary of this updated plan is contained in document FCCC/SBSTA/2010/MISC.9. The full report is available at <<http://unfccc.int/items/3462.php>>.

² See decision 9/CP.15 and the conclusions of the SBSTA at its thirtieth session (FCCC/SBSTA/2009/3, paras. 57 and 58).

identification of needs for improving land and coastal networks for observations relevant to vulnerability assessments and adaptation, with specific emphasis on developing countries.

41. The SBSTA urged Parties to work towards full implementation of the 2010 updated GCOS implementation plan and to consider, within the context of their national capabilities, what actions they can take at the national, regional and international levels to contribute to the implementation of the plan.

42. The SBSTA further encouraged Parties to increase consideration of GCOS-related implementation in relevant national and regional activities, such as those undertaken by regional centres and national meteorological and hydrological, terrestrial and oceanographic services and those undertaken in the context of adaptation. In this regard, the SBSTA encouraged Parties and relevant organizations to increase coordination of relevant activities and to build upon and enhance existing national and regional centres with the aim of facilitating implementation of the GCOS regional action plans and strengthening observation networks.

43. The SBSTA further noted the importance of historical observations as the basis for analysis and reanalysis and encouraged Parties and relevant organizations to increase their data rescue and digitization of historical observations and to establish and strengthen international coordination initiatives for these activities.

44. The SBSTA encouraged Parties, when providing information related to systematic observation in their detailed technical reports on systematic observations provided in conjunction with their national communications and in line with relevant reporting guidelines,¹ to take into consideration the new requirements identified in the 2010 updated GCOS implementation plan, in particular the new essential climate variables (ECVs). The SBSTA noted that any future revision of relevant UNFCCC reporting guidelines, in particular those on global climate change observing systems, should take into account the new elements identified in that plan.

45. The SBSTA invited the GCOS secretariat to report on progress made in the implementation of the 2010 updated GCOS implementation plan on a regular basis, at subsequent sessions of the SBSTA, as appropriate. In this regard it encouraged the GCOS to review, in broad consultation with relevant partners, the adequacy of observing systems for climate, such as by updating the *Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC*.² It noted the usefulness of updating the GCOS implementation plan on a regular basis, so as to take into consideration developments under the Convention and their related observational needs. The SBSTA agreed to consider, at its thirty-fifth session, issues related to the timing of GCOS contributions to the SBSTA.

46. The SBSTA noted the relevance of global climate observations for climate research, prediction and services. In this regard, the SBSTA recalled the outcome of World Climate Conference-3, inter alia the call for major strengthening of the GCOS and all its components and associated activities, as one of the essential elements of the Global Framework for Climate Services.

47. The SBSTA welcomed the report by the GTOS³ on the framework for climate-related terrestrial observations and the workplan on the development of standards and protocols for the terrestrial ECVs assessed. It encouraged the GTOS to continue coordinating the development of methodologies for climate-related terrestrial observations and to continue working with its sponsors⁴ and the International Organization for Standardization, and in broad consultation with relevant partners, towards implementation of that workplan, including through mobilization of the necessary resources.

¹ Decision 11/CP.13, which adopted the revised “UNFCCC reporting guidelines on global climate observing systems”.

² Available at <<http://www.wmo.int/pages/prog/gcos/index.php?name=Publications>>.

³ A summary of this report is contained in document FCCC/SBSTA/2010/MISC.10. The full report is available at <<http://unfccc.int/items/3462.php>>.

⁴ These are FAO, the International Council for Science, the United Nations Environment Programme, the United Nations Educational, Scientific and Cultural Organization and the World Meteorological Organization.

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48. The SBSTA encouraged Parties, in close cooperation with the GTOS, to support and facilitate the development of terrestrial standards and to improve their terrestrial networks.
49. The SBSTA also noted the increased usefulness of the terrestrial ECVs beyond observations of climate change, such as for biodiversity and desertification, and encouraged the GTOS to increase synergy with ongoing relevant initiatives.
50. The SBSTA invited the GTOS to report at the thirty-fifth session of the SBSTA on progress made on the matters referred to in paragraphs 47–49 above.
51. The SBSTA noted that the future workplan of GOOS includes emerging ECVs on ocean chemistry and ecosystems and noted the relevance of these variables in tracking the impacts of climate change and acidification on ocean ecosystems.
52. The SBSTA welcomed the coordinated response by the CEOS¹ to the relevant needs of the GCOS implementation plan and those of the Convention, and the progress and commitment by space agencies involved in climate observations to address the space-based component of the GCOS and improve climate monitoring capabilities from space on a sustained basis.
53. The SBSTA encouraged Parties that support space agencies involved in global observations to continue, through CEOS, cooperation with and support to the GCOS and to respond to the relevant needs identified in the 2010 updated GCOS implementation plan. It invited the CEOS to provide, by SBSTA 37, an updated report on progress made on major achievements in relevant areas.
54. The SBSTA emphasized the important role of high-quality climate observations in underpinning climate change research, modelling and strengthening the robustness of the scientific knowledge, including that of assessments by the Intergovernmental Panel on Climate Change (IPCC). It noted the critical importance of such information for supporting decision-making on climate change policies, including in the context of long-term cooperative action on climate change and the review of the adequacy of the long-term goal currently under consideration under the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA).
55. The SBSTA emphasized the urgent need to secure funding to meet the essential needs for global climate observations under the Convention on a long-term basis. In this regard the SBSTA noted the information related to additional funding requirements identified in the updated 2010 GCOS implementation plan.
56. The SBSTA further urged Parties in a position to do so, and invited relevant organizations, to provide the support needed to strengthen observation networks and capabilities in developing countries, especially the LDCs and SIDS.
57. The SBSTA invited the SBI to consider the funding needs referred to in paragraphs 55 and 56 above at its thirty-fourth session under relevant agenda items, as appropriate.
58. The SBSTA also invited the AWG-LCA to consider the funding needs referred to in paragraph 55 above in its deliberations with the aim that adequate financial resources are made available on a long-term basis in the future financial architecture.
59. The SBSTA noted with appreciation the updated information on emerging scientific findings and research outcomes provided by regional and international climate change research programmes and organizations.² It also took note of the views submitted by Parties on issues related to the research dialogue, including the workshop to be held in conjunction with SBSTA 34.³ It invited Parties to provide additional views on these matters by 31 January 2011, and requested the secretariat to make these available as a miscellaneous document prior to SBSTA 34.

¹ A summary of this report is contained in document FCCC/SBSTA/2010/MISC.11. The full report is available at <<http://unfccc.int/items/3462.php>>.

² FCCC/SBSTA/2010/MISC.15.

³ FCCC/SBSTA/2010/MISC.12.

SBI 34, 2011

(FCCC/SBI/2011/7)

59. The SBI noted the information related to additional funding needs identified in the 2010 updated Global Climate Observing System (GCOS) implementation plan and emphasized the importance of ensuring that these needs be taken into account in the future financial architecture of the Convention, recognizing that their funding is also being processed through multiple existing channels, including those under other specialized programmes, such as GCOS, and other conventions.

SBSTA 35, 2011

(FCCC/SBSTA/2011/5)

36. The SBSTA considered the views submitted by Parties on the research dialogue, including ongoing activities, associated modalities and possible ways to enhance the dialogue.¹

37. In the light of the progress made in the implementation of decision 9/CP.11, and the success of the activities undertaken under the SBSTA research dialogue on developments in research activities relevant to the needs of the Convention, including the related workshop held in conjunction with the thirty-fourth session of the SBSTA, the SBSTA agreed that the research dialogue should continue, on a regular basis, at SBSTA 36 and beyond.

38. The SBSTA encouraged Parties, in particular developing country Parties, and invited regional and international research programmes and organizations active in climate change research to utilize the research dialogue as a forum for:

(a) Discussing needs for climate change research and research-related capacity-building, particularly those of developing countries, to support the work of the Convention;

(b) Conveying research findings and lessons learned from activities undertaken by regional and international research programmes and organizations of relevance to the Convention.

39. The SBSTA invited Parties to submit, prior to a SBSTA session during which a research dialogue would be held, their views on specific themes to be addressed at the research dialogue meeting.² In this regard, the SBSTA invited Parties to submit, by 5 March 2012, their views for the upcoming research dialogue to be held in conjunction with the thirty-sixth session of the SBSTA.

40. The SBSTA invited relevant regional and international research programmes and organizations active in climate change research to provide, in the context of the research dialogue, submissions with information on developments in their research activities relevant to the Convention, including with respect to the long-term global goal referred to in decision 1/CP.16, paragraph 4, as appropriate.

41. The SBSTA recalled its conclusions at its thirty-fourth session, at which the SBSTA requested the secretariat, subject to the availability of resources, to continue to support the research dialogue, including organizing further workshops, as appropriate, in periodic consultation with the relevant research programmes and organizations and as agreed by the SBSTA. The objective of such workshops is to facilitate the in-depth consideration of issues considered under the research dialogue, with a view to providing information in support of the UNFCCC process.

42. The SBSTA requested the secretariat, taking into consideration information from relevant research programmes and organizations and the IPCC, to further enhance the availability and visibility of scientific information relevant to the Convention on the UNFCCC website, including through webcasts of the proceedings of any workshops under the research dialogue.

¹ FCCC/SBSTA/2011/MISC.8 and Add.1.

² In line with the timeline for submissions from Parties for inclusion into a miscellaneous document of that respective session.

43. The SBSTA invited Parties and regional and international research programmes and organizations active in climate change research, including marine research, to provide information on the technical and scientific aspects of emissions by sources, removals by sinks, and reservoirs of all greenhouse gases, including emissions and removals from coastal and marine ecosystems such as mangroves, tidal salt marshes, wetlands and seagrass meadows, with a view to identifying and quantifying the impact of human activities. This information would be considered as a theme for the next research dialogue, also taking into account the submissions received in accordance with paragraph 39 above. At its thirty-sixth session, the SBSTA may consider the need for a workshop to give in-depth consideration to the themes considered in the research dialogue. The SBSTA noted the views of Parties regarding the importance of other ecosystems with high-carbon reservoirs, in particular terrestrial ecosystems, for example steppe, tundra and peatlands.

44. The SBSTA took note of the information provided by the secretariat of the Global Terrestrial Observing System (GTOS)¹ and agreed to consider this information, in conjunction with any updates received from GTOS on this matter, as well as matters related to the Global Climate Observing System, at its thirty-sixth session when considering matters related to systematic observation, in line with the conclusions of the SBSTA at its thirty-fourth session.²

45. The SBSTA noted with appreciation the statement provided by WMO on the progress towards the implementation of the Global Framework for Climate Services (GFCS). The SBSTA recognized that the GFCS is an important initiative to underpin science-based adaptation and to support countries in meeting the challenges of climate variability and change.

46. The SBSTA invited WMO to provide, at the thirty-seventh session of the SBSTA, information on the outcome of the Extraordinary Session of the WMO Congress in October 2012 with respect to GFCS implementation. The SBSTA also invited WMO to provide information, when appropriate, on the progress in the implementation of the GFCS at future sessions in order to inform the work under the Convention.

47. The SBSTA welcomed the IPCC *Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, noting the importance of the underlying research and systematic observations enabling the production of that report.

48. The SBSTA took note of the estimated budgetary implications of implementing the provisions contained in these conclusions, as provided by the secretariat. The SBSTA requested that the actions of the secretariat called for in these conclusions be undertaken subject to the availability of financial resources.

49. The SBSTA decided to recommend a draft decision³ on the research dialogue for adoption by the COP at its seventeenth session (for the text of the decision, see FCCC/SBSTA/2011/L.27/Add.1).

SBI 35, 2011

(FCCC/SBI/2011/17)

57. The SBI took note of the information submitted by Parties⁴ and the information compiled by the secretariat⁵ on the support provided to developing country Parties on activities undertaken to strengthen existing and, where needed, establish national and regional systematic observation and monitoring networks.

58. The SBI also noted the report of the GEF⁶ to the COP affirming that its mandate under the LDCF and the Special Climate Change Fund (SCCF) covers the activities identified in decision 5/CP.7, paragraph 7(a)(iv), and providing information on projects it supported relating to systematic observation and monitoring networks.

¹ FCCC/SBSTA/2011/MISC.14.

² FCCC/SBSTA/2011/2, paragraph 56.

³ For the text as adopted, see decision 16/CP.17.

⁴ FCCC/SBI/2011/MISC.6.

⁵ FCCC/SBI/2011/INF.10.

⁶ FCCC/CP/2011/7.

59. The SBI recommended that the COP, at its seventeenth session, request the GEF, as an operating entity of the financial mechanism of the Convention, under its mandate for the LDCF and the SCCF, to continue to provide financial resources to developing countries to strengthen existing and, where needed, establish national and regional systematic observation and monitoring networks.

SBSTA 36, 2012

(FCCC/SBSTA/2012/2)

38. The SBSTA took note of the views of Parties and of the progress made in developing draft conclusions under this agenda item.

39. The SBSTA agreed to continue its consideration of this agenda item at its thirty-seventh session on the basis of the draft text contained in annex II.

Annex II

Draft text on research and systematic observation

1. [The Subsidiary Body for Scientific and Technological Advice (SBSTA) noted with appreciation the statements delivered by representatives of the World Meteorological Organization (WMO), the Global Climate Observing System (GCOS) and the Intergovernmental Panel on Climate Change (IPCC).

2. The SBSTA welcomed the plan of the GCOS Steering Committee and secretariat to prepare, in broad consultation with relevant partners, by early 2015, a third report on the adequacy of the global observing systems for climate¹ and, by 2016, a new implementation plan for the global observing system for climate, which would, inter alia, support the Convention.² The SBSTA invited the GCOS secretariat to provide the final implementation plan to the SBSTA in 2016 by its [45th] session, and the third adequacy report to the SBSTA by 2015 at its [43rd] session. The SBSTA encouraged the GCOS to provide a draft of the implementation plan to the SBSTA by its [43rd] session in 2015.

3. [The SBSTA noted that the GCOS secretariat would consider, inter alia, [emerging observational needs for adaptation and for the provision of climate services, and] the findings of the Fifth Assessment Report of the IPCC, in the development of the third adequacy report.]

4. The SBSTA welcomed the activities undertaken by the GCOS secretariat to support efforts to address the needs for climate observations, including the preparation of an update of the Satellite Supplement³ to the 2010 updated GCOS implementation plan. The SBSTA invited the Committee on Earth Observation Satellites (CEOS) to respond to this new supplement when reporting to the thirty-seventh session of the SBSTA on progress made.⁴

5. The SBSTA further welcomed the regional initiatives of the GCOS secretariat⁵ in supporting the development of and improvements to climate observation capacities. The

¹ A report on the adequacy of the climate observing systems was prepared in 1998, followed by a second such report in 2003, both of which are available at <<http://www.wmo.int/pages/prog/gcos/index.php?name=Publications>>.

² For the summary of the GCOS *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, prepared in 2004, see document FCCC/SBSTA/2004/MISC.16. For the summary of the 2010 update of the plan see document FCCC/SBSTA/2010/MISC.9.

³ Full title of the Satellite Supplement: *Systematic Observation Requirements for Satellite-based Products for Climate*. This report provides supplemental details to the satellite-based component of the 2010 update of the GCOS implementation plan. The full report is available at <<http://www.wmo.int/pages/prog/gcos/Publications/gcos-154.pdf>>.

⁴ At its thirty-third session, the SBSTA invited CEOS to provide, by the thirty-seventh session of the SBSTA, an updated report on progress made on major achievements in relevant areas (FCCC/SBSTA/2010/13, para. 53).

⁵ Recent regional initiatives of the GCOS secretariat have focused on Africa and South America, as indicated by the GCOS secretariat in its submission to the SBSTA (see FCCC/SBSTA/2012/MISC.4).

SBSTA invited the GCOS secretariat to further expand such initiatives¹ and encouraged Parties, in a position to do so, to support these efforts.

6. The SBSTA noted that the report on progress by the Global Terrestrial Observing System (GTOS) secretariat was not submitted to the SBSTA by its thirty-sixth session,² and encouraged the GTOS secretariat to submit that report to the SBSTA by its xxth session. The SBSTA highlighted the importance of such reports for the work of the SBSTA.

7. The SBSTA expressed its appreciation to the GCOS sponsors³ for the support provided to the GCOS programme for the past 20 years, and encouraged them to continue to provide such support. The SBSTA also welcomed the initiative by the GCOS sponsors to undertake a review of GCOS, and invited the GCOS sponsors, through WMO, to inform the SBSTA on the outcome of this review.

8. The SBSTA noted with appreciation the information by WMO on progress made towards implementation of the Global Framework for Climate Services (GFCS), including on the draft GFCS Implementation Plan. The SBSTA invited WMO to keep the SBSTA informed on the developments of the GFCS.

9. The SBSTA noted the importance of systematic observation for vulnerability assessments and adaptation, with specific emphasis on developing countries. The SBSTA encouraged Parties to contribute to the identification of emerging needs for systematic observation in the context of the Convention, in support of the activities mentioned in paragraph 2 above.

10. [The SBSTA noted the potential of systematic observation for carbon monitoring, such as for monitoring carbon fluxes in ecosystems[, and invited GCOS to consider enhancing its activities in this regard.]]

11. [The SBSTA agreed to continue its consideration of systematic observation at its thirty-seventh session, and then revert to its customary practice of focusing on research during the first sessional period of a year and on systematic observation during the second sessional period of a year.]

12. [The SBSTA welcomed the continuation of the research dialogue held during the thirty-sixth session of the SBSTA. It also conveyed its appreciation to the regional and international programs and organizations [footnote on participants] engaged in climate change research, the IPCC and scientific experts for their active participations and contribution to the research dialogue. The SBSTA also expressed its appreciation to Parties for sharing their views on their research needs and priorities.]

13. [SBSTA agreed to focus the next Research Dialogue at SBSTA 38. The SBSTA invited Parties to provide, by 31 January 2013, their views on the research dialogue, including on-going activities, associated modalities and ways to enhance the dialogue. The SBSTA requested the secretariat to compile these submissions to a miscellaneous document for consideration by the SBSTA at its 38th session.]

14. [SBSTA agreed to focus the next research dialogue at SBSTA 38th session on socio-economic and scientific aspects of climate change. SBSTA invited Parties to submit their views on this theme by [date] with the view to organize a workshop before SBSTA 38 to allow in-depth consideration of this theme.]]

¹ For example, to the Asia-Pacific region and the Caribbean.

² At its thirty-third session, the SBSTA invited the secretariat of the GTOS to report to the SBSTA at its thirty-fifth session on progress made on a number of matters relating to climate-related terrestrial observations (see FCCC/SBSTA/2010/13, paras. 47–50). At the thirty-fifth session of the SBSTA, the GTOS secretariat provided a summary of progress (FCCC/SBSTA/2011/MISC. 14), indicating that the report invited by the SBSTA at its thirty-third session would be submitted to the SBSTA at its thirty-sixth session.

³ The sponsors of GCOS are the following: WMO, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, the United Nations Environment Programme and the International Council for Science.

SBSTA 37, 2012

(FCCC/SBSTA/2012/5)

36. The SBSTA noted with appreciation the statements delivered at its thirty-sixth session by representatives of WMO, the Global Climate Observing System (GCOS) and the Intergovernmental Panel on Climate Change (IPCC), and at its thirty-seventh session by representatives of WMO and CEOS.

37. The SBSTA welcomed the plan of the GCOS Steering Committee and secretariat to prepare, in broad consultation with relevant partners, by early 2015, a third report on the adequacy of the global observing systems for climate¹ and, by 2016, a new implementation plan for the global observing system for climate, which would, inter alia, support the Convention.² The SBSTA invited the GCOS secretariat to provide the third adequacy report to the SBSTA in 2015 by its forty-third session, and the final implementation plan to the SBSTA in 2016 by its forty-fifth session. The SBSTA encouraged the GCOS secretariat to provide a draft of the new implementation plan to the SBSTA by its forty-third session in 2015.

38. The SBSTA noted that the GCOS secretariat would consider, inter alia, the findings of the Fifth Assessment Report of the IPCC, in the development of the third adequacy report.

39. The SBSTA noted the importance of systematic observation for vulnerability assessments and adaptation, with a specific emphasis on developing countries. It encouraged Parties to contribute to the identification of emerging needs for systematic observation in the context of the Convention, in support of the activities mentioned in paragraph 37 above.

40. The SBSTA welcomed the activities undertaken by the GCOS secretariat to support efforts to address the needs for climate observations, including the preparation of an update of the Satellite Supplement³ to the 2010 updated GCOS implementation plan.

41. The SBSTA expressed its appreciation to CEOS for its update on progress made by space agencies providing global observations in their coordinated response to relevant needs of the Convention.⁴ It noted the importance of continuing and sustaining satellite observations on a long-term basis, and the role of CEOS in promoting full and open data sharing, in order to support the work under the Convention. It invited CEOS to provide, by SBSTA 41, an updated report on progress made by space agencies providing global observations in their coordinated response to relevant needs of the Convention.

42. The SBSTA welcomed the regional initiatives of the GCOS secretariat⁵ in supporting the development of and improvements to climate observation capacities. It invited the GCOS secretariat to further expand such initiatives and encouraged Parties in a position to do so to support these efforts.

43. The SBSTA took note of the report on progress in the development of methodologies, standards and protocols for climate-related terrestrial observations and related matters, which was provided by the GCOS secretariat on behalf of the Global Terrestrial Observing System.⁶ The SBSTA highlighted the importance of such reports for its work.

¹ A report on the adequacy of the global climate observing systems was prepared in 1998, followed by a second such report in 2003; they are available at <<http://www.wmo.int/pages/prog/gcos/Publications/gcos-48.pdf>> and <http://www.wmo.int/pages/prog/gcos/Publications/gcos-82_2AR.pdf>.

² For the summary of the GCOS *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, prepared in 2004, see document FCCC/SBSTA/2004/MISC.16. For the summary of the 2010 update of the plan, see document FCCC/SBSTA/2010/MISC.9.

³ Full title of the Satellite Supplement: *Systematic Observation Requirements for Satellite-based Data Products for Climate*. This report provides supplemental details to the satellite-based component of the 2010 update of the GCOS implementation plan. The full report is available at <<http://www.wmo.int/pages/prog/gcos/Publications/gcos-154.pdf>>.

⁴ FCCC/SBSTA/2012/MISC.14.

⁵ Recent regional initiatives of the GCOS secretariat have focused on Africa and South America, as indicated by the GCOS secretariat in its submission to the SBSTA (FCCC/SBSTA/2012/MISC.4). FCCC/SBSTA/2012/MISC.15

⁶ FCCC/SBSTA/2012/MISC.15.

44. The SBSTA expressed its appreciation to the GCOS sponsors¹ for the support provided by them to the GCOS programme for the past 20 years, and encouraged them to continue to provide such support. It welcomed the initiative of the GCOS sponsors to undertake a review of GCOS, and invited the sponsors, through WMO, to inform the SBSTA on the outcome of that review.

45. The SBSTA noted with appreciation the information from WMO² on the outcome of the Extraordinary Session of the World Meteorological Congress, held in Geneva, Switzerland, from 29 to 31 October 2012, with respect to the implementation of the Global Framework for Climate Services.³ It invited WMO to provide, at SBSTA 39, information on the outcome of the first session of the Intergovernmental Board on Climate Services, to be held in July 2013. The SBSTA recommended draft conclusions⁴ on this matter for adoption by the COP at its eighteenth session.⁵

46. The SBSTA recalled the conclusions of the SBI at its twenty-fourth session⁶ and concluded that it would continue to focus its consideration on research during the first sessional period of a year and on systematic observation during the second sessional period of a year.

47. The SBSTA welcomed the continuation of the research dialogue during SBSTA 36. It expressed its appreciation to the representatives of regional and international research programmes and organizations active in climate change research, and to the IPCC, for their contributions to the dialogue.⁷ It also expressed its appreciation to Parties for sharing their views on their research needs and priorities in the context of the dialogue.⁸

48. The SBSTA invited Parties to submit to the secretariat, by 25 March 2013, their views on possible items for consideration as part of the research dialogue during SBSTA 38 and requested the secretariat to compile these submissions into a miscellaneous document.

49. The SBSTA noted the views submitted by Parties contained in document FCCC/SBSTA/2012/MISC.2 and Add.1 and 2.

50. The SBSTA requested the secretariat to organize a workshop, subject to the availability of financial resources, to be held by SBSTA 39, to consider information on the technical and scientific aspects of ecosystems with high-carbon reservoirs not covered by other agenda items under the Convention, such as coastal marine ecosystems, in the context of wider mitigation and adaptation efforts.

51. The SBSTA invited Parties to submit to the secretariat, by 25 March 2013, their views on the content of that workshop and requested the secretariat to compile these submissions into a miscellaneous document.

52. The SBSTA invited Parties and regional and international research programmes and organizations active in climate change research to provide information on the technical and scientific aspects of emissions by sources, removals by sinks, and reservoirs of all greenhouse gases (GHGs), including emissions and removals from terrestrial ecosystems such as steppe, savannah, tundra and peatlands, with a view to identifying and quantifying the impact of human activities. This information would be considered as a theme for the next research dialogue, also taking into account the submissions received in accordance with paragraph 48 above.

¹ The sponsors of the GCOS are the following WMO, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, the United Nations Environment Programme and the International Council for Science

² FCCC/SBSTA/2012/MISC.21.

³ See <http://www.wmo.int/pages/gfcs/index_en.php>.

⁴ Adopted as document FCCC/SBSTA/2012/L.25/Add.1.

⁵ For the text as adopted, see FCCC/CP/2012/8, paragraph 55.

⁶ FCCC/SBI/2006/11, paragraph 109(a).

⁷ This information was provided in the submissions contained in document FCCC/SBSTA/2012/MISC.3 and in the presentations given during the research dialogue. For information on research programmes and organizations that contributed to the research dialogue, see <<http://unfccc.int/6896.php>>.

⁸ This information was provided in the submissions contained in document FCCC/SBSTA/2012/MISC.2 and Add.1 and 2 and in the presentations given during the research dialogue, see <<http://unfccc.int/6896.php>>.

53. The SBSTA took note of the estimated budgetary implications of the activities to be undertaken by the secretariat pursuant to the provisions contained in paragraph 50 above.

54. The SBSTA requested that the actions of the secretariat called for in paragraph 50 above be undertaken subject to the availability of financial resources.

SBSTA 39, 2013

(FCCC/SBSTA/2013/5)

42. The SBSTA noted with appreciation the statements delivered by the representatives of the IPCC, WMO and GCOS.¹

43. The SBSTA also noted with appreciation the information provided by WMO on the developments regarding the implementation of the Global Framework for Climate Services (GFCS) and the outcome of the first session of the Intergovernmental Board on Climate Services (IBCS).² The SBSTA invited WMO to provide, at SBSTA 41, information on the outcome of the second session of the IBCS, to be held in November 2014.

44. The SBSTA also noted with appreciation the information provided by GCOS on its recent and planned activities³ and the role of GCOS, its sponsors⁴ and partners in strengthening observation networks and the provision of high-quality climate information and data, including in the implementation of the GFCS.

45. The SBSTA emphasized the continued need to secure funding to meet the essential needs for global climate observations under the Convention on a long-term basis.⁵

46. The SBSTA welcomed the contribution of Working Group I to the Fifth Assessment Report (AR5) of the IPCC. The SBSTA noted that the IPCC will have released the contributions of Working Groups II and III to the AR5 by SBSTA 40 and the AR5 Synthesis Report by SBSTA 41. It further noted the continued key importance of research and systematic observation to the work of the IPCC.

47. The SBSTA emphasized the importance of systematic observation for the UNFCCC process at large, including for advancing climate modelling at all scales and for decision-making on adaptation. It noted that there are still gaps in critical observational data, inter alia for the oceans, and in the networks in some parts of the world, especially in developing countries. The SBSTA affirmed the importance of historical data records, the need to enhance data rescue and digitization efforts and climate monitoring. It therefore urged Parties and relevant organizations to enhance capacity, collaboration and coordination in this area.

48. The SBSTA also noted that a workshop on systematic observation, organized in close collaboration with GCOS and its sponsors, could help to identify ways to strengthen systematic observation and to enhance related capacity in developing countries, in particular in support of adaptation planning.

SBSTA 41, 2014

(FCCC/SBSTA/2014/5)

34. The SBSTA noted with appreciation the statements delivered by representatives of the WMO, the GCOS secretariat, and of Japan on behalf of the CEOS and the CGMS.¹

¹ The statements are available on the UNFCCC website at <<http://unfccc.int/7950.php>>.

² The submission by WMO to SBSTA 39 is available on the UNFCCC website at <<http://unfccc.int/7482.php>>.

³ The submission by GCOS to SBSTA 39 is available on the UNFCCC website at <<http://unfccc.int/7482.php>>.

⁴ The sponsors of GCOS are WMO, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, the United Nations Environment Programme and the International Council for Science.

⁵ See also document FCCC/SBSTA/2010/13, paragraph 55.

35. The SBSTA welcomed the Synthesis Report of the AR5 of the IPCC and noted the continued key importance of research and systematic observation to the work of the IPCC.

36. The SBSTA welcomed the report by the GCOS secretariat on its recent and planned activities,² including on the outcomes and recommendations of the GCOS programme review by its sponsors, which confirmed the significance of the programme and that it should continue. The SBSTA noted that the GCOS workshop on observations for climate change mitigation³ contributed to a better understanding of the observational requirements for mitigation.

37. The SBSTA noted the progress made by GCOS towards the development of a status report that will be presented at SBSTA 43 (November–December 2015), and on the new implementation plan that will be presented at SBSTA 45 (November 2016).

38. The SBSTA recalled the conclusions from SBSTA 37⁴ and encouraged Parties to actively engage in the review of the status report and to support the development of the new implementation plan, including on aspects related to ocean observation and acidification.

39. The SBSTA recalled the conclusions from SBSTA 39⁵ and welcomed the plans of the GCOS secretariat to organize, in collaboration with the IPCC and the secretariat, a workshop to identify ways to enhance systematic observation and related capacity, especially in developing countries to support preparedness and adaptation in a changing climate proposed to be held in February 2015 in Bonn, Germany. It invited the GCOS secretariat to provide a report on the workshop by SBSTA 43.

40. The SBSTA expressed its appreciation to CEOS and CGMS for their updated report on the progress made by space agencies providing global observations in their coordinated response to relevant needs of the Convention.⁶ It noted the importance of continuing and sustaining satellite observations on a long-term basis and welcomed the efforts to develop an architecture for climate monitoring from space. It invited CEOS to report on progress at SBSTA 43, and at subsequent sessions, as appropriate.

41. The SBSTA noted with appreciation the information provided by WMO on the developments regarding the implementation of the Global Framework for Climate Services (GFCS) and the outcome of the second session of the Intergovernmental Board on Climate Services.⁷ The SBSTA noted that GFCS has moved into an implementation phase and encouraged Parties to make use of the opportunities that GFCS provides to help to address climate variability and change at the national level, including to enhance climate observations and monitoring, and to support the formulation and implementation of national adaptation planning processes, as appropriate. The SBSTA invited WMO to report, by SBSTA 43, on progress made on the implementation of GFCS.

42. The SBSTA recalled paragraphs 45 and 47 of the report on SBSTA 39⁸ and reemphasized the importance of systematic observation for the UNFCCC process at large and the continued need to secure funding to meet the essential needs for national, regional and global climate observations under the Convention on a long-term basis

¹ The statements are available at <<http://unfccc.int/8744>>.

² The submission by the GCOS secretariat to SBSTA 41 is available at <<http://unfccc.int/7482>>.

³ The workshop was co-sponsored by the Land Cover Project Office of the Global Observation for Forest Cover and Land Dynamics Programme and was held from 5 to 7 May 2014 in Geneva, Switzerland. The report on the workshop is available at <<http://www.wmo.int/pages/prog/gcos/Publications/gcos-185.pdf>>.

⁴ FCCC/SBSTA/2012/5, paragraph 39.

⁵ FCCC/SBSTA/2013/5, paragraph 48.

⁶ The submission from CEOS to SBSTA 41 is available at <<http://unfccc.int/7482>>.

⁷ The submission from WMO to SBSTA 41 is available at <<http://unfccc.int/7482>>.

⁸ FCCC/SBSTA/2013/5.

SBSTA 43, 2015

(FCCC/SBSTA/2015/5)

23. The SBSTA noted with appreciation the statements delivered by representatives of GCOS, IOC of UNESCO, the IPCC, WMO and Australia on behalf of CEOS and the Coordination Group for Meteorological Satellites (CGMS).¹

24. It also noted with appreciation the report by GCOS entitled Status of the Global Observing System for Climate (hereinafter referred to as GCOS SR 2015),² which provides an assessment of the adequacy of the global observing system and progress made in the implementation of the GCOS Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (2010 Update), the executive summary of GCOS SR 2015,³ and the draft outline of a new GCOS Implementation Plan (hereinafter referred to as GCOS IP 2016).⁴

25. The SBSTA noted the report by GCOS on the workshop “Enhancing observations to support preparedness and adaptation in a changing climate – learning from the IPCC 5th Assessment Report”, held from 10 to 12 February 2015 in Bonn, Germany, and welcomed the cooperation between GCOS, the IPCC and the secretariat in organizing the workshop.⁵

26. The SBSTA also noted the CEOS and CGMS joint report on progress made by space agencies providing global observations on their coordinated response to relevant needs of the Convention.⁶

27. The SBSTA noted the WMO report on relevant outcomes of the seventeenth World Meteorological Congress, which was held in Geneva, Switzerland, from 25 May to 12 June 2015,⁷ and progress made on the implementation of the Global Framework for Climate Services (GFCS).⁸

28. The SBSTA recognized the progress made in improving observing systems for climate, as relevant to the Convention, and encouraged GCOS to consider the outcomes of COP 21 when preparing the GCOS IP 2016.⁹

29. The SBSTA invited GCOS to collaborate with relevant partners to continue enhancing access to, and understanding and interpretation of, data products and information to support decision-making on adaptation and mitigation at national, regional and global scales.

30. The SBSTA urged Parties to work towards addressing the priorities and gaps identified in the GCOS SR 2015, and invited Parties and relevant organizations to provide inputs to, and contribute to the review of, the GCOS IP 2016.

¹ The statements are available at <<http://unfccc.int/7528.php>>.

² Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/541.pdf>.

³ Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/542.pdf>.

⁴ Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/546.pdf>.

⁵ Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/543.pdf>.

⁶ Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/538.pdf>.

⁷ Available at <<http://cg-17.wmo.int/>>.

⁸ Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/547.pdf>.

⁹ Available at <http://unfccc.int/files/documentation/submissions_from_observers/application/pdf/546.pdf>.

31. The SBSTA welcomed the WMO supplement to the technical guidelines for the national adaptation plan process¹ outlining how GFCS could provide support.

32. The SBSTA encouraged Parties and relevant organizations to enhance systematic observations related to the understanding and prediction of extreme events.

¹ *Climate Services for Supporting Climate Change Adaptation: Supplement to the Technical Guidelines for the National Adaptation Plan Process*. Available at
<http://unfccc.int/files/adaptation/application/pdf/supplement_nap_wmo_cop21.pdf>.