

**PROGRESS/ACTIVITY REPORTS PRESENTED AT THE
FIFTEENTH SESSION OF THE
COMMISSION FOR CLIMATOLOGY
(Antalya, Turkey)**

(unedited)

WORLD CLIMATE CONFERENCE-3

1. Overview

1.1 At the invitation of the Government of Switzerland, the World Climate Conference-3 (WCC-3) was held in Geneva, Switzerland, from 31 August to 4 September 2009. It was organized by the World Meteorological Organization (WMO), in collaboration with the United Nations Educational Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the Food and Agriculture Organization of the United Nations (FAO), the International Council for Science (ICSU) and other intergovernmental and non-governmental partners. The Conference was generously supported by the governments of Australia, Canada, China, Denmark, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Kenya, Namibia, Norway, Pakistan, Russian Federation, Saudi Arabia, Spain, Switzerland, the United Kingdom and the United States of America, and by the European Union, the European Space Agency, the United Nations Environment Programme and FAO. Additional in kind support was received from many other countries and organizations. Some 2,000 participants from 163 countries and 59 international organizations attended the Conference.

1.2 The First and Second World Climate Conferences had laid the foundation for building research and observational activities to understand the nature of the climate challenges and to provide the scientific bases for developing the comprehensive and sound climate services that are now being sought by all countries and in virtually every sector of society:

- (i) The First World Climate Conference (1979) influenced the establishment of a number of important international scientific initiatives, notably the WMO World Climate Programme, including the World Climate Research Programme (co-sponsored by WMO, the International Council for Science and the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization), and the Intergovernmental Panel on Climate Change (co-sponsored by WMO and the United Nations Environment Programme), which won the Nobel Peace Prize in 2007;
- (ii) The Second World Climate Conference (1990) called for the establishment of a climate convention, adding momentum to international efforts that resulted in the development of the UN Framework Convention on Climate Change in 1992. It also led to the establishment of the Global Climate Observing System and to recommendations for future activities of the World Climate Programme.

1.3 The Fifteenth World Meteorological Congress (Geneva, Switzerland, May 2007) had decided it was necessary and timely to build on these legacies, and approved the organization of World Climate Conference-3, in collaboration with other UN system agencies and partners. WCC-3 gave WMO, its partners and nations an opportunity to jointly consider an appropriate global framework for climate services over the coming decades that would help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the growing array of climate prediction and information services made possible by recent and emerging developments in international climate science and technology.

1.4 The theme of the Conference was 'Climate Prediction and Information for Decision Making' and its vision was to develop "An international framework for climate services that links science-based climate predictions and information with the management of climate-related risks and opportunities in support of adaptation to climate variability and change in both developed and developing countries".

2. Commission for Climatology participation

2.1 The president and vice-president of the Commission, Mr Pierre Bessemoulin and Mr Shourong Wang, respectively, along with Mr Michael Coughlan (member of the CCI Management Group), participated as members of the International Organizing Committee for WCC-3 (WIOC).

2.2 Many other members of the Commission for Climatology (CCI) including chairs of Open Area Programme Groups (OPAGs) and Expert Team leaders took part in the work of the WCC-3 as members of organizing committees for various segments of the programme, as speakers and as discussants, and as poster presenters.

3. Results of the Conference

3.1 Expert segment (31 August to 2 September)

3.1.1 The Expert Segment of the Conference, including some 200 speakers and 1,500 participants, reviewed a wide range of individual and community-based papers and presentations from climate science, service, application and user communities as well as the results of deliberations by a number of other major climate service stake-holder groups, in a series of sessions, forums, workshops and round-tables. Development, provision and uptake of climate services, and requirements for climate services were discussed under the following themes:

- (i) The shared challenge for climate science, services and applications;
- (ii) User needs and applications;
- (iii) The scientific basis for climate services;
- (iv) Adaptation to climate variability and change;
- (v) Societal perspectives on climate services;
- (vi) Implementing climate services; and
- (vii) Exploiting new developments in climate science and services.

3.1.2 The Conference recognized that great progress has been made over the past 30 years towards an integrated global approach to the development, implementation, operation and application of climate services in support of a wide range of societal needs in all countries and in all major socio-economic sectors. It particularly recognized the achievements under the World Climate Programme (WCP) to put in place a firm basis for the delivery of a wide range of climate services, especially its World Climate Applications and Services Programme (WCASP) and the Climate Information and Prediction Services Project (CLIPS) in the successful implementation of Regional Climate Outlook Forums (RCOFs) and Regional Climate Centres, and their support for enhanced national climate services in many countries.

3.1.3 While the discussions made it clear that the present arrangements for provision of climate services fall far short of meeting the identified needs, especially in developing countries, the conference noted that there is vast, as yet largely untapped, potential to improve these arrangements and enhance the quality and utility of climate services for the benefit of all countries and all sectors of society. There was widespread agreement among both provider and user communities that a new global framework is required to enable better management of the risks of climate variability and change and adaptation to climate change at all levels through development and incorporation of science-based climate information into planning, policy and practice.

3.1.4 The participants in the Expert Segment welcomed the extensive preparatory work by WMO and its partner organizations on the design of the proposed Global Framework for Climate Services and the consultations that had already taken place with governments through both technical and diplomatic channels. They were in full agreement that, from the scientific and operational perspective, the proposed Framework should reinforce and complement the established international organizations for the provision and application of weather, climate, water and related environmental information, forecasts and warnings and should build on, and integrate, the existing international systems and programmes for climate observations and research which are co-sponsored by WMO, other UN System partner organizations, and ICSU. WMO and user-sector organizations should enhance collaboration in the development of practical guidance on the preparation and use of climate products in different sectors and regions.

3.1.5 In its Conference Statement, the WCC-3 therefore called for major strengthening of the essential elements of a global framework for climate services:

- (i) The Global Climate Observing System and all its components and associated activities; and provision of free and unrestricted exchange and access to climate data;
- (ii) The World Climate Research Programme, underpinned by adequate computing resources and increased interaction with other global climate relevant research initiatives;
- (iii) Climate services information systems taking advantage of enhanced existing national and international climate service arrangements in the delivery of products, including sector-oriented information to support adaptation activities;
- (iv) Climate user interface mechanisms focused on building linkages and integrating information, at all levels, between the providers and users of climate services; and
- (v) Efficient and enduring capacity building through education, training, and strengthened outreach and communication;

and supported the development of the proposed Global Framework for Climate Services.

3.1.6 The full set of conclusions and recommendations of the Expert Segment of the Conference are described in the Conference Statement, which can be found at http://www.wmo.int/wcc3/page_en.php.

3.2 High level segment (3 to 4 September)

3.2.1 Heads of State and Government and other invited dignitaries expressed their views on the proposed global framework for climate services, noted the findings of the Expert Segment of the Conference and, along with ministers and other national representatives, adopted a Conference Declaration.

3.2.2 Through the declaration, the conference decided to establish a Global Framework for Climate Services (hereafter referred to as "the Framework") to strengthen the production, availability, delivery and application of science-based climate prediction and services; requested the Secretary-General of WMO to convene an intergovernmental meeting of Member States of the WMO to approve the terms of reference and to endorse the composition of a task force of high-level, independent advisors for implementing the framework, taking into account the concepts outlined in the Brief Note annexed to the Declaration; decided further that the report of the task force shall be circulated by the Secretary-General of WMO to Member States of the WMO for consideration at the next WMO Congress in 2011, with a view to the adoption of the Framework and a plan for its implementation; and invited the Secretary-General of WMO to provide the report to relevant organizations and to the UN Secretary-General.

3.2.3 The full text of the WCC-3 Conference Declaration can be found at http://www.wmo.int/wcc3/declaration_en.php and its annexed Brief Note at http://www.wmo.int/wcc3/documents/brief_note_en.pdf.

REGIONAL ACTIVITIES RELATED TO THE WORLD CLIMATE PROGRAMME

In addition to the information below, regionally pertinent information may also be found in CCI-XV/INF. 13 on the activities of OPAGs.

1. Regional Association I (RA I, Africa)

1.1 The RA I Working Group on Climate Related Matters (WGCRM) held its first meeting in Cotonou, Benin from 25 to 27 November 2008 to reinforce the climate activities within the NMHSs and particularly the implementation of the WMO Regional Climate Centres (RCCs) in the Region. The meeting established a Task Team to identify and evaluate capacities of centers, NMHSs or other institutions that express intent to become RCCs and propose a region-wide networking of potential RCCs.

Climate Data Management Systems (CDMSs)

1.2 Three workshops were held in Africa to help countries migrate from CLICOM to more capable software such as CLIDATA, CLISYS and CLIMSOF. Two CLIMSOF training workshops were held in Africa with the support of the UK Met Office in Kigali (Rwanda in September-October 2006 and Brazzaville, Congo from 23 to 27 April 2007). WMO and the UK Met Office organized a training workshop for the Enhancement of CLIMSOF capabilities of Climate Data and Metadata Exchange (Training of Trainers) in Lusaka, Zambia from 20 April to 1 May 2009. This workshop was attended by participants from Africa, the Caribbean, Asia and the Pacific.

Climate Data Rescue

1.3 Participants from Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Guinea Bissau, Guinea Conakry, Liberia, Mali, Niger, Sao Tome & Principe, Senegal and Togo attended a WMO Regional Data Rescue Workshop held at ACMAD, Niamey, Niger, in March 2006. Data rescue remains one of the highest priority issues in RA I. WMO provided support to ICPAC to rescue climate records of the East African region archived in old and obsolete magnetic tapes.

1.4 The Department of Regional Activities of the WMO (DRA) signed a Memorandum of Understanding with the International Environmental Data Rescue Organization (IEDRO) under NOAA-VCP funds to support data rescue in Kenya, Senegal, Niger, Zambia and Mali.

Climate Data homogenization and climate indices

1.5 As part of WCDMP supporting activities for climate change detection and indices and under the guidance of the joint CCI/WCRP-Clivar/JCOMM Expert Team on Climate Change Detection and Indices, WMO organized a one week seminar on climate data homogenization and climate change indices in Central Africa, Brazzaville, April 2007. The seminar was organized back-to-back with the climate data management workshop. The workshop led for the first time to the development of collaborative work involving experts from NMHSs in Central Africa, Zimbabwe, Guinea side by side with ETCCDI lead scientists.

1.6 As part of the French ACClimate project on capacity building in climate change adaptation for the countries of the Indian Ocean Commission, France sponsored an ETCCDI workshop on climate data homogenization and climate change indices held in Vacoas, Mauritius, from 19 to 23 October 2009.

Regional Climate Outlook Forums

1.7 RCOFs have regularly been held for the past 10 years in Africa for Southern Africa, Greater Horn of Africa and Western Africa, coordinated by SADC-DMC, ICPAC and ACMAD respectively. In a new initiative, the RCOF for Central Africa was revived after a lapse of nearly six years, and the third session of the forum (PRESAC-3) was held (Bangui, 20–24 October 2008), with support from WMO and ACMAD, whereby ACMAD provided the technical coordination of the session. An international expert review meeting of RCOFs took place in November 2008 (Arusha, Tanzania) to revisit implementation of the recommendations of the previous review (October 2000, Pretoria, South Africa); share experiences, successes and challenges; and pave the way forward for future forums. Issues addressed include forecasting methodologies and verification, communication with users, achievements in global and regional structures for production and delivery of forecast products and services, sustainability, liaison with users and linkages with UNFCCC, WCC-3 expected outcomes and other climate relevant frameworks or goals. All the RCOFs active around the world were represented at this meeting.

Regional Climate Centres

1.8 Resolution 10 of XIV-RA I (2007) established the RA I Working Group on Climate Related Matters with Terms of Reference that include, inter alia, to advise the RA I president on the implementation of RCCs in RA I. The WGCRM developed a survey on assessing needs and potential Member candidates for carrying out RCC functions. The corresponding survey was sent by the president of RA I through a formal letter to all Members and several responses were collected by the WMO Secretariat.

Climate Projects

1.9 The "Climate for Development in Africa Programme (ClimDev Africa)" has been formally approved by the Africa Union, the UN Economic Commission for Africa and the African Development Bank (in 2009). ClimDev Africa addresses both observational and climate services need in RA I. In 2009, WMO launched a project, funded by Korea International Cooperation Agency (KOICA), to strengthen the capacity of ICPAC to perform RCC functions for the Greater Horn of Africa (GHA) region, and to help GHA countries to use the outputs. The World Bank GFDRR has also funded a WMO project on climate observations and regional modelling in support of Climate Risk Management and Sustainable Development for the GHA.

Capacity building

1.10 A CLIPS Focal Point Training Workshop was held for RA I with special focus on the Mediterranean region in Tunis-Carthage, Tunisia, from 29 October to 9 November 2007. A WHO/WMO Regional Workshop on Adaptation Strategies to Protect Health under Climate Variability and Climate Change was held in Dar Es Saalam, Tanzania, in July 2008.

2. Regional Association II (RA II, Asia)

2.1 The RA II WGCRM met in Beijing, China from 7 to 8 April 2007, and in Tokyo, Japan from 7 to 8 August 2008. Implementation of RCCs in RA II formed a major work component of the Group.

Implementation of Climate Watch Systems

2.2 WMO in collaboration with China Meteorological Administration (CMA) organized a workshop on climate monitoring including the implementation of climate watch systems in RA II with focus on monsoon affected areas (Beijing, China, 10-13 November 2009). NMHSs of Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Honk Kong China, India, Japan, Lao People's Democratic Republic, Maldives, Myanmar, Pakistan, Republic of Korea,

Sri Lanka, Thailand and Vietnam were represented at the workshop and made presentations of their capabilities for supporting the climate monitoring and climate watch activities. Two sectoral institutions from Bangladesh and Japan respectively were also represented and provided user perspective.

Climate Data Management Systems (CDMSs) and climate indices

2.3 A CLIMSOF training workshop was held in Ha Noi, Viet Nam, from 12 to 30 November 2007 with participants from Bhutan, Cambodia, Fiji, Laos, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Democratic Republic of Timor Leste (East Timor) and the Socialist Republic of Viet Nam. A seminar on Climate Data Homogenization and Climate Change Indices was conducted by Lisa Alexander (Australia), Blair Trewin (Australia) and John Caesar (UK) from 3 to 7 December back-to-back with the CLIMSOF training workshop.

Regional Climate Outlook Forums

2.4 Meetings of the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRA II), cosponsored by CMA and WMO, have been held on an annual basis since 2004, in Beijing, China. More than 20 RA II NMHSs were involved in each of these activities, including institutions from other regional associations. Efforts are underway to consider an appropriate mechanism to initiate sub-regional COFs in RA II, in collaboration with the full regional annual event. CMA-JMA-KMA joint meetings on summer and winter East Asia Monsoon are held twice per year. In a meeting held on 6 August 2009 at Trieste, Italy, the Permanent Representatives of South Asian countries with WMO unanimously agreed to establish a South Asian Climate Outlook Forum (SASCOF) and to organize the sessions from 2010 onwards for generating consensus outlooks for the summer monsoon. The offer by India to host the first three sessions of SASCOF was accepted.

Regional Climate Centres

2.5 With the strong support of the RA II WGCRM, RA II established a pilot RCC network for the Region (2004), and developed an Implementation Plan (2007). Following the approval of the fourteenth session of RA II in December 2008, the RA II WGCRM developed the first draft of "Guidelines on the Eligibility of RCCs" which identified operational, coordination, data services, training/capacity building and research/development functions, and "Designation Procedures for the Establishment of the Regional Climate Centre (RCC) Network in RA II". In accordance with the Implementation Plan, Beijing Climate Center (BCC) and Tokyo Climate Center (TCC) established a joint portal site at <http://www.rccra2.org>, which was linked to the websites of BCC, TCC, NMHSs in RA II and other related institutions. In 2009, the WMO Executive Council (EC-LXI) adopted the amendment, and designated BCC and TCC as the first WMO RCCs. India, the Islamic Republic of Iran, the Russian Federation and Saudi Arabia expressed interest in joining the RA II RCC network.

Capacity Building

2.6 A CLIPS Training Workshop for RA II (Eastern Part) was held in Bangkok, Thailand in January 2007. An International Workshop on the Application of Advanced Climate Information in the Asia-Pacific Region was held in Tokyo, Japan in February 2007. A CLIPS training session on applications for urban climatology was held in January 2010, in Pune, India. Other climate-relevant events benefiting the Region include the Fourth International Seminar on Climate System and Climate Change (Beijing, China, 16-27 July 2007) and an advanced International Training Programme on Climate Change – Mitigation & Adaptation (Beijing, China, October 22-26, 2007).

2.7 Three WHO workshops (co-sponsored by WMO) on Human Health Impacts from Climate Variability and Climate Change, were held in RA II: for the Himalayas and Mountainous Asia (2005, 7 countries); Malaysia (2007, 18 countries); and Uzbekistan (2006, 7 countries). The

CCI Expert Team on Climate and Health is working with the Shanghai Meteorological Bureau, Shanghai, China, to ensure an operational Heat-Health Warning System as part of a Multi-hazard Early Warning System for EXPO 2010.

3. Regional Association III (RA III, South America)

3.1 The RA III WGCRM met in Montevideo, Uruguay from 15-17 May, 2006 and made recommendations on issues such as support for CCI, data, applications, RCCs, training, RCOFs, and capacity building.

Implementation of Climate Watch Systems

3.2 WMO organized a workshop on climate monitoring including the implementation of Climate Watch Systems in RA III (Guayaquil, Ecuador 8-11 December 2008). Regional climate related institutions including CIIFEN, CPPS and the University of ESPOLO of Ecuador co-sponsored the workshop. In addition to the NMHSs of the Region, participants from NOAA (CPC), Météo-France and Armenia attended this workshop. Participating institutions and NMHSs agreed to cooperate in the implementation of CWSs in the Region taking into consideration the CCI guidelines on climate watches. As a follow-up action to this workshop, the NOAA Climate Prediction Center (CPC) started issuing El Niño Watch in February 2009.

Regional Climate Outlook Forums

3.3 In RA III, regular RCOFs are held for the Western Coast of South America (WCSACOF) under the leadership of CIIFEN comprising the countries of Venezuela, Colombia, Ecuador, Peru, Chile and Bolivia, and Southeast of South America (SSACOF) comprising the countries of Brazil, Paraguay, Uruguay and Argentina. An annual sub-national COF was also established for the Northeastern part of Brazil (NEBCOF).

Regional Climate Centres

3.4 The RA III WGCRM recommended implementation of RCCs in RA III and proposed development and completion of a questionnaire to establish requirements and capacity in the Region. RA III (Lima, 2006) noted the offer by CIIFEN to serve as a RCC, but indicated that a network with distributed functions might serve the Region best.

Capacity Building

3.5 A CLIPS Focal Point Training Workshop for RA III was held from 8-19 August 2005 at Lima, Peru, attended by experts from twelve South American countries, the USA and Spain.

4. Regional Association IV (RA IV, North America, Central America and the Caribbean)

4.1 RA IV coordinates its climate activities through its Management Group. RA IV agreed to have a special focus on the implementation of RCCs.

Climate Data Management Systems

4.2 An advanced CLIDATA Training was organized at the CIMH in Barbados from 19 to 30 May 2008 for countries that have been successful in implementing the CLIDATA system under the SIDS Caribbean project funded by the Finnish Government: Cuba, Dominican Republic, Guyana, Jamaica, Trinidad and Tobago. This workshop was supported by the Finland VCP funds.

4.3 The following countries have installed the ClimSoft through the ClimSoft workshop organized in Trinidad and Tobago in May-June 2008: Anguilla, Bahamas, Belize, British Virgin

Islands, Cayman Islands, Dominica, Grenada, Montserrat, Netherlands Antilles and Aruba, St. Kitts & Nevis, Saint Lucia, St. Vincent and the Grenadines, and Turks & Caicos.

Regional Climate Outlook Forums

4.4 RCOFs for Central America (Foro del Clima de América Central, FCAC) are held annually. Also, the Caribbean Institute of Meteorology and Hydrology (CIMH) and the Central American Regional Committee of Hydrological Resources (CRRH) produce seasonal precipitation outlooks for the Caribbean countries of the Central America. RA IV benefits from having designated GPCs in Montreal, Canada and Washington, USA, for provision of long-range forecasts.

Regional Climate Centres

4.5 An RA IV RCC Pilot Project sponsored by the United States of America and implemented by the Central American Regional Committee of Hydrological Resources was launched in 2005 and a project to initiate RCC activities in Central America was launched in 2007 supported by the Inter-American Development Bank and the European Union. RA IV, at its fifteenth session in 2009, agreed to establish a Task Team on the development of RCCs in the Region.

Capacity Building

4.6 A WMO workshop on “Climate Variability and Change and their Health Effects in Central America: Health Vulnerability and Adaptation Planning” was held in San José, Costa Rica (6-9 August 2007).

5. Regional Association V (RA V, South-West Pacific)

5.1 The RA V WGCRM met in Singapore from 7 to 10 February 2006. The working group made several recommendations on climate data rescue and management, seasonal to interannual prediction, climate variability and trends, extreme climate events and sea level activities.

Climate Data Management Systems

5.2 The first CLIMSOFT training workshop held in Fiji, August 2005 was attended by participants from ten countries in the Pacific Region, namely: Cook Islands, Fiji, Kiribati, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu and Vanuatu. It was the first CLIMSOFT training and several countries in the Region continue to use the CLIMSOFT system.

Climate Observations

5.3 The Pacific Islands GCOS Technical Support Maintenance Center based in New Zealand continued to make strides to improve GCOS station performance in the Region.

Climate Information Services

5.4 Due to a collaborative effort by the US, Australia, and the International Pacific Research Center in Honolulu, a server was implemented in July 2007 to accommodate the web and data needs for PI HYCOS, GCOS, and GOOS. The USA Pacific Region Integrated Climatology Information Products project was implemented to assist coastal decision-makers to reduce their vulnerability to economic, social, and environmental risks.

Regional Climate Outlook Forums

5.5 The Australian Bureau of Meteorology has implemented a Pacific Island – Climate Prediction Project (PI-CPP) to strengthen PI NMS capacity to meet users' needs in climate prediction through providing a proven seasonal prediction system and training in its prudent use. The pilot focused on predictions for sugar cane in Fiji, the fisheries industry, water/drought management, agriculture, health, media and communications, and renewable energy sources. Ten South Pacific countries are participating regularly through an On-line Climate Outlook Forum. The Region has demonstrated cost-effective implementation of the RCOF process, through teleconferencing and Internet communications among the participants and experts. Island Climate Update (ICU) and the Pacific ENSO Applications Center (PEAC) are other forms of RCOF implementation in the Region.

Regional Climate Centres

5.6 The RA V Task Team on RCC services and seasonal to inter-annual prediction has recommended consulting with existing organizations in the four sub-regions with the purpose of developing and implementing a plan to create a proposed virtual RCC with its multiple nodes. In May 2006, RA V approved implementation and a survey of RA V Members identified the requirements of the Members. The Region is now pursuing the implementation of RCCs as per the designation criteria adopted by WMO in 2009.

Capacity Building

5.7 The International Research Institute for Climate and Society (IRI) and the Association of South East Asian Nations (ASEAN) Specialized Meteorological Centre (ASMC) conducted a joint training workshop on the ASEAN Seasonal Inter-annual Climate Prediction and its Applications in Singapore in May 2007. The workshop provided participants with an overview of seasonal forecasting methods, with a focus on statistical downscaling. The central theme was the tailoring of forecasts for risk management applications. A CLIPS workshop on 'Communicating about ENSO: Developing a common Understanding', was held in Honolulu, Hawaii in April 2008. A Training Workshop on Climate Variability and Predictions in the Indian Ocean Basin, was organized by NOAA with co-sponsorship by WMO, at Hanoi, Vietnam, 22-29 June 2009. Several countries from Asia and Africa participated in this workshop.

Climate Services for risk management and adaptation

5.8 The USA's Pacific Regional Integrated Sciences and Assessment (RISA program) supports an integrated program of climate risk management. With an emphasis on reducing Pacific Island vulnerability to climate-related extreme events such as drought, floods and tropical cyclones, RISA focuses heavily on sustaining a dialogue with decision-makers and emphasizes the effective engagement of communities, governments and businesses in developing policies to build resilience and sustainability in key sectors.

6. Regional Association VI (RA VI, Europe)

6.1 The fifteenth session of RA VI took place from 18 to 24 September 2009 in Brussels/Belgium. As a result of a simplified work structure of the Association, aligned with the new structure of the WMO Secretariat to ensure a consistent approach in the implementation of WMO programmes, a Working Group on Climate and Hydrology was established. Its climate-related Terms of References comprise, for example, assistance in the full implementation of the RA VI RCC Network, advice and reporting on climate change research findings and adaptation needs, the further implementation of the RCOF mechanism, guidance on data rescue etc.

Climate Data Rescue and Homogenisation

6.2 WMO, the NMHS of Spain (EAMET) and the University of Rovira i Virgili in Spain sponsored a workshop on data rescue and digitization of climate records in the Mediterranean basin which took place in Tarragona, Spain, 28-30 November 2007. The workshop led to the set up of the Mediterranean Data Rescue initiative (MEDARE) which was subsequently endorsed by EC-LX.

Climate Monitoring and Assessment

6.3 Coordinated by the RA VI WGCRM, and supported by its respective questionnaire on RA VI Operational Climate Monitoring Requirements, RA VI Members reached important progress towards a consistent RA VI-wide climate monitoring capability. The annual WMO Statements on the Status of the Global Climate were prominently supported by RA VI Members and translated into the German and Hungarian languages through voluntary efforts by experts from the NMHSs of Germany and Hungary.

Climate Prediction and Modelling Research

6.4 RA VI Members hosted a number of important events, like the World Modelling Summit for Climate Prediction (May 2008, Reading, UK), the WCRP Seasonal Prediction Workshop (June 2007, Barcelona, Spain), the Workshop on Evaluating and Improving Regional Climate Projections (February 2009, Toulouse, France), etc. and continued hosting the International Project Offices of the WCRP CliC, CLIVAR and SOLAS projects. BALTEX (Baltic Sea Basin) and HyMeX (Mediterranea) regional experiments were carried out under the umbrella of the WCRP Global Energy and Water Cycle Experiment (GEWEX).

Regional Climate Outlook Forums

6.5 With SEECOF-1, the South-Eastern Europe Climate Outlook Forum, RCOF process has been initiated in RA VI. SEECOF-1 was held from 11 to 12 June 2008 in Zagreb, Croatia, co-sponsored by the World Bank, WMO and the NMHSs of Croatia, Germany, Slovenia and Switzerland. SEECOF-2, as part of the European Commission funded activity under the Regional Programme on Disaster Risk Reduction in South-eastern Europe, was held from 23 to 27 November 2009 in Budapest, Hungary. A WMO WCRP IPY Workshop on CLIPS in Polar Regions was held in September 2008 in St. Petersburg, Russian Federation, and developed an agreement to work towards the establishment of a Polar Climate Outlook Forum (PCOF), as an IPY legacy initiative.

Regional Climate Centres

6.6 As a result of a RA VI RCC Implementation Meeting (20-21 October 2008, Geneva, Switzerland), and after extensive communication amongst RA VI Members, the RA VI WGCRM had developed an RA VI RCC Implementation Plan, which was endorsed by the president of RA VI in June 2009. The pilot RA VI RCC Network in its current design consists of three nodes, representing consortia of NMHSs and covering the climate data, climate monitoring and Long-rang Forecasting domains.

Capacity Building including CLIPS training

6.7 Amongst other activities, the RA VI WGCRM organized a Training Workshop on Capacity Building in Climate-related Matters in Yerevan, Armenia from 2 to 5 October 2006. A series of training workshops on the use of satellite data for climate monitoring for technical staff of NMHSs from Central and Eastern Europe was organized under the auspices of the EUMETSAT Satellite Application Facility on Climate Monitoring.

Climate Services for risk management and adaptation

6.8 Three major global WMO conferences directly relevant to climate adaptation were hosted in the Region during the previous intersessional period, namely the WMO Conference on Living with Climate Variability and Change: understanding the uncertainties and managing the risks (Espoo, Finland, 17-21 July 2006), the WMO Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services (Madrid, Spain, 19-22 March 2007) and the World Climate Conference-3 (Geneva, Switzerland, 31 August-4 September 2009).

OVERALL COORDINATION OF CLIMATE ISSUES AND INTER-AGENCY COLLABORATION

1. Current United Nations Climate Change Coordination

1.1 The United Nations System Chief Executives Board for Coordination (CEB) submitted a document to COP-14 in Poznan, December 2008, entitled *'Acting on Climate Change: The UN System Delivering as One'* through its High-Level Committee on Programmes (HLCP). <http://www.un.org/climatechange/pdfs/Acting%20on%20Climate%20Change.pdf>. This document brings together information on climate-related activities undertaken throughout the United Nations system, including its agencies, funds and programmes, as contributed by the respective entities. In this joint practice, Executive Heads in the United Nations system have mobilized the wide range of expertise and knowledge available within their organizations to focus on priority areas and specific deliverables which follow the approach defined in the negotiation and in pursuance of broader mandates and capacities already existing in the system. The initiative brings together expertise and ongoing work in diverse areas ranging from science and technology to agriculture, transport, forestry and disaster risk reduction, to address both mitigation and adaptation. It also brings together the normative, standard setting and knowledge sharing capacities of the system with its operational reach in order to support the most vulnerable. The United Nations system is positioning itself as an effective conduit of international action on an unprecedented scale. The overall objective is to maximize existing synergies, eliminate duplication and overlap, and optimize the impact of the collective effort of the UN system. The convening agencies including WMO have been asked to work in close collaboration with the UNFCCC Secretariat.

UN Climate-Related Activities

<i>Focus areas</i>	<i>Conveners</i>
Adaptation	HLCP collectively
Technology transfer	UNIDO, UN-DESA
Reduction of emissions from deforestation and degradation	(REDD) UNDP, FAO, UNEP
Financing mitigation and adaptation action	UNDP, World Bank Group
Capacity building	UNDP, UNEP
 <i>Cross-cutting areas</i>	
Climate knowledge: science, assessment, monitoring and early warning,	WMO, UNESCO
Supporting global, regional and national action	UN-DESA, UN Regional Commissions, UNDP
Climate-neutral	UN UNEP
Public awareness	UNCG, UNEP
 <i>Sectoral areas</i>	
Energy	UN-Energy
Agriculture	FAO, IFAD, WFP
Water	UN-Water
Oceans	UN-Oceans
Forestry & Fishery	FAO
Transport	IMO, ICAO, UPU
Health	WHO
Disaster Risk Reduction	ISDR, WMO
Human Settlements	UN-Habitat
Education	UNESCO
Industry	UNIDO, WIPO

1.2 WMO and UNESCO jointly take the lead on United Nations system coordination in the area of “science, assessment, monitoring and early warning (knowledge base)” as a key cross-cutting area within the United Nations system. HLCP invited the Secretary-General to continue consultations with UNESCO.

2. UNFCCC

2.1 WMO continues to contribute fully in line with the United Nations climate strategy elements, support the UNFCCC negotiation process within an agreed framework, and contribute to the implementation on the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change and other activities mandated by Congress.

2.2 The WMO core contribution in addressing climate variability and change was founded by the three top-level objectives, which WMO should deliver and communicate in a manner enabling engagement with the United Nations system to support other organizations with its infrastructure and scientific expertise, to fulfill their missions, as well as to draw upon the expertise and resources available from the United Nations system members.

2.3 The UNFCCC at COP-11, Nairobi, adopted the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change (NWP). It is structured around nine work areas, namely: methods and tools; data and observations; climate modeling, scenarios and downscaling; climate related risks and extreme events; socio-economic information; adaptation planning and practices; research; technologies for adaptation; and economic diversification.

2.4 The Nairobi Work Programme is a five year programme (2005-2010) implemented by Parties, intergovernmental and non-governmental organizations, the private sector, communities and other stakeholders. Its objective is to assist all Parties, in particular developing countries, including the least developed countries and small island developing States to:

- (i) Improve their understanding and assessment of impacts, vulnerability and adaptation to climate change;
- (ii) Make informed decisions on practical adaptation actions and measures to respond to climate change on a sound scientific, technical and socio-economic basis, taking into account current and future climate change and variability.
http://unfccc.int/adaptation/sbsta_agenda_item_adaptation/items/3633.php

2.5 In response to the UNFCCC Nairobi Work Programme, WMO submitted a “Concept paper: on the role of WMO and National Meteorological and Hydrometeorological Services (NMHSs) in the Implementation of the Nairobi Work Programme”, in November 2006. WMO has a leading role in the following areas of activities within the NWP: methods and tools; data and observations; climate modeling, scenarios and downscaling; climate related risks and extreme events; and research. http://www.wmo.int/pages/prog/wcp/cca/documents/cca1-concept_paper.pdf

2.6 Every year, WMO participates in the UNFCCC COP and SBSTA sessions and makes statements in the Plenary of those meetings. WMO also organizes side events and prepares Position Papers, specifically for COP sessions. These Papers have improved the understanding of Parties on the role of science for adaptation to climate change and better decision making. <http://www.wmo.int/pages/prog/wcp/cca/documents/PositionpaperpreparedforCOP14.pdf>

2.7 The Bali Action Plan (Decision 1/CP.13), adopted at COP-13 in Bali, December 2007, identifies adaptation as one of the five key building blocks required (shared vision, mitigation, adaptation, technology and financial resources) for a strengthened future response to climate change to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012. The Bali Action Plan is negotiated under

the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) for COP-15. <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3>

2.8 The UNFCCC Bali Action Plan includes specific components of disaster risk reduction strategy, risk management and risk transfer, and NMHSs are engaged with climate change and disaster risk reduction partners to ensure that meteorological and hydrological services are appropriately recognized in the negotiated texts of climate change adaptation.

3. UNEP

UNEP initiated establishing a multifunctional Global Climate Change Adaptation Network and seeks to mobilize the resources of relevant regional centres and ground networks to enhance key institutional capacity for adaptation in a synergistic and coherent manner. The objective is to build climate resilience of vulnerable human systems, ecosystems and economies through the mobilization of knowledge and technologies to support adaptation capacity building, policy-setting, planning and practices, piloting adaptation interventions and planning longer-term adaptation efforts. The focus areas would be ecosystems, arid lands, water, low land mountains and SIDS. WMO participation in the planning process of the proposed network will contribute to UNEP's initiative through GFCS.

The core Network functions are:

- (i) Mobilizing knowledge and technology by improving their availability, accessibility and usability for user-communities at all levels;
- (ii) Piloting adaptation options, demonstrating and disseminating the best practices;
- (iii) Assembling and providing packages of adaptation services including knowledge, technology and capacity, to support adaptation actions taken by governments, practitioners and communities;
- (iv) Supporting the increased integration of adaptation options into national and regional development planning processes and practices;
- (v) Promoting synergies and collaboration between various disciplines, groups of practitioners, sectors, and regions, through the above functions.

4. Future IPCC activities

4.1 IPCC has already started the preparation of the Fifth Assessment cycle (AR5), and in particular the identification of benchmark scenarios (or representative concentration pathways) and a Special Report on managing risks of extreme events to advance climate change adaptation.

4.2 The 30th and 31st sessions of the IPCC took place in Turkey and Indonesia, in April and October 2009, respectively. The IPCC is currently outlining its Fifth Assessment Report (AR5). It will comprise of the contributions of the three IPCC Working Groups and a Synthesis Report which will integrate and synthesize the information. The Working Group I Report will address the physical science basis and would be finalized in 2013. Working Group II will address impacts, adaptation and vulnerabilities and Working Group III mitigation of climate change. The Reports of Working Groups II and III would be finalized in early 2014 and the Synthesis Report at the end of 2014.

4.3 As has been the case in the past, the outline of the AR5 will be developed through a scoping process which involves climate change experts from all relevant disciplines and users of IPCC reports, in particular representatives from governments. Gaps in knowledge, evolving understanding in relevant scientific technical fields as well as information needs of policymakers

will be addressed in this context. As a first step, experts, governments and organizations including WMO involved in the Fourth Assessment Report have been asked to submit comments and observations in writing. WMO has contributed those comments as input to the Scoping Meeting of experts, held in Venice, Italy, in July 2009.

4.4 In a next step governments and participating organizations will be asked to nominate experts, which can act as authors and reviewers for the three Working Groups contributions to the AR5. The selection of authors will be done by the IPCC Bureau as stipulated in the IPCC procedures. The writing process is likely to start in the second half of 2010 for Working Group I and early 2011 for Working Groups II and III. The Panel has requested that the new scenarios and models currently developed by the scientific community are transferred in a timely manner into development of the Fifth Assessment Report, in particular in relation to impacts, adaptation and vulnerability.

4.5 Two Special Reports are currently under preparation. As for all Special Reports, their preparation follows the same procedures as for the Assessment Reports.

4.5.1 The Special Report on “Renewable Energy Sources and Climate Change Mitigation” is carried out under the leadership of the IPCC Working Group III and will be released in 2010. The first Lead authors meeting has been held in January 2009 in San Jose, Brazil, and a second one will convene at the end of August. This Special Report aims to provide a better understanding and broader information on the mitigation potential of renewable energy sources: technological feasibility, economic potential and market status, economic and environmental costs-benefits, impacts on energy security, co-benefits in achieving sustainable development, opportunities and synergies, options and constraints for integration into the energy supply systems and in the societies. It will also assess resources by region and impacts of climate change on these resources.

4.5.2 The preparation of the Special Report on “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation” commenced as its outline was approved by the Panel at its 30th Session last April. This Special Report will consider three types of extreme events: the ones for which climate change has or will amplify occurrence - as floods and droughts; the ones in which trends outside the domain of climate will increase exposure or vulnerability to climate-related extremes - for instance coastal development increasing exposure to storm surges; and new kinds of potentially hazardous events and conditions that may occur as a result of climate change - such as glacial lakes outburst. The report will include 9 chapters. Three of them will focus on managing the risk at different levels in the society: community based responses; national scale and international responses. Two main case studies will be carried out throughout all chapters, while the last chapter will be entirely dedicated to case studies. The UN International Strategy for Disaster Reduction (ISDR) will participate in the preparation of the report which is planned to be released in 2011.

5. GCOS

5.1 The GCOS Secretariat submitted to EC-LXI the draft Progress Report on the Implementation of GCOS 2004-2008, which assessed progress by Members and other “agents of implementation” in advancing the 131 actions specified in the 2004 GCOS report, “Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC”.

5.2 The WMO Executive Council has called on the World Climate Research Programme and the Global Climate Observing System (GCOS) to continue providing coordination of data reprocessing and reanalysis efforts, and urged them and sponsors to continue their support for efforts spanning the full record of instrumental observation and for the climate system as a whole. The president of CCI has regularly attended the GCOS Steering Committee meetings since 2006 and enhanced interaction with that body on systematic observations.

5.3 The new vision for the space-based GOS will address climate observation needs among its core objectives and a high-level goal that there should be no gap in the satellite-based climate records, in accordance with the GCOS Climate Monitoring Principles. The homogeneity of such records should be secured through overlap, as appropriate, and intercomparison of consecutive missions, continuity of instrument capability, and appropriate ground-truthing efforts.

6. WCRP

6.1 The World Climate Research Programme (WCRP) had a review meeting with ICSU in 2008. Among a number of issues, the review had emphasized:

- (i) Societal needs of the research that will underpin mitigation strategies and climate adaptation;
- (ii) Societal and policy relevance that will sustain the Programme in the long run and make the necessary resources easier to acquire;
- (iii) Implementation plan for activities emerging from the Strategic Framework in 2005 as well as the observations of accelerated climate change.

6.2 The WCRP has multiple mechanisms for partnerships, moving from basic research to applied research. It coordinates international efforts in bottom up approach and provides interface. Nevertheless, the user groups should be defined more clearly. In line with its long-term plans, WCRP input to WCC-3 furthered seamless research on seasonal/interannual to decadal timescale prediction through centennial prediction timescale, with an emphasis on supporting the transition from basic research to the applications domain. Presently the accuracy for decadal prediction does not meet the needs for policy advice and further research efforts are being made to address this. The JSC meeting focuses on implementation of the WCRP plan in two phases, namely, from now to 2013 and post 2013 period.

6.3 There is close interaction between the Commission for Climatology (Open Programme Area Group on Monitoring and Analysis of Climate Variability and Change) and other relevant WMO Programmes, in particular WCRP/CLIVAR and JCOMM. That collaboration led to excellent and sustained work on climate change indices with direct benefits to the Members' efforts in assessing and monitoring climate extremes, regionally and locally, as well as to the IPCC work. As a result it is expected that the CCI/CLIVAR/JCOMM Joint Expert Team work plan for the current CCI intersessional period will continue to assist NMHSs in developing and least developed countries in using the knowledge developed through that work plan. Furthermore, the Technical Conference, preceding CCI-XV, in Antalya, February 2010 will include a one-day joint meeting between the CCI and the Joint Scientific Committee (JSC) for the World Climate Research Programme (WCRP). The Conference will focus on how both climate variability and change impact on sustainable development, and on how the WCRP climate research community and other partners can work with the Commission for Climatology (CCI) to improve WMO's responses to the needs of Society in this regard.

6.4 The workshop on Future Climate Change Research and Observations: GCOS, WCRP and IGBP Learning from the IPCC Fourth Assessment Report (Sydney, Australia, 4-6 October 2007) recognized an increasing demand by decision makers for climate change information required for adaptation and the assessment of impacts and vulnerability, and that significant gaps still existed in our ability to observe, understand and predict climate with the required level of detail. It called on WCRP and its projects to develop strategies for future climate research that would be aimed at continuous substantiation of climate predictions and projections and the workshop identified requirements of communities studying impacts, vulnerability and means of adaptation to climate change. The workshop recognized the long-term climate record as a key foundation for adaptation and reinforced the high importance of adequate support to existing

GCOS networks for effective use of both research-based and operational observations in climate monitoring.

6.5 WMO Executive Council has requested the Commission for Climatology and relevant WMO Programmes, including the co-sponsored WCRP and GCOS, to identify current activities relevant to adaptation and gaps to be addressed for provision for the needs of key socio-economic sectors for climate information for climate-risk management, and to take steps to incorporate those in future priority setting and planning. In particular, there is a need to assist NMHSs in developing reliable climate scenarios, and to assess the inherent uncertainty. Those efforts had to address, among others, WMO commitments to the UNFCCC Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change, and cover methods and tools (for example, RCOFs, CLIPS, downscaling and scenarios) and data and observations (DARE, data exchange, climate system monitoring, etc.), and be in line with the recommendations of the WMO Conference on Living With Climate Variability and Change: understanding the uncertainties and managing the risks (Espoo, Finland, 17–21 July 2006).

6.6 There is a need to foster the transition of results from climate research to the operational practices of NMHSs. On this basis the Commission for Climatology and the WCRP Joint Scientific Committee will establish a mechanism to identify the requirements of Members for, and to facilitate development and operational implementation by Members of, appropriate climate prediction techniques, and to provide technical guidance to NMHSs in contributing to solutions to problems associated with climate variability and climate change, and with climate-related hazards.

WMO STRATEGIC PLANNING AND RESULTS-BASED MANAGEMENT

1. Implications of WMO Results-based Management for the CCI

1.1 The Fifteenth World Meteorological Congress (Cg-XV) approved a new framework for the Results-based Management (RBM) of the Organization. The approval of the RBM approach included the implementation from 2008 of the Strategic Plan that defined three Top Level Objectives, five Strategic Thrusts and eleven Organization-wide Expected Results. The Operating Plan and the Results-based Budget for the period 2008-2011 direct the programmatic implementation activities of the Organization.

1.2 Cg-XV, through Resolution 27 (Cg-XV) on the WMO Strategic Plan, requested the technical commissions to adhere to the direction and priorities set forth in the Strategic Plan and to organize their programme structures and activities so as to pursue the top-level objectives and to achieve the expected results.

1.3 The sixtieth session of the Executive Council (EC-LXI, June 2009) requested that within the WMO strategic planning process, each technical commission should prepare a note on lessons learned, experiences gained and prospective challenges in the course of the implementation of the current WMO Strategic Plan, which would be used in the preparation of the next Plan. It agreed that technical commissions should develop Operating Plans for 2012–2015 based on the experience gained through the development of the Operating Plan for the fifteenth financial period.

1.4 The EC-LXI noted that the presidents of technical commissions (PTC) had held extensive discussions on RBM and actions towards the improvement of the efficiency and effectiveness of the Commissions and aligning activities to the WMO Strategic Plan during their meeting held in Geneva, Switzerland from 2 to 4 February 2009. It noted that the PTC recognizes the cross-cutting nature and the principal and important role of the WMO Programmes. It noted with satisfaction the suggestions given by PTC for consideration by the Executive Council Working Group on Strategic and Operational Planning (EC WG/SOP) indicating the need for further exploring the outlined concept, which suggested alternatives for conducting technical commission meetings.

2. Monitoring and Evaluation of the WCP

The sixtieth session of the WMO Executive Council (EC-LX, June 2008)

2.1 EC-LX requested the Secretary-General to pursue the development of a comprehensive WMO Monitoring and Evaluation (M&E) System Plan in a practicable, feasible and cost-effective way for presentation at its sixty-first session (June 2009).

2.2 The Council further decided that the development of the WMO M&E System should, inter alia, take into account lessons learned and M&E tools and methodologies available in a number of NMHSs.

The sixty-first session of the WMO Executive Council (EC-LXI, June 2009)

2.3 The Council noted the report of its Working Group on WMO Strategic and Operational Planning (Geneva, 16–18 March 2009) on matters related to the WMO Monitoring and Evaluation (M&E) Plan. The Council stressed the importance of the WMO M&E System for a successful implementation of RBM in WMO and endorsed the following recommendations of its WG/SOP:

- (a) The WMO M&E Plan should be used as the action plan for the development and Implementation of the WMO M&E System, including a Preparatory Phase (2009), a

M&E Pilot Phase (2010–2011) and the full M&E System (as of 2012), with reporting by the Secretary-General to EC on progress made;

(b) Selection of Expected Result 5 and Expected Result 8 for the Pilot Phase (2010–2011).

2.4 The Council requested the technical commissions to contribute to the M&E process through collecting and assessing monitoring and performance information related to programmes under their technical responsibility.

2.5 The Council requested that an evaluation of the Pilot Phase be conducted and submitted to Cg-XVI. In this context, the Council noted that the Secretariat had already developed the M&E framework for Expected Result 5, which would be used in the Pilot Phase. It reiterated the need for a cost prudent approach for the implementation of the M&E System and requested that the evaluation of the Pilots include a realistic assessment of the costs and workload for the Full Implementation Phase of the System.

3. WMO Strategic and Operating Plans (2012-2015)

3.1 The strategic direction of WMO in its planning is driven by a set of Global Societal Needs (GSNs) which form an over-arching framework for defining its strategic thrusts and high-level expected results. Through its Strategic Plan, the WMO focuses its planning, programmes and the activities, especially those of the NMHSs, on achieving results that will provide the best possible support to the safety and welfare of its Member countries and make a contribution to meeting the GSNs, including enhancing the global economy and addressing global environmental issues, through the provision of information and services. WMO has identified 5 strategic thrusts and 8 Expected Results to address these GSNs (see Table 1). A set of strategic priority areas have also been identified to define the focus for the planning period 2012 to 2015. They include:

3.1.1 Strategic Priority Area 1: Global Framework for Climate Services

The Heads of States and Governments, Ministers and Heads of Delegations present at the World Climate Conference-3 (WCC-3), decided to establish a Global Framework for Climate Services to help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the growing array of climate prediction and information services made possible by recent and emerging developments in international climate science and technology.

3.1.2 Strategic Priority Area 2: Disaster Risk Reduction

Disaster risk reduction is a strategic priority for WMO due to the fact that major disasters exact very high costs and dislocations in many countries, especially in developing and least developed countries and is at the core of the WMO mission and those of the NMHSs. WMO will address the information needs and requirements of the disaster risk management community, effectively and in a timely fashion, through a coordinated approach, and working with its partners.

3.1.3 Strategic Priority Area 3: Capacity Building

Many developing and least developed countries lack the institutional infrastructure to provide even the most basic services to their governments and society. Institutional capacity-building is a priority for these countries to provide the necessary national capabilities and expertise for addressing environmental and development issues. Management education and training, as well as scientific and technical skills development, are essential.

3.1.4 Strategic Priority Area 4: Weather, Climate and Water Research, Predictions and Services

The WMO Executive Council established a Task Team on Research (EC-RTT) to report on ways to “strengthen and promote the linkages between climate, weather, water and environmental research to enable NMHS and other related services to provide improved services in the next decade”. The EC-RTT recommended a major change in the paradigm for prediction research, recognizing that the traditional boundaries between weather forecasting, seasonal forecasting and climate prediction have eroded while the need for information from prediction systems has expanded to include new and novel variables and products, particularly with respect to atmospheric constituents and climate change.

3.1.5 Strategic Priority Area 5: WMO Integrated Global Observing System (WIGOS)

One of the major purposes of the World Meteorological Organization (WMO), as laid down in its Convention, is “To facilitate worldwide cooperation in the establishment of networks of stations for the making of meteorological observations as well as hydrological and other geophysical observations related to meteorology, and to promote the establishment and maintenance of centres charged with the provision of meteorological and related services. Accordingly, WMO Members operate, in a coordinated manner, complex networks in space, the atmosphere, on land and over oceans.

The following schematic diagram shows the global societal needs, strategic thrusts and distribution of Expected Results.

Table 1: Global Societal Needs, Strategic Thrusts and Organization-wide Expected Results

3 Global Societal Needs	Strategic Thrusts	8 Expected Results
1. Improved protection of life and property (related to impacts of hazardous weather, climate, water and other environmental events and increased safety of transport on land, at sea and in the air).	I. Improving service quality and service delivery.	1. Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate and water and related environmental predictions, information and services in response to users' needs and to enable their use in decision-making by all relevant societal sectors.
		2. Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate and water and related environmental elements.
		3. Enhanced capabilities of NMHSs to produce better weather, climate, and water and related environmental information, predictions and warnings to support in particular climate impact and adaptation strategies.
		4. Enhanced capabilities of Members to access, develop, implement and use integrated and interoperable surface-based and space-based systems for weather, climate and hydrological observations as well as related environmental observations, based on world standards set by WMO.
2. Poverty alleviation, sustained livelihoods and economic growth (in connection with the Millennium Development Goals) including improved health and social well-being of citizens (related to weather, climate, water and environmental events and influence).	II. Advancing scientific research and application as well as development and implementation of technology	5. Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and environment science and technology development.
	III. Strengthening Capacity Building	6. Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates.
	IV. Building and enhancing partnerships and cooperation.	7. New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategies.
V. Strengthening good governance.		8. An effective and efficient Organization.
3. Sustainable use of natural resources and improved environmental quality.		

4. WMO Operating Plan 2012–2015

The WMO Operating Plan is designed to translate the top-level objectives, expected results and key outcomes described in the Strategic Plan into specific initiatives and projects, which are needed to achieve the desired outcomes. The WMO Operating Plan, which serves as a foundation for the WMO results-based budget, distinguishes the contribution of WMO Members, technical commissions, regional associations and the Secretariat.

The WMO Operating Plan is build upon the following elements:

- Programme deliverables and activities, which provide specific approaches to address the expected results and key outcomes;
 - Cross-cutting initiatives and other mechanisms for achieving the expected results;
 - Performance metrics to assess progress in the implementation of the WMO Operating Plan;
 - Mechanisms for monitoring and evaluating the implementation of the WMO Operating Plan.
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WMO QUALITY MANAGEMENT FRAMEWORK

1. What is a Quality Management System?

The ultimate goal of a QMS is to encourage and to support the continual improvement of the quality of the delivered services and products. A QMS consists of a set of rules (procedures) that an organization decides to follow in order to achieve its objectives related to the quality of its products. Such a system contains, for example, rules concerning the general management of the organization and makes reference to the technical procedures which have to be followed, the quality controls which are performed on the products or services and the actions to be taken if the products or services do not comply with the requested specifications. In order to ensure the achievement of the quality objectives, it is essential that clear and unambiguous procedures are used for each specific task. For access to 'Explanatory circular on the WMO Quality Management Framework', visit the following link:

http://www.wmo.int/pages/prog/www/QMF-Web/Documentation/Other/QMF-circ_en.pdf

2. WMO Quality Management Framework and ISO

WMO is encouraging NMHSs to implement Quality Management Systems. In this context, it should be noted that the development of a WMO Quality Management Framework and the implementation of ISO 9001 are complementary and not mutually exclusive activities. However, certification according to the ISO 9001 standard has an element of international credibility and recognition that must not be ignored. EC-LXI adopted a resolution (EC-LXI, Resolution 8, Procedures to be followed in proposing common WMO/ISO technical Standards), in 2009. The resolution decides that for each proposed common Standard; the responsible body initiating the proposal should prepare comprehensive supporting documentation that includes; the benefit/cost implications to Members for adoption of WMO/ISO Standard, a full description of the cross-cutting elements, and an assessment of which elements in the common Standard could create a risk if adopted.

3. Basic Decisions and Rationale

3.1 Congress (Cg-XIV, Resolution 27) decided that WMO should work toward a Quality Management Framework for NMHSs that would eventually include and develop the following distinct though related elements:

- WMO technical standards;
- Quality management systems including quality control;
- Certification procedures.

3.2 The WMO Quality Management Framework should enable the provision of early and continuing relevant advice to Members on developing their Quality Management Systems. The need to introduce Quality Management (QM) in a systematic manner has been recognized by WMO Members and programme officers for some time and is reflected in many global and regional standards, namely those established by the regulatory documents of WMO (i.e. Technical Regulations, Manuals) and by many publications issued under the WMO scientific and technical programmes in the form of Guides.

4. The Main Steps in Setting up a Quality Management System

The introduction of a Quality Management System can be divided into five phases. Beforehand, the management of the NMHSs has to decide whether it considers it necessary to

consult an external consultant. This can help in defining the key processes, give advice as to how to implement the QM system into a hierarchical structure or simply brief the top and middle management on their role and understanding of QM.

(a) Phase 1 "Quality Policy"

The top management defines the quality policy and the quality objectives aligned with WMO argued standard policy. The quality policy needs to be understood and accepted by all staff members. The quality objectives should be measurable by quality indices, e.g., data availability, data quality, timeliness or customer satisfaction.

(b) Phase 2 "Education and Training"

Well-trained and well-informed staff members are very important for the introduction of a QMS. The objective of phase 2 is to promote and maintain staff motivation, systematic human resource development and to introduce a QM information mechanism within the organization. The management is responsible for filling in the staff position (or positions) of a quality manager and to install a QM team.

(c) Phase 3 "Process Analysis"

The processes have to be described and documented. The process analysis defines all sub-processes and records as well as the existing quality control procedures. The objective of this phase is to perform an inventory of the processes and help to prioritize the processes.

(d) Phase 4 "Realization and Implementation"

Processes have to be optimized and be focused on customers. Every single activity of a process has to be checked for standards, continuity with the following activities and for a customer-oriented output. The aim of this phase is to define the quality objectives, to create an interface to the customers, to introduce a document management system and to set-up a quality assurance system.

(e) Phase 5 "Evaluation and Process Control"

All staff members have been informed and trained appropriately. The quality objectives and the quality indices have been established and serve as indicator and measure for quality. At this stage, it is highly advisable to perform an internal audit or a pre-audit to close some possible gaps in the QM system. The objective for this phase is to assess oneself and prove that you are able to continually improve your QM system.

5. Quality Management Activities of WMO

In preparation of the Quality Management related activities of the WMO programme bodies and the Intercommission Task Team on Quality Management (ICTT/QM), the WMO Secretariat conducted a survey among Members on their actions and plans relating to the introduction of QM Systems on the level of NMHSs to which many Members responded positively. The results were presented to EC-LVI which shows that most NMHSs have firm plans to establish QM Systems, several have already obtained certification in accordance with ISO standards, and others are preparing to follow within the next few years. The survey also provided valuable information on the rationale for establishing QM as an element of NMHSs policy, and on the requirements for assistance by WMO.

6. Benefits from a Quality Management System

The benefits resulting from having a quality management system are wide-ranging. Some of them are:

- Optimizes techniques to customers needs;
- Improves customer confidence and satisfaction (helps to keep customers);
- Provides better controls over operations (results are easier to control);
- Continual process improvement;
- Increases productivity and efficiency;
- Ensures prompt and effective action on faults or complaints;
- Clarifies working structure;
- Improves teamwork and communication;
- Enhances corporate image and quality awareness in the organization;
- Ensures availability of proper documentation;
- Enables quick start-up time;
- Provides systematic training to staff;
- Helps in marketing services;
- Assurance of effective management to directors and shareholders/owners.

7. Conclusion

The experience gained with the implementation of QM systems and certification in accordance with ISO standards clearly showed that a systematic application to the WMO scientific and technical programmes has a great potential for improving the efficiency of the organization of the NMHSs. The introduction of QM principles and the creation of a QM framework is therefore becoming a policy element of the international cooperation in meteorology and hydrology. Apart from the benefits NMHSs, or individual programmes, may gain from QM systems, WMO through the creation of a QM framework will improve the efficiency of its programmes and thereby foster international collaboration in meteorology and hydrology on all scales. For additional information on Quality Management Framework of WMO, visit the following link:

<http://www.wmo.int/pages/prog/www/QMF-Web/Documentation/Other/SomeConsiderations.pdf>

ACTIVITIES OF THE PRESIDENT AND THE CCI MANAGEMENT GROUP

1. The CCI Management Group met in February 2006 and March 2009 during the intersessional period. The first meeting mainly reviewed the operational aspects of the new WMO structure and priorities for the Commission's work programme, status and plans of the OPAGs and WCP support for the work of the Commission. The second meeting had a stock taking approach towards actions and achievements which have taken place since the beginning of the fourteenth period. It also reviewed the actions which needed to be completed. The Management Group had also discussed the Global Framework for Climate Services (GFCS) as an outcome of WCC-3 and the way in which CCI could contribute both to the Conference and to the Framework as well. The last but most important item of discussion in the Management Group meeting in 2009 was preparations for CCI-XV, proposed structure for the next period, workplan and Technical Conference preceding CCI-XV.

<http://www.wmo.int/pages/prog/wcp/cca/ClimateCoordinationActivitiesPreviousMeetings.html>

2. The president of CCI issued four circular letters in the intersessional period, all of which were posted on the web in English and French languages.

http://www.wmo.int/pages/prog/wcp/ccl/documents/CCI-213-CLPA-CCA-CCI_9832_en.pdf

http://www.wmo.int/pages/prog/wcp/ccl/documents/ccl212clpa-cca-ccl_15274_en.pdf

http://www.wmo.int/pages/prog/wcp/ccl/documents/CircularletterNo.2_enFINAL.doc

http://www.wmo.int/pages/prog/wcp/ccl/documents/CircularletterNo.1_enFINAL.doc

3. The following is a list of CCI president activities and achievements: participation to WMO Congress and EC sessions, including their subsidiary bodies, WMO co-sponsored meetings, CCI body sessions, WMO inter-commission sessions, Inter-agency and International programmes, main presentations and publications.

The meeting noted that the president of the Commission, in cooperation with other experts within the Commission, had produced a large number of climate-related scientific publications.

SUMMARY OF ACTIVITIES AND MAJOR ACHIEVEMENTS

- Coordination of CCI involving daily liaison with the WMO Secretariat, and frequent contacts with OPAG and ET Chairs;
- Contribution to WMO cross-cutting themes (Climate, Water and Environment; Disaster Prevention and Mitigation; Quality management; GCOS; WMO Space programme; Evolution of SMHNs and WMO; Role of WMO and NMHSs in the implementation of the UNFCCC programme on impacts and adaptation to climate change;
- Participation to ET meetings (1.1, 1.2, 2.1, 2.2, 2.3, 3.3, 4.1, 4.2, 5.2);
- Participation to CCI/CBS Inter-Commission work for updating the Manual on the GDPFS with amendments related to WMO designation of Regional Climate Centres (RCCs);
- Participation to ICTT-QMF work, especially for drafting a new volume of the WMO Technical Regulations on Quality Management;
- Deep involvement in the 3rd edition of the Guide to Climatological Practices (a draft had been made available on line to Cg-XV);
- Co-editor of upcoming WHO/WMO Guidance on Heat Health Warning Systems (a draft had been made available on line to Cg-XV);
- Involvement in MEDARE (co-chair of Steering Group);
- Participation to some brainstorming on ClimDev Africa;
- Preparation of and attendance to relevant meetings and conferences (e.g. Espoo, Madrid, Geneva, ...), and contribution to several publications (see below);
- In particular, member of the WCC-3 POC then of the WIOC and responsible person for sessions on Seasonal to inter-annual variability, on Mega Cities, and on Climate Services (Nations and Regions);
- Involvement in the development of the « WMO Initiative to Support Climate Change Adaptation (WISCCA) » in cooperation with CLW/CLPA branch, adopted by EC-LX, and its evolution towards a concept note on a Global Framework for Climate Services, which was intended to represent a basis for shaping the outcomes of WCC-3;
- Preparation of the History of CCI: Synthesis of CCI-XIII et XIV for inclusion in draft, and liaison with John Maunder, Morley Thomas, other contributors and WMO Secretariat;
- Review of papers submitted to international peer-reviewed journals and of projects reports (e.g. World Bank);
- Ongoing participation to the update of the IAEA « Safety Guide on Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations »;
- Validation of several world or continental records, with some others, in the framework of activities led by our Rapporteur on Climate Extremes Randy Cerveny (a very challenging and interesting activity!);
- Facilitation of a regional ETCCDI meeting (19-23 October 2009) for the Indian Ocean area (with financial support from French government);

- Facilitation of the ETCCDI workshop on Extremes (May 2008, De Bilt, The Netherlands);
- Discussions for implementation of RA VI RCC;
- Preparation of CCI-XV;
- Review of IPCC AR4 WG1 report for French government.

MEETINGS

1. WMO Congress and EC body sessions

- 15th WMO Congress (14-25/05/2007) and associated side meetings
- WMO Executive Council (EC) (Geneva, 20-30/06/2006, 18-27/06/2008, 2-9/06/2009)
- WCC-3 Provisional Organizing Committee (POC/WCC-3) (Geneva, 27-28/03/2006 and 27-28/11/2006)
- WCC-3 International Organizing Committee (Geneva, 3-5/09/2008, Bonn 16-18/03/2009): responsibility of parallel sessions on “Understanding and Predicting Seasonal to Inter-annual Climate Variability”, “Climate Information for Improved Planning and Management of Mega Cities”, and “Climate Services (Nations and Regions)”
- 7th session of EC WG on Climate and Environment (EC-AGCE-VII) (Geneva, 23-24/02/2006)
- EC WG on Climate and Related Water and Environmental Matters (EC WG CWE, Geneva, 27-29/03/2008, 11-13/02/2009, 21-23/10/09)
- 1st session of EC WG on Evolution of SMHNs and WMO (EC WG-ENW) (Geneva, 24-28/04/2006)
- EC Advisory Group on Disaster Prevention and Mitigation (EC-AG-DPM), (Geneva, 30/01/2007): 4 CCI projects were part of the 42 actions identified by DPM
- EC Task Team on the Integration of the WMO Observation Systems (EC-TT-WIGOS), Geneva, 31/01-2/02/2007
- Informal Meeting of Presidents of Regional Associations and Presidents of Technical Commissions (I-PRA/PTC), (Geneva, 22/05/2007, 25/06/2008, 4/06/2009)
- EC WG on WMO Strategic and Operational Planning (EC WG SOP, Geneva, 27-29/02/2008)

2. WMO (co-)Sponsored Meetings/Conferences

- Conference “Living with Climate Variability and Change (LWCVC): Understanding the Uncertainties and Managing the Risks” (Espoo, Finland, 17-21/07/2006)
- Workshop on the Role of WMO/NMHSs in the Implementation of the UNFCCC Five-year Programme on Impacts, Vulnerability, and Adaptation to Climate Change (Geneva, Switzerland, 17-18/10/2006) (preparation of the WMO statement to be delivered by WMO at SBSTA-25 in Nairobi, Kenya)
- WMO Regional Workshop on Social and Economic Benefits of Meteorological and Related Services to Society, Zagreb, Croatia, 5-6/02/2007
- International Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services, Madrid, Spain, 19-22/03/2007
- The Greater Horn of Africa 20th Climate Outlook Forum (GHACOF20) for September-December 2007 rainfall season, Nairobi, Kenya, 5-7/09/2007
- GCOS Steering Committee: Paris, 16-19/10/ 2007; Geneva, 14-17/10/2008; Paris, 27-30/10/2009
- International Symposium on the Public Weather Services (PWS): A key to Service Delivery, Geneva, Switzerland, 3-5/12/2007
- WCRP Joint Steering Committee (JSC), Arcachon, France, 31 March- 3 April 2008; Univ. Maryland, USA, 6-9/04/2009
- 1st Workshop on Climate Watches in RA III (Guayaquil, Ecuador, 8-11/12/2008)
- Workshop on Climate Watches in RA II with focus on monsoon affected areas, Beijing, China, 10-13/11/2009
- Third World Climate Conference (WCC-3), Geneva, 31/08 to 4/09/2009

3. CCI body sessions

- CCI Management Group (Geneva, Switzerland, 13-14/02/2006, 23-25/03/2009)
- Informal meeting of CCI Management Group (Espoo, Finland, 21/07/2006)
- Informal CCI MG meeting (teleconference on 17/12/2007) : progress report at mid term
- CCI Implementation and Coordination Team (ICT), Geneva, Switzerland, 9-11/10/2007. Main items addressed: designation and implementation of RCCs, Climate watches, CLIPS update
- Meeting of the Expert Team 5.2 on the Guide to Climatological Practices (CCI-GCP)(Geneva, Switzerland, 3-7/04/2006; 7-8/09/2009)
- Meeting of the Expert Team 2.2 on Climate Monitoring including satellite and marine data and products (Tarragona, Spain, 20-22/09/2006)
- Meeting of the Expert Team 4.1 on Climate and Health (London, UK, 20-22/11/2006). The principle deliverables will be the « Guidelines on Heat-Health Warning Systems »
- Meeting of the Expert Team 4.1 on Climate and Health, Geneva, Switzerland, 28/02-2/03/2007. Harmonization of contributions in view of publication
- Meeting of the Expert Team 1.2 on Observing Requirements and Standards for Climate, Geneva, Switzerland, 28-30/03/2007
- Meeting of the Expert Team 3.2 on CLIPS Operations, Verification and Application Services (teleconference), 19/06/2007
- Meeting of Expert Team 4.2 on Climate and Energy, Geneva, Switzerland, 19-21/11/2007
- International Workshop on Rescue and Digitization of Climate Records in the Mediterranean Basin (MEDARE), with ET 2.2 and 2.3. Tarragona, Spain, 28-30/11/2007
- WMO CLIPS Workshop on Communicating about ENSO: Toward Developing a Common Understanding (with ET 3.3); Honolulu, Hawaii, USA, 8-10/04/2008
- Workshop on Extremes in a Changing Climate, ETCCDI (ET 2.1), 13-16/05/2008, De Bilt, The Netherlands
- ET 1.1 expert meeting on WCP requirements for Metadata, 11-13/03/2008
- Meeting of the ET 3.1 on Research needs (teleconference): 22/01/2009
- Meeting of External Reviewers of the Guide to Climatological Practices, Geneva, 6-9/09/2009

4. WMO inter-commission meetings

- Meetings of Presidents of Technical Commissions (PTC), (Geneva, 2-3/02/2007, 18-20/02/2008, 2-4/02/2009)
- Informal Meeting of Presidents of Technical Commissions (I-PTC), (Geneva, 14/05/2007, 24/06/2008)
- Inter-commission Task Team on Quality Management Framework (ICTT-QMF) (Geneva, 25-27/04/2006, 15-17/01/2007, 28-30/10/2008). Note agreement with ISO recognizing WMO as a certification body, adoption of 8 quality management principles, and decision concerning management of mandatory publications (need for a Rapporteur in the future). The ICTT-QMF also proposed the structure and content of a new volume (IV) of the WMO Technical Regulations (WMO-No. 49) on Quality Management
- Inter-commission Task Team (CBS-CCI) on Regional Climate Centres (RCCs) (Geneva, 21-22/01/2008): update of the Manual on the Global Data-processing and Forecasting System (GDPFS) to include designation and functionalities of RCCs. Final version has been endorsed by CBS and then EC

5. Inter-Agencies and International Programmes

- EU COST Action 730 “Towards a Universal Thermal Climate Index UTCI for Assessing the Thermal Environment of the Human Being”, Ljubljana, 6-7/09/2006. Final meeting of this action took place at WMO in Geneva (15-16/04/2009). Final report to be published as a WMO publication
- WHO-Europe EUROHEAT Meeting (Budapest, 18-19/05/2006), focused on prevention of heat waves (representing WMO)
- Meetings on IAEA Safety Guide on « Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations » (IAEA Headquarters, Vienna, Austria, 17-21/11/2008 ; 30/03 to 3/04/2009)

6. EUMETNET/EMS Meetings

- EMS/ECAC Conference (European Meteorological Society/European Conference on Applied Climatology) (Ljubljana, 4-8/09/2006; Amsterdam, 29/09-3/10/2008). Co-convenor of Session 12 “International climate projects and programmes” and AC1: “Urban and building environments, tourism and recreation, health”
- ECSN Advisory Committee (EAC), Madrid, 23/03/2007 to establish EMS7/ECAM8 Programme (El Escorial, Spain, 1- 5/10/2007)
- Convenor of session: 10 (Nicholas Georgescu-Roegen session) “Social, economical and cultural aspects of severe storms” of the *4th European Conference on Severe Storms (ECSS 2007)*, Trieste, Italy, 10-14/09/2007

MAIN PRESENTATIONS

P. Bessemoulin: Perspectives on the benefits of NMHSs to social and economic development. Keynote speech at the Regional Workshop on Social and Economic Benefits of Meteorological and Related Services to Society, Zagreb, Croatia, 5-6/02/2007.

P. Bessemoulin: Societal Benefits of Climate Information and Services. International Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services, Madrid, Spain, 19-22/03/2007.

P. Bessemoulin: Presentation of the CCI activity report over the 14th financial period. WMO Congress XV, Geneva, Switzerland, 7-26/05/2007.

P. Bessemoulin: Action Plan from the Madrid WMO Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services". The Greater Horn of Africa 20th Climate Outlook Forum (GHACOF20) for September-December 2007 rainfall season, Nairobi, Kenya, 5-7/09/2007.

P. Bessemoulin: Development of User-Driven Climate Products and Services for Key Socio-Economic Sector Applications. International Symposium on the Public Weather Services (PWS): A key to Service Delivery, Geneva, Switzerland, 3-5/12/2007.

P. Bessemoulin: Joint CCI/Clivar/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). WCRP Joint Steering Committee, Arcachon, France, 31/03-3/04/2008.

P. Bessemoulin: WMO/CCI perspectives for CCI ET 2.1 (ETCCDI). Workshop on Extremes in a Changing Climate, De Bilt, The Netherlands, 13-16/05/2008.

P. Bessemoulin: i) Climate Variability and Climate change; Key issues including current status on extremes;
ii) The WMO Commission for Climatology : Vision, Structure and Work Plan. *1st Workshop on Climate Watches in RA III*, Guayaquil, Ecuador, 8-11/12/2008.

P. Bessemoulin: WMO DARE activities. International conference organized by the French National Library, Paris, France, 5-7/03/2009.

P. Bessemoulin: WMO Perspectives on Weather, Climate, Water and Environment Observation and Monitoring over the next 15 years. Senior level Meeting Global setting for European Environmental Monitoring: Measuring what we must manage. Copenhagen, Denmark, European Environment Agency, 13-15 May 2009.

P. Bessemoulin: i) Climate Variability and Climate change; Key issues including current status on extremes; ii) The WMO Commission for Climatology : Vision, structure and work plan. *Workshop on Climate Watches in RA II*, Beijing, China, 10-13/11/2009.

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ACTIVITIES OF THE VICE-PRESIDENT AND THE IMPLEMENTATION COORDINATION TEAM

1. The CCI Implementation/Coordination Team met in October 2007 during the intersessional period. Chaired by the vice-president of the Commission, the team was informed of the status and plans of the OPAGs and the regional association's Working Groups on Climate-related Matters and discussed activities related to the work of these groups requiring coordination and/or implementation. Amongst these activities were Regional Climate Centres, CLIPS, Climate Watches and Capacity Building. The ICT agreed on a set of respective recommendations as well as its workplan.
2. The ICT proved to be an important information exchange platform between the Commission and the regional associations, allowing for effective transfer of both CCI activities into regional projects and operations and regional requirements into the Commission's work.
3. As a key issue, the Team discussed steps towards the formal designation of Regional Climate Centres. The meeting proposed related coordination mechanisms with CBS and developed a set of mandatory and highly recommended functions of RCCs. The ICT agreed on a follow-on meeting of CCI, CBS and regional experts, which successfully developed the amendments required for the Manual on the GDPFS to support formal WMO designation of RCCs or RCC-Networks.
4. Dr Wang Shouroung, vice-president of the Commission and chair of the CCI Implementation/Coordination Team (ICT) discharged his duties during the intersessional period which mainly fell in four areas.
5. The vice-president of the Commission supported capacity building on regional and global climate monitoring, prediction and climate information application and services, especially those capabilities on monitoring and early warning on extreme climate events in China and Asia. Under his guidance, the WMO East Asian Monsoon Activity Center (EAMAC) and WMO Global Producing Center for Long Range Forecasts (GPC-LRF) in Beijing are both in operating well. The Regional Climate Centres in RA II (BCC and TCC) play an important role in CLIPS and CLIMATE WATCH under the CCI framework, including the tailored climate service products. The RA II RCC Network home page, hosted by both BCC and TCC are in good shape.
6. The vice-president of the Commission was involved in organizing activities related to the 4th and 5th IPCC Assessment Reports. He nominated lead authors and authors from China to contribute to the preparation of various parts of the 5th Assessment Report. He emphasized that experts from the Commission and NMHSs should be involved in the IPCC climate impact assessment processes. A national project entitled "Studies on Strategy of Adaptation to Climate Change in China" was supervised by the vice-president of CCI, and a special report will soon be published.
7. He served as a member of the WCC-3 International Organizing Committee (WIOC), actively promoted the WCC-3 in CMA and identified scientists to contribute to different WCC-3 sessions. Furthermore, he broadly disseminated the conference information. In WCC-3, he delivered a talk on "Developing a Global Climate Service System to Enhance Climate Hazard Risk Management" in the round table meeting. The round table emphasized the importance of improving the accuracy of climate predictions and enhancing the capacity-building for climate hazard risk assessment and early warning services. After WCC-3, the long term development plans of climate operation and research in China and the strategy of Beijing RCC development are formulated under his guidance.

8 Dr Wang noted that from 2005 to 2009, five sessions of Forum on Regional Climate monitoring, prediction and assessment in Asian Region (FOCRAII) were successfully held and provided a platform for sharing the experience of seasonal to interannual climate prediction methodologies and systems as well as prediction products. In addition, other climate forums and workshops, Joint Meeting on East Asian Winter Monsoon, CLIPS Training Workshop for RA II (Eastern Part) and international Workshop on the Application of Advanced Climate Information in the Asia-Pacific Region have been organized in Asian countries. As a consequence the social awareness on climate prediction and climate information application has been improved.

9. The vice-president of the Commission attended the second meeting of the CCI Management Group, February 2009 and presented his progress report of activities.

ACTIVITIES OF THE OPAGs

1. OPAG 1 – CLIMATE DATA AND DATA MANAGEMENT

1.1 General

1.1.1 Data and observations are the basic requirement of any climate activity. ET 1.2 (Expert Team on Observing Requirements and Standards for Climate) had a meeting in Geneva 28-30 March 2007 and developed a work-plan. It included three major tasks, namely:

- Develop an updated list of standards for Automatic Weather Stations (AWS) for climate purposes;
- Develop, or contribute to, a Guidelines document for climate observational standards in developing countries;
- Complete the Guidelines on Quality Assurance/Quality Control of surface meteorological data” which was initiated in 2005.

There has been good progress in the second task which is led by Dr William Wright, the ET leader from the Bureau of Meteorology, Australia.

1.1.2 WCDMP collaborated with DRR on Observations and Data Requirements for Catastrophe Insurance (CAT) and the chair of ET 1.2 attended an expert meeting on “Requirements of Catastrophe Insurance and Weather Risk Management Markets” held by WMO, in Geneva 5-7 December 2007. The meeting made several recommendations including modernization of observing networks and data management systems, data rescue, raising political awareness on the potential contribution from the NMHSs, and capacity building of NMHSs.

1.1.3 WCDMP interacted closely with GCOS AOPC on CLIMAT messages and CLIMAT TEMP. GCOS AOPC concluded that there was no need to continue CLIMAT TEMP messages, nevertheless, EC-LX requested CCI to assess the impacts of a possible discontinuation of CLIMAT TEMP on other domains, such as applied climatology, research, aviation, etc. The WMO Secretariat had liaised with the president of the Commission to develop a questionnaire which was sent to all Members. The Secretariat will analyze and compile the replies.

1.2 Climate Data Management including Metadata

1.2.1 The Expert Team on Climate Data Management met from 3 to 6 November 2006 in Nairobi, Kenya, and initiated several tasks including the finalization of the Guidelines document on Climate Data Management, which was done successfully and published in English, French and Spanish. An expert meeting focusing on WCP requirements for Metadata was held in Toulouse, from 11 to 13 March 2009 which involved four ET 1.1 experts as well as other experts from WMO and Météo-France with special focus on Metadata and WIS. The Meeting also reviewed other ET 1.1 tasks related to CDMSs. There was a consensus that CCI needs to further explore the WMO core profile for its suitability to represent the minimum level of description needed for climate metadata exchange. The CCI MG noted that CDMS has become a continuous issue and that WMO should provide further guidance to NMHSs in choosing the best CDMSs when there are many options (either commercial or open sources). Furthermore, the issue of climate data exchange with a wider user community beyond NMHSs also needs to be considered in the future.

1.3 Future strategy for CDMSs

1.3.1 There is a joint effort between the Secretariat and ET 1.1 by which they develop an action to monitor CDMSs operationality in NMHSs and the status of successful migration from CLICOM. A survey has been sent to Members and the results of the questionnaire will help better

plan WMO future actions in supporting CDMSs and define the level of capacity building needed in various regions with respect to the upgrading and the maintenance of the new installations.

1.4 Climate Data Management Systems, Interoperability and WIS

1.4.1 WCDMP, in collaboration with the UK Met Office and the WIS project office, launched a Demonstration Project to develop data and metadata interfaces for CLIMSOFT to the emerging standards for data interoperability, including the WMO Core Profile of the ISO Metadata standard. EC-LX had endorsed the project and urges Members and CCI to extend the concept of this project to other Climate Data Management Systems being operated at NMHSs.

1.4.2 The Expert Team on Climate Data Management (ET 1.1) is developing an approach for Climate Metadata Discovery and Exchange considering the WMO Core profile and the WIS (Ref. ET meeting in Toulouse, 11-13 March 2009) and had proposed an action to develop new model description for CDMSs addressing interoperability, based on WMO Metadata Core Profile and ISO standards in addition to new features and functionalities.

1.4.3 A meeting of the Expert Team on Climate Data Management extended to other experts and representatives of HMEI held in Casablanca, Morocco in October 2009 initiated the development of the main parts of the document "Updating the requirement for CDMS" and finalized a model of description for the Climate Database Management Systems.

1.4.4 The CCI MG had welcomed the initiative of ET 1.1 in preparing a guidelines document for NMHSs in developing and Least Developed Countries to assist them in implementing, operating and producing climate information using updated technologies and requirements for Data Management and the associated data management procedures based on international standards for an improved climate data services.

1.5 Rescue, Preservation and Digitization of Climate Records

1.5.1 The Expert Team on the Rescue, Preservation and Digitization of Climate Records (ET 1.3) met in Bamako, Mali, Bamako in May 2008 and reviewed the progress of several DARE related projects such as the NOAA-NCDC CDMP project, the BOM CLIMARC project, the CMA-DARE project, and the non-profit International Environmental Data Rescue Organization (IEDRO) initiative to rescue historical data in several countries in Africa and Latin America.

1.6 MEDARE Initiative

1.6.1 WMO, in collaboration with AEMET-Spain and the University of Rivera y Virgili in Tarragona, organized a workshop on Data Rescue in the Mediterranean Region which led to the setting up of a Mediterranean Data Rescue Initiative whose main objective is to develop, consolidate and progress climate data and metadata rescue activities across the Greater Mediterranean Region (GMR). The long-term goal of MEDARE is to develop a comprehensive high quality instrumental climate dataset for the GMR with a focus on the Essential Climate Variables (ECV) of the Global Climate Observing System (GCOS). The meeting brought together climatologists from the National Meteorological and Hydrological Services in the GMR, scientists from universities, research centers and other international climate-related institutions and projects. The meeting was informed that EC-LX had endorsed the initiative and requested to develop similar projects in other regions.

1.7 Capacity Building

1.7.1 During the fourteenth intersessional period, there had been substantial efforts in modernizing climate data management systems in various regions, mostly supported through VCP. WCDMP has organized training workshops for developing countries and LDCs in the Pacific SIDS, Caribbean, East Africa, Central Africa and South East Asia, funded by the UK VCP. The

Commission took note of WMO's support to ACMAD and ICPAC in Africa on DARE activities and was informed that NOAA had contributed to WMO Trust Fund to support DARE in Africa.

2. OPAG 2 – MONITORING AND ANALYSIS OF CLIMATE VARIABILITY AND CHANGE

2.1 Climate Change Indices workshops

2.1.1 The ET 2.1 (Joint CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices) met in Niagara-on-the Lake, 14-16 November 2006 and WCDMP organized two seminars on climate indices back-to-back with CLIMSOF training workshop to maximize the benefits of those events. Furthermore, two other events had also been organized for Central Africa in Congo, Brazzaville, April 2007 and for South East Asia, in Hanoi, December 2007. The meeting in Africa had produced a peer reviewed paper entitled "Changes in temperature and precipitation extremes in western central Africa, Guinea Conakry, and Zimbabwe, 1955-2006", published in AGU Journal of Geophysical Research, Vol. 114, in January 2009.

2.1.2 Similar projects on climate change indices were being planned by ETCCDI and the Secretariat for other regions through various funding sources. It welcomed the ETCCDI initiative in developing a guideline document on "Extremes in a changing climate". The Secretariat released publication with wide distribution both in print and on the web. http://www.wmo.int/pages/prog/wcp/wcdmp/wcdmp_series/documents/WCDMP_72_TD_1500_en_1.pdf

2.1.3 The creation of extremes indices has contributed in overcoming the constraints of accessing raw data. Many decision makers need data on extremes in their daily work, but the challenge is to acquire sufficient knowledge to validate them. As regards to climatic indices, the Management Group has emphasized the need for temporal high resolution data (sub-daily or daily at least).

2.2 WMO annual statements on the status of the global climate

2.2.1 WMO continued the publication of the statement in all languages and made early coordination with Members and a large number of institutions to enhance inputs from developing and Least Developed Countries. Due to lack of sufficient funds, the 5-year summary statement on the status of the global climate was not published as was recommended by CCI-XIV. Nevertheless, due to the length of the report, just the abstract, introduction and, for each chapter, only the short overview section and figure captions, would be translated, as this would meet CCI needs.

2.3 ET 2.2 Work plan

2.3.1 The Expert Team on Climate Monitoring including the Use of Satellite and Marine Data and Products (ET 2.2) met in September 2006, in Tarragona, Spain and developed a sound work plan. The ET 2.2, in collaboration with the Secretariat, developed a useful website, produced a pamphlet on its activities and provided voluntary translation of the BAMS Article on the State of the Climate in Arabic, Chinese and Spanish; however due to lack of funds they were not published.

2.3.2 The CCI MG welcomed the establishment of a useful website (<http://wmo.asu.edu/>) on climate weather extremes by the Rapporteur on Climate Extremes, Prof Randall Cerveny at Arizona State University (USA), and welcomed the OPAG-II chair proposal to strengthen this activity by nominating a second expert in the future and for Prof Randall Cerveny to continue to serve as the Rapporteur in the next intersessional period.

2.3.3 The CCI MG considered the importance of phenological data and noted that phenological observations would be useful for various purposes, especially as it has implications to

climate change in agriculture, biodiversity and so on. It welcomed the publication of the WMO Guidelines on Plant Phenological Observations (WMO/TD-No. 1484 / WCDMP-No. 70)

2.3.4 The ET 2.2 would review its work plan during its second meeting and focus on Satellite Climate Monitoring. It was informed that the aim of the Sustained coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) which is being implemented by the WMO Space Programme was to establish a network of facilities ensuring continuous and sustained provision of high-quality satellite products related to the Essential Climate Variables (ECV), on a global scale, responding to the requirements of the Global Climate Observing System (GCOS).

2.4 Climate Watches

2.4.1 As recommended by CCI-ICT, WMO organized the first workshop on the implementation of climate watch systems in RA III (Guayaquil, 8-11 December 2008). The workshop had developed an implementation plan for the Region involving NMHSs, CIIFEN, ESPOL, CPPS and WMO (including RA III, its Working Group on Climate Matters and the WCDMP). The meeting supported the Secretariat plan to organize a second workshop of this kind which would be held in RA II and would focus on Monsoon affected areas.

3. OPAG 3 – CLIMATE INFORMATION AND PREDICTION SERVICES (CLIPS)

3.1 General

3.1.1 All the three Expert Teams in the OPAG have met: ET 3.1 (Expert Team on Research Needs for Intraseasonal, Seasonal and Interannual Prediction, including the Application of these Predictions) in November 2008, ET 3.2 (Expert Team on CLIPS Operations, Verification and Application Services Operations Co-Lead and Overall Expert Team Coordinator) in September 2007 and ET 3.3 (Expert Team on El Niño and La Niña) in August 2007 and considered their work plans during the intersessional period. The meetings of ET 3.1 and 3.2 were preceded by one-day "Open Seminars" on a theme relevant to the team's main focus, in collaboration with the local hosts. These Open Seminars were very successful and helped to enhance the visibility of CCI and also in facilitating broader discussions of the ETs' work. The teams, as well as the OPAG Chair/Co-Chair, have also interacted with each other through teleconferences.

3.2 Research Needs for Intraseasonal, Seasonal and Interannual Prediction

3.2.1 ET 3.1 recognized the needs of information at scales smaller than those provided by global models in both seasonal to interannual prediction and climate change domains (including emerging capabilities in decadal prediction), particularly to meet the climate information requirements of applications (including demonstration of usefulness and value of climate information). Considering that downscaling is a crucial activity for both domains whatever the method used (statistical, dynamical or hybrid), the team worked on the development of a guidance document on best practices in downscaling, the preliminary draft of which is available. The focus of the guidance document is seasonal prediction, although the concepts are also relevant to downscaling of climate change scenarios.

3.2.2 ET 3.1 considered CCI-CBS-WCRP linkages to be crucial for a collaborative and complementary approach to address the seasonal prediction problem, and actively pursued these linkages by involving the concerned experts in its deliberations. A draft statement on the Multi-Model Ensemble (MME approach) has been developed by the ET.

3.2.3 ET 3.1 has developed a guidance document on consensus methods for seasonal forecasts. The relevant aspects of the RCOF Review 2008 outcomes have also been integrated into this document.

3.2.4 A new design for RCOF operations has been developed for Western Africa in collaboration with ACMAD, IRI and Météo-France, which also involved collaborative efforts between ET 3.1 and ET 3.2. This has been endorsed by PRESAO-12.

3.2.5 Seasonal to interannual prediction may be considered as the first step to implement adaptation to climate change. ET 3.1 notes that decadal prediction will fill the gap between seasonal prediction and climate change timescales and that CLIPS needs to actively consider decadal prediction and its applications.

3.2.6 ET 3.1 has actively contributed to capacity building in CLIPS training activities, and also in facilitating the use of Climate Predictability Tool (CPT) developed by the IRI. The ET agreed that CPT is a very useful and practical tool for operational seasonal prediction, and that a critical review along with other similar packages can help in its wider usage. The ET has worked towards creating a resource base for sustained CPT training and development.

3.3 CLIPS Operations, Verification and User Liaison

3.3.1 A draft updated version of Technical Note 145, with a revised title of “Socio-economic Benefits of Climate Services” was compiled by ET 3.2 consisting of a collection of sector-specific papers written by a wide range of experts. The papers were edited by Dr Mickey Glantz, and the final version is being processed for publication as a technical document under the WCASP Series.

3.3.2 The WMO Conference on Living with Climate Variability and Change: Understanding the Uncertainties and Managing the Risks was successfully held in Espoo, Finland, during 17-21 July 2006. The outcome of the conference was synthesized in the form of the Espoo Statement, which was endorsed by Cg-XV and was widely distributed including UNFCCC COP sessions. The draft report of the Espoo Conference has been made available on WMO web pages. The final report is under process for publication and distribution.

3.3.3 The RCOF process has completed more than 10 years, and the leading role of several longstanding RCOFs in Africa and South America in developing the RCOF concept has been widely recognized. The process has also greatly helped in regional networking of climate service providers and liaison with the core socio-economic sectors. WMO organized an international expert review meeting on RCOFs (Arusha, United Republic of Tanzania, 3-7 November 2008) on this occasion. All the currently active RCOFs around the world were represented at this meeting, which reviewed the current status and discussed possible approaches for future evolution of the RCOF process. This review meeting was structured around a few key issues central to the RCOF operations and their further development, and around the development of position papers devoted to each of those issues. The position papers address issues related to promotion of tools and techniques for RCOFs. ET 3.2 played a key role in the review meeting.

3.3.4 Draft guidance on best practices for verification of seasonal forecasts has been developed by ET 3.2 to complement CBS guidelines on standardized verification systems (SVS). This comprehensive approach discusses issues including the size of the forecast region, gridding etc., describes probabilistic forecasts, recommends procedures and instructions on how to interpret forecast results; and covers uncertainty. Annexes to this document include a step-by-step calculation with data and a glossary of definitions on verification terms. The draft has been peer-reviewed, and the revised final draft is under preparation.

3.3.5 ACMAD and IRI have prepared a comprehensive verification of RCOF products in Africa, and have submitted this to WMO and others for comments. It was also presented at the recent RCOF Review held in 2008. ET 3.2 played a key role in this verification project, and recommends that training materials on verification be developed based on these new documents.

3.3.6 The RCOFs concept is being extended to northern latitudes, and was discussed with a broad audience at the recent Polar CLIPS workshop in St. Petersburg, Russian Federation. It was

noted at this workshop that there is great interest in extending the CLIPS concept to high latitudes, but that at present there is limited skill in seasonal prediction for these regions. The concept of a Polar Climate Outlook Forum (PCOF) has received considerable encouragement, and is recognized as a WMO contribution to the IPY Legacy.

3.3.7 A draft compilation of terminology focused on climate prediction has been developed by ET 3.2.

3.4 El Niño and La Niña

3.4.1 WMO has been successfully issuing consensus-based El Niño/La Niña Updates, which are well-received worldwide. ET 3.3 actively participated in the development of these updates, and also provided guidance on their structure and development process.

3.4.2 WMO, with the support of ET 3.3 and NOAA, organized a CLIPS Workshop on “Communicating about El Niño-Southern Oscillation (ENSO): Towards Developing a Common Understanding” during 8-10 April 2008 in Honolulu, Hawaii, USA. In addition to the ET members, distinguished physical scientists, operational meteorologists and climatologists, media, and users of ENSO information participated in the workshop. ET 3.3 led the scientific organization of this workshop, which discussed several key aspects related to ENSO communication such as ENSO definitions/indices, vocabulary (e.g., cold/warm event, strong/weak), ENSO information procedure, such as the WMO El Niño/La Niña Update, distinction between ENSO phenomenon and impacts, media perception of ENSO, user and public awareness of ENSO, etc., and made a number of recommendations to promote a common understanding of the phenomenon to develop guidance on best practices.

3.4.3 ET 3.3 discussed the development of an Atlas on impacts of El Niño/La Niña, and developed an outline and some demonstrative examples. The ET recommends that the initial version of the atlas may be in the form of web-based products, which can gradually pave the way for a stable hard copy version. Through informal consultations, CIIFEN offered to participate in the Atlas development process and host it on its website.

3.5 OPAG-3 Perspectives

3.5.1 OPAG-3 is closely aligned with the ICT recommendation that CLIPS be concluded as a project in 2015. This might not imply that CLIPS activities would be terminated, but it may no longer continue as a project beyond the agreed sunset date. WCC-3 outcomes could be considered as the logical evolution of CLIPS into operational climate services around the world. Appropriate ways and means need to be explored to mark the conclusion of CLIPS project, highlighting CLIPS achievements, identifying the challenges and determining its legacy. The OPAG has further recommended that, for the remainder of the CLIPS project, the focal point network should be re-established and reinforced. The cooperation with WCRP in CLIPS activities has improved significantly through the participation of their experts in OPAG-3, but it needs a formal process to facilitate sustained and effective collaboration.

4. OPAG 4 – CLIMATE APPLICATIONS AND SERVICES

4.1 General

4.1.1 The work of the OPAG was accomplished through a number of meetings, teleconferences, conference participation, projects, publications, etc., and was organized in four Expert Teams on Climate and Health (ET 4.1); Climate and Energy (ET 4.2); Climate and Tourism (ET 4.3); and on Urban and Building Climatology (ET 4.4). The OPAG successfully delivered many of its intended deliverables and all those who contributed to these accomplishments are appreciated for their leadership, and generous allocation of their time and expertise to these outcomes. Where needed, work yet to be completed or recommended for modification, as well as

challenges faced by the Expert Teams in this intersessional period are also noted. Three Expert Teams in the OPAG have met and considered their work plans during the intersessional period. ET 4.3 on Climate and Tourism decided to conduct its business without any physical meeting, and to use the available resources to facilitate the work on certain agreed deliverables. The teams as well as the OPAG Chair/Co-Chair have also interacted with each other through teleconferences. The following are some salient aspects of the work done/being done by the specific ETs under OPAG-4:

4.2 Climate and Health

4.2.1 A major component of the work of ET 4.1 has been the development of a joint (WMO and the World Health Organization (WHO)) guidance document on Heat/Health Warning Systems (HHWS), 'Heat Waves and Health: Guidance on Development of Warning Systems' (Prof. Glen McGregor, lead Ed.). A meeting of authors was held in Geneva, Switzerland (March 2007), and a draft version of the Guidance was presented to WMO Members at the Fifteenth World Meteorological Congress (May 2007). Efforts are underway to finalize the guidance document, to initiate the peer review process involving both WMO and WHO experts, and to arrange for its joint WMO-WHO publication.

4.2.2 In a project led by Dr Christina Koppe (Deutscher Wetterdienst) and hosted by Dr Jianguo Tan (Shanghai Meteorological Bureau), some members of the ET and relevant HHWS experts have assisted in the development of an intercomparison of HHWS models, as part of a Multi-Hazard Early Warning System (MHEWS) demonstration project for Shanghai, China. An operational HHWS is a component of the Shanghai MHEWS which will be showcased during Expo 2010. This experience can provide useful inputs for similar activities in other countries vulnerable to health risks from heat waves. A meeting was held in July 2009 (Shanghai, China), where it was agreed to produce a new joint brochure (WMO, WHO, UNWTO, if possible) on health risks of extreme heat for major outdoor events, to be available by the first quarter of 2010.

4.2.3 ET 4.1 has also been promoting climate-health partnerships in contributing to the efforts of WMO in liaising with WHO, the International Society for Biometeorology, EU-COST Action 730, etc.

4.3 Climate and Energy

4.3.1 As per its terms of reference, ET 4.2 considered the development of a new report under the title "Meteorological Aspects of Utilization of Renewable Energy Sources". The ET finalized a framework – content, chapter outline, lead authors and other contributors, and a timeline. Contacts were made with some proposed contributors from outside of the ET, and they tentatively agreed to contribute to the writing of the report. Progress was made in that case studies were prepared on climate and hydropower in Kenya, and on solar energy in Kenya, and on climate risk assessment for nuclear and thermal power industry, requirements of oil and gas complex for climate data, information, products and services in the high latitudes, etc.

4.3.2 ET 4.2 member Sandra Robles-Gil participated in the scoping meeting for the IPCC Special Report on Climate Change and Renewable Energy, in January 2008, and provided useful inputs (papers and reports) to the ET.

4.3.3 Keeping the establishment of the Global Framework for Climate Services in view, it may be useful to refocus the direction of this work towards meeting the requirements of energy user communities for practical information, products and services for Climate Risk Management and adaptation to climate change.

4.4 Climate and Tourism

4.4.1 In early 2008, the UN World Tourism Organization (UNWTO), the United Nations Environment Programme (UNEP) and WMO jointly published a new report entitled 'Climate Change and Tourism: Responding to the Global Challenges'. At the request of UNWTO, the ET Lead (Prof. Daniel Scott) served as the lead author. This major international review study represents a significant accomplishment for the ET.

4.4.2 In a collaborative WMO-UNWTO effort, supported by Members of ET 4.3 and other tourism experts from around the world, Prof. Scott was invited to lead the development of a Tourism Sector White Paper, covering needs and opportunities for the World Climate Conference-3 (WCC-3). Work continues to develop this report as a joint publication with UNWTO.

4.4.3 Together with UNEP, Oxford University and UNWTO, WMO co-sponsored an International Seminar on "Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices", focusing on Developing Countries and Small Island States, at Oxford University from 8-10 April 2008. ET 4.3 actively contributed to this seminar, whose aim was to discuss weather and climate information needs and utilization within the recreation and tourism sector and facilitate collaboration between tourism (industry and government) and meteorological professionals in NMHSs. It was a template for workshops that are needed in most major global tourism regions (as outlined in the ET Terms of Reference). In association with this seminar, a UNEP/UNWTO/WMO/Oxford University joint publication has been brought out as part of UNEP Manuals on Sustainable Tourism. Lessons learned from this seminar were also incorporated into the White Paper for WCC-3.

4.4.4 Work to update the 'Climate and Tourism-Recreation Bibliography' of Scott et al. (2005) was also taken up by ET 4.3, and is in progress.

4.5 Urban and Building Climatology

4.5.1 Two bibliographic reports had been completed during the previous intersessional period. It was agreed that the bibliography should be made available online with searchable options. To facilitate this, the International Association for Urban Climate (IAUC) agreed to host the bibliography on their website using appropriate free software. WMO provided support to IAUC to help them implement the online bibliography.

4.5.2 A complete draft of a new Technical Note (TN) on 'Building Climatology' was prepared by Prof John Page. This TN replaces the original TN-150 on Building Climatology also authored by Prof John Page and published in 1976. ET 4.4 is in the process of formatting and editing the draft manuscript, for peer review and publication process.

4.5.3 The outline and nature of contents for the update of TN-149 on Urban Climatology, taken up by Dr G. Mills, have been discussed by the ET and agreed. Preparation of the full draft is in progress.

4.5.4 ET 4.4 has contributed to the efforts of ET 3.2 in developing a guide to best practices in user liaison, by providing inputs relevant to urban and building climatology. The ET has also provided inputs to ET 4.1 on health-related aspects of urban and building climatology that need to be considered in developing guidance for heat-health warning systems.

4.5.5 A proposal for training paths for practicing meteorologists in NMHSs on application of meteorological knowledge to practice or urban planning and design has been developed. This provides the rationale and structure of a course that can be delivered as an online/DVD and also face-to-face. ET 4.4 has led the technical organization of a training workshop as part of CLIPS training series, with a focus on urban climatology (Pune, India, December 2009).

4.5.6 ET 4.4 has a major presence in IAUC, and the relationship is further strengthened by the Working Arrangement between WMO and IAUC approved by the governing bodies of both, and also the WMO co-sponsorship of the Seventh International Conference on Urban Climate (Tokyo, Japan, July 2009).

4.5.7 ET 4.4 has invited NMHSs through WMO to take part in an international urban climate model intercomparison project being coordinated by its members. ET 4.4 was also invited to lead the session on “Climate Information for Improved Planning and Management of Mega-cities”, and the two corresponding White Papers in preparation for WCC-3, in collaboration with IAUC and several other experts/agencies including UN-Habitat.

4.6 OPAG-4 Perspectives

4.6.1 The CCI Management Group (March 2009) noted that the scale of activities in OPAG-4 was impressive; nevertheless, in terms of interaction with user sectors at national level, contribution from NMHSs was rather low. The Group believed that, in dealing with other UN Agencies in sectoral areas, there were further opportunities to develop cooperation. Given the establishment of the Global Framework for Climate Services, a key outcome of WCC-3, and the increased focus by WMO and partnering agencies including UNEP, UNESCO, UNWTO, WHO, FAO, etc., on development of relevant and actionable information for users for climate risk management and adaptation to climate change, the work done under OPAG 4, and the lessons learned from this and the earlier intersessional periods, would be useful to build new perspectives on the use of climate information in sectoral applications, including for agriculture/food security and water resources sectors.

5. GUIDE TO CLIMATOLOGICAL PRACTICES (WMO-No. 100)

5.1 General

5.1.1 The third edition of the Guide to Climatological Practices has been prepared by the relevant CCI Expert Team and includes six Chapters plus one Annex for Acronyms. The Expert Team has made an effort to ensure that all subjects of relevance are included. It has been agreed that the Guide is not intended to serve as a complete manual or textbook about statistical methodology.

5.2 Progress Report on Stages of Review

5.2.1 *Internal Review*

5.2.1.1 The Secretariat has conducted an internal review to get a sign-off from the relevant programmes that support the CCI (Data and climate monitoring, applications and services and climate coordination). The Secretariat made available a draft copy of the Guide to Fifteenth Congress and all relevant WMO Programmes, but only a minor feedback was received. Furthermore, the Secretariat made a contract with Dr Ned Guttman from NOAA to communicate with the rest of the team to conduct the final round of development of content before the peer-review process. Chapters 1, 2, 3, 5 (only the reanalysis section reviewed) and 6 had passed through internal review process of the Secretariat and a clean copy of them was available on WAMIS ftp server for external review.

5.2.2 *External Review*

5.2.2.1 External Review process was completed by 22 volunteered members. Each chapter was headed by one coordinator. The Secretariat organized a meeting, chaired by the president of CCI for chapter coordinators and the consultant for the Guide (Dr Ned Guttman), Geneva, 7-8 September 2009. The meeting discussed and corrected relevant parts.

5.2.2.2 The CCI MG confirmed that the president of the Commission was the 'scientific authority', for WMO to approve the document. It would also be his responsibility (with all of the ET and relevant Secretariat) to ensure all the references are there, all illustrations ready to use and all credits in place. The publications board would expect that it was all dealt with before it was submitted to them. It was also generally agreed that one review cycle should be enough, with perhaps the revised text. Further to the above-mentioned stages, the document should also go through the editing and proof reading process by LSP in the Secretariat. According to the proposal of the CCI MG in 2006, the third edition of the Guide will be published in loose leaf form making it possible to keep the material updated at regular intervals.

ROLES AND RESPONSIBILITIES OF WMO COMMISSION FOR CLIMATOLOGY VOLUNTEERS

1. Volunteerism in the work of technical commissions and regional associations

1.1 Volunteerism in the works of WMO technical commissions and regional associations has been addressed several times. At the PTC 2007 meeting (Geneva, 2-3 February 2007), the president of CCI commented on some of the issues concerning volunteerism in the work of the technical commissions and attracted wider attention to this subject. As a result, it was recognized that volunteerism played an important role in the technical commissions and programmes of WMO.

1.2 After the point was discussed again at the fifty-eighth session of the Executive Council, it was decided that the issue be brought to the attention of Fifteenth Congress which considered an item entitled '*Volunteerism in the work of technical commissions and regional associations*'.

1.3 Cg-XV agreed with the fifty-eighth session of the Executive Council that in seeking nomination for membership in technical commission and regional association subsidiary bodies (rapporteurs, working groups, Open Programme Area Groups, expert teams), especially prior to a constituent body session, the procedure should ensure that the commitment of the Permanent Representatives with WMO and the proposed experts were confirmed, as well as the availability of the professional profile, through a brief curriculum vitae, of the latter, to help ascertain their specific expertise. That would also ensure that the particular expert was aware of the nomination and had expressed his or her commitment to serve, if so selected. The identification of such national experts need not be limited to National Meteorological and Hydrological Services only.

1.4 Cg-XV further agreed that the presidents of technical commissions and regional associations be invited to provide their recommendations on how the situation on the increasing difficulty in obtaining appropriate national experts could be improved, including proposals for recognizing the valuable contribution of those national experts. In that connection, they were also encouraged to analyze the situation with respect to the performance of their subsidiary bodies as a way of identifying areas of concern on which recommendations might be proposed.

2. PTC-2008 proposals for the volunteerism

2.1 As requested by Cg-XV, the PTC-2008 meeting (Geneva, 18-20 February 2008) addressed the volunteerism and asked the president of CCI to submit his proposals. In overall consideration of volunteerism, the PTC 2008:

- (i) Recognized the important role that volunteerism plays in the technical commissions (TCs) and regional associations (RAs) subsidiary bodies;
- (ii) Reviewed all issues related to their involvement, including nomination, performance monitoring and recognition; and
- (iii) Made a number of proposals in order to improve the current situation, especially the declining number of volunteers.

2.2 The PTC-2008 proposed a number of criteria for nomination of experts as follows:

- (i) WMO work should be better advertised and promoted within NMHSs and other Weather - Climate - Water - Environment communities, in order to ensure contributions from a wide spectra of expertise, and appropriate geographic coverage;
- (ii) In seeking nomination for membership in TC and RA subsidiary bodies, especially prior to a constituent body session, the procedure should ensure that the commitment of the

PRs and the proposed experts were confirmed, as well as the availability of the professional profile, through a brief CV of the latter, to help ascertain their specific expertise, and willingness to contribute. It would be best that Nomination Committees are established early enough to have time to look at all experts personal information prior to constituent body session;

- (iii) Team members should be chosen in such a way that their volunteer work corresponds to their day activities in their home institutions;
- (iv) It appears much better that the list of proposed names has been agreed at regional association level prior to submission to the Nomination Committees, when possible;
- (v) All candidate experts should be aware of responsibilities and commitments, especially as far as coordination and participation is concerned;
- (vi) An indication of time to commit (e.g. in terms of minimum percentage of overall activity or time slots) might be useful for PR agreement to secure the necessary time for WMO work;
- (vii) Permanent Representatives should provide complete and up-to-date expert details, especially working e-mail addresses, to facilitate establishing subsidiary bodies;
- (viii) Candidate experts not selected by Nomination Committees should be informed, thanked, and encouraged to apply again for some other WMO work.

2.3 The PTC-2008 noted that performance monitoring was a key issue to ensure smooth and high quality of work flow to and within the Commission and regional groups. Consequently, it proposed the following:

- (i) The WMO Secretariat should manage the organization of subsidiary bodies meetings as early as possible within the intersessional period, in order to finalize action plans drafted following e-mail communication or teleconferences. This means that budget is setup to allow it accordingly. Otherwise it is discouraging not to have any work assigned;
- (ii) The evaluation of each subsidiary body and involved experts should be conducted by the appropriate Chairs according to the rules of result-based management. This would be particularly useful for deciding to reconduct or not the entities and/or the experts (considering anyway that there is a need for a balance between some continuity and new faces). This would also be important for experts involved, especially for the recognition of their work by their PR;
- (iii) In the situation where an expert is not contributing to the expected level, or in case of totally silent expert, there should be a mechanism (e.g. led by Management Groups or relevant OPAGs) known by every appointed expert allowing to replace them, e.g. after 2 years of insufficient contribution;
- (iv) Peer-reviewed reports produced should be published as soon as possible with names of contributors made clear, at least at subsidiary bodies websites, preferably in appropriate publication series. This is essential for performance monitoring, and if not done, discouraging for authors to realize that their work is not recognized.

2.4 The PTC-2008 proposed the following criteria to acknowledge the work and services of volunteers:

- (i) Permanent Representatives should give recognition of conducted work for WMO activities. As in most NMHSs an individual evaluation procedure is in place for rating staff members, the contribution to WMO work should be included in the list of criteria used;
- (ii) Other incentives are needed, such as issuing certificates or addressing letters of appreciation to experts concerned, with copy to their PR. This should be made generally at TC or RA president level, following proposals by OPAG or WG Chairs. Applicable rules should be established by WMO, and templates should be designed.

3. EC-LX decision for volunteerism

In pursuant to the proposal of PTC-2008, EC-LX in 2009 addressed the issue of volunteerism and approved the following:

The Executive Council at its sixtieth session agreed in principle with the suggestions of the presidents of the Commission for Basic Systems and the Commission for Hydrology to award recognition to the experts who volunteered to devote their time to undertake the activities planned by technical commissions and regional associations. It urged the Secretary-General to propose a common scheme for awarding such recognition. The Council also urged Permanent Representatives to facilitate the participation and voluntary contribution of experts, not only from the NMHSs but also from other institutions, to the activities of WMO.

PROPOSAL FOR A NEW INTERNATIONAL ANALYSIS OF LAND SURFACE AIR TEMPERATURE DATA

Submitted by UK Met Office

Executive summary

Surface temperature datasets are of critical importance for detecting, monitoring and communicating climate change. They are also essential for testing the validity of the climate models that are used to produce predictions of future climate change. The current datasets, constructed in the UK and US using different methodologies, agree in showing that the world is warming. Taken together these records provide a robust indicator of global change and form part of the evidence base that led the IPCC Fourth Assessment Report to conclude that “warming of the climate system is unequivocal”.

To meet future needs to better understand the risks of dangerous climate change and to adapt to the effects of global warming, further development of these datasets is required, in particular to better assess the risks posed by changes in extremes of climate. This will require robust and transparent surface temperature datasets at finer temporal fidelity than current products.

The current surface temperature datasets were first put together in the 1980s to the best standards of dataset development at that time; they are independent analyses and give the same results, thereby corroborating each other.

In the case of the CRU land surface temperature dataset (CRUTEM3, which forms the land component of the HadCRUT dataset) there are substantial IPR issues around the raw station data that underpin the dataset; we are actively pursuing resolution of these issues so that the base data can be made openly available. We know that several stations have already been explicitly forbidden from release by the rights' holders so we will not be able to release all the under-pinning station data.

Consequently we have been considering how the datasets can be brought up to modern standards and made fit for the purpose of addressing 21st Century needs. We feel that it is timely to propose an international effort to reanalyze surface temperature data in collaboration with the World Meteorological Organization (WMO), which has the responsibility for global observing and monitoring systems for weather and climate.

The proposed activity would provide:

1. Verifiable datasets starting from a common databank of unrestricted data at both monthly and finer temporal resolutions (daily and perhaps even sub-daily);
2. Methods that are fully documented in the peer reviewed literature and open to scrutiny;
3. A set of independent assessments of surface temperature produced by independent groups using independent methods;
4. Robust benchmarking of performance and comprehensive audit trails to deliver confidence in the results;
5. Robust assessment of uncertainties associated with observational error, temporal and geographical in homogeneities.

It is important to emphasize that we do not anticipate any substantial changes in the resulting global and continental-scale multi-decadal trends. This effort will ensure that the datasets are completely robust and that all methods are transparent.

Background

In many respects HadCRUT has been the default choice of surface dataset in all 4 IPCC Assessment Reports. However we must stress that other independent datasets are used which support the HadCRUT data. There are three centres which currently calculate global average temperature each month:

- Met Office, in collaboration with the Climatic Research Unit (CRU) at the University of East Anglia (UK);
- Goddard Institute for Space Studies (GISS), which is part of NASA (USA);
- National Climatic Data Center (NCDC), which is part of the National Oceanic and Atmospheric Administration (NOAA) (USA).

These groups work independently and use different methods in the way they process data to calculate the global average temperature. Despite this, the results of each are similar from month to month and year to year, and there is robust agreement on temperature trends from decade to decade.

All existing surface temperature datasets are homogenized at the monthly resolution, and are therefore suitable for characterizing multi-decadal trends. These are adequate for answering the pressing 20th Century questions of whether climate is changing and if so how. But they are fundamentally ill-conditioned to answer 21st Century questions such as how extremes are changing and therefore what adaptation and mitigation decisions should be taken. Monthly resolution data cannot verify model projections of extremes in temperature which by definition are (sub-) daily resolution events.

Through collaboration with NCDC we have two quality controlled, but not homogenized products at the daily and sub-daily resolution (HadGHCND and HadISD – the latter about to be submitted to peer review), spanning 1950 onwards and 1973 onwards respectively. However, because these are not homogenized, they may retain time-varying biases. It is an open scientific question as to whether homogenization is feasible at these timescales whilst retaining the true temporal characteristics of the record. In particular, seasonally invariant adjustments which are adequate for monthly timescale data will be grossly inadequate at the daily or sub-daily resolution. Clearly homogenization of these data is highly desirable but some detailed research is needed to define the best approach.

The way forward

Recognizing that no single institution can undertake such a fundamental data collection, re-analysis and verification process single-handedly, we would envisage this as a broad community effort – a ‘grand challenge’ so to speak - involving UK and international partners.

The UK would convene a workshop to be hosted by the Met Office Hadley Centre and invite key players who could plausibly create such datasets with the aim of initiating an agreed community challenge to create an ensemble of open source land temperature datasets for the 21st Century both at monthly temporal resolution and also at the daily and sub-daily timescales needed to monitor extremes. Such an approach would help distribute many of the basic tasks, ensuring that the most appropriate parties were responsible for each part as well as providing a focused framework and timeline. This effort would ideally have involvement from, and be coordinated under, the umbrella of one or more of the Commission for Climatology, the Global Climate Observing System, or the World Climate Research Programme, with assistance from other WMO constituent bodies as appropriate.

Activities that would be required within any overall programme are:

1. Creation of an agreed international databank of surface observations to be made available without restriction, akin to the I-COADS databank in the ocean domain. Note that NCDC already have substantial efforts in this regard and would be a key participant and likely host as the designated world data bank. Data to be available at monthly, daily and sub-daily resolutions;
 2. Multiple independent groups undertake efforts to create datasets at various temporal resolutions based upon this data-bank. Participants will be required to create a full audit trail and publish their methodology in the peer-reviewed literature. Strong preference will be given to automated systems and creations of ensembles that reflect the uncertainties in the observations and methods;
 3. One or more groups to create realistic test-cases of the spatio-temporal observational availability by sampling output from a range of climate simulations from a number of models, adding realistic error structures;
 4. Groups to run their algorithms against the test-cases and one or more groups, preferably completely independent, to undertake a holistic assessment based upon the results of this verification exercise from all groups.
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World Meteorological Organization

CCI-XV/INF. 2

COMMISSION FOR CLIMATOLOGY

Submitted by: Secretary-General

Date: 28.VII.2009

FIFTEENTH SESSION

Original Language: English

Antalya, Turkey,
19-24 February 2010

PROVISIONAL LIST OF DOCUMENTS¹

A – In numerical order

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2.2(2)	Explanatory memorandum relating to the provisional agenda	2	Secretary-General
3	Report of the Secretary-General on the World Climate Programme	3	Secretary-General
4	Report of the president of the Commission	4	President of CCI
5	Decisions of Congress and the Executive Council of relevance to the World Climate Programme	5	Secretary-General
6	Review of ongoing activities	6	Secretary-General
7	CCI strategic planning	7	President of CCI
8	CCI Quality Management Framework initiatives	8	President of CCI
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10	Follow-up to WCC-3	10	Secretary-General
11	Capacity building	11	Secretary-General
12	Election of officers	12	President of CCI
13	CCI work plan and future structure (2010-2014)	13	President of CCI
14	Review of previous resolutions and recommendations of the Commission and of relevant Executive Council resolutions	14	Secretary-General

¹ All the listed documents will be made available on the WMO ftp server and can be accessed and downloaded as and when they are available in different languages. Please note that in order to reduce wastage of paper and reduce carbon footprints the documents will not be provided in hard copy unless specifically requested. During the session also the work will be carried out on electronic form.

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INF. 1	Material arrangements for the session		
INF. 2	Provisional list of documents		
INF. 3	Tentative work plan for the session		
INF. 4	Provisional list of participants		
INF. 5	World Climate Conference-3		
INF. 6	Regional activities related to the World Climate Programme		
INF. 7	Technical Conference on 'Changing climate and demands for sustainable development'		
INF. 8	Overall coordination of climate issues and interagency collaboration		
INF. 9	WMO Strategic planning and Results-based Management		
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INF. 11	Activities of the president and the CCI Management Group		
INF. 12	Activities of the vice-president and the Implementation Coordination Team		
INF. 13	Activities of the OPAGs		
INF. 14	Roles and responsibilities of the WMO Commission for Climatology Volunteers		

B – By agenda item

Agenda item	Documents
1. OPENING OF THE SESSION	-
2. ORGANIZATION OF THE SESSION	Doc. 2.2(1) Doc. 2.2(2)
3. REPORT OF THE SECRETARY-GENERAL ON THE WORLD CLIMATE PROGRAMME	Doc. 3
3.1 World Climate Conference-3	INF. 5
3.2 Regional activities related to the World Climate Programme	INF. 6
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3.4 Overall coordination of climate issues and interagency collaboration	INF. 8
3.5 WMO Strategic planning and Results-based Management	INF. 9
3.6 WMO Quality Management Framework	INF. 10
4. REPORT OF THE PRESIDENT OF THE COMMISSION	Doc. 4
4.1 Activities of the president and the CCI Management Group	INF. 11
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5. DECISIONS OF CONGRESS AND THE EXECUTIVE COUNCIL OF RELEVANCE TO THE WORLD CLIMATE PROGRAMME	Doc. 5
6. REVIEW OF ONGOING ACTIVITIES	Doc. 6
7. CCI STRATEGIC PLANNING	Doc. 7
8. CCI QUALITY MANAGEMENT FRAMEWORK INITIATIVES	Doc. 8
9. PRIORITIES FOR THE FUTURE WORK OF THE COMMISSION	Doc. 9
9.1 Climate Data Quality Management	
9.2 Climate Analysis, Monitoring and Assessment	
9.3 Climate Products and Services and their delivery mechanisms	
9.4 Climate Information for Adaptation and Climate Risk Management	
10. FOLLOW-UP TO WCC-3	Doc.10
11. CAPACITY BUILDING	Doc. 11
11.1 Basic requirements	
11.2 Development of a CCI strategy for capacity building	

Agenda item	Documents
12. ELECTION OF OFFICERS	Doc. 12
13. CCI WORK PLAN AND FUTURE STRUCTURE (2010-2014)	Doc. 13 INF. 14
14. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT EXECUTIVE COUNCIL RESOLUTIONS	Doc. 14
15. ANY OTHER MATTERS	-
16. DATE AND PLACE OF THE SIXTEENTH SESSION	-
17. CLOSURE OF THE SESSION	-

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15. ANY OTHER MATTERS	-
16. DATE AND PLACE OF THE SIXTEENTH SESSION	-
17. CLOSURE OF THE SESSION	-

TENTATIVE WORK PLAN

COMMISSION FOR CLIMATOLOGY ALLOCATION OF THE AGENDA ITEMS		
Committee Allocation	Agenda Item	Title
GENERAL PLENARY	1.	Opening of the session
GENERAL PLENARY	2.1	Consideration of the report on credentials
GENERAL PLENARY	2.2	Adoption of the agenda
GENERAL PLENARY	2.3	Establishment of committees
GENERAL PLENARY	2.4	Other organizational matters
GENERAL PLENARY	3.	Report of the Secretary-General on the World Climate Programme
INF. 5	3.1	World Climate Conference-3
INF. 6	3.2	Regional activities related to the World Climate Programme
INF. 7	3.3	Technical Conference on 'Changing climate and demands for sustainable development'
INF. 8	3.4	Overall coordination of climate issues and inter-agency collaboration
INF. 9	3.5	WMO Strategic Planning and Results-based Management
INF. 10	3.6	WMO Quality Management Framework
GENERAL PLENARY	4.	Report of the president of the Commission
INF. 11	4.1	Activities of the president and the CCI Management Group
INF. 12	4.2	Activities of the vice-president and the Implementation Coordination Team
INF. 13	4.3	Activities of the OPAGs

Plenary B	5.	Decisions of Congress and the Executive Council of relevance to the World Climate Programme
Plenary B	6.	Review of the ongoing activities
Plenary B	7.	CCI Strategic Planning
Plenary A	8.	CCI Quality Management Framework
Plenary A	9.	Priorities for the future work of the Commission
Plenary A	9.1	Climate Data Management
Plenary A	9.2	Climate Analysis, Monitoring and Assessment
Plenary A	9.3	Climate Products and Services and their delivery mechanisms
Plenary A	9.4	Climate Information for Adaptation and Climate Risk Management
Plenary A	10.	Follow up to WCC-3
Plenary B	11.	Capacity Building
GENERAL PLENARY	12.	Election of Officers
GENERAL PLENARY	13.	CCI Workplan and Future Structure (2010-2014)
GENERAL PLENARY	14.	Review of previous resolutions and recommendations of the Commission and of relevant Executive Council resolutions
GENERAL PLENARY	15.	Any other matters
GENERAL PLENARY	16.	Date and place of the fifteenth session
GENERAL PLENARY	17.	Closure of the session

CCI-XIV/INF. 3, APPENDIX B

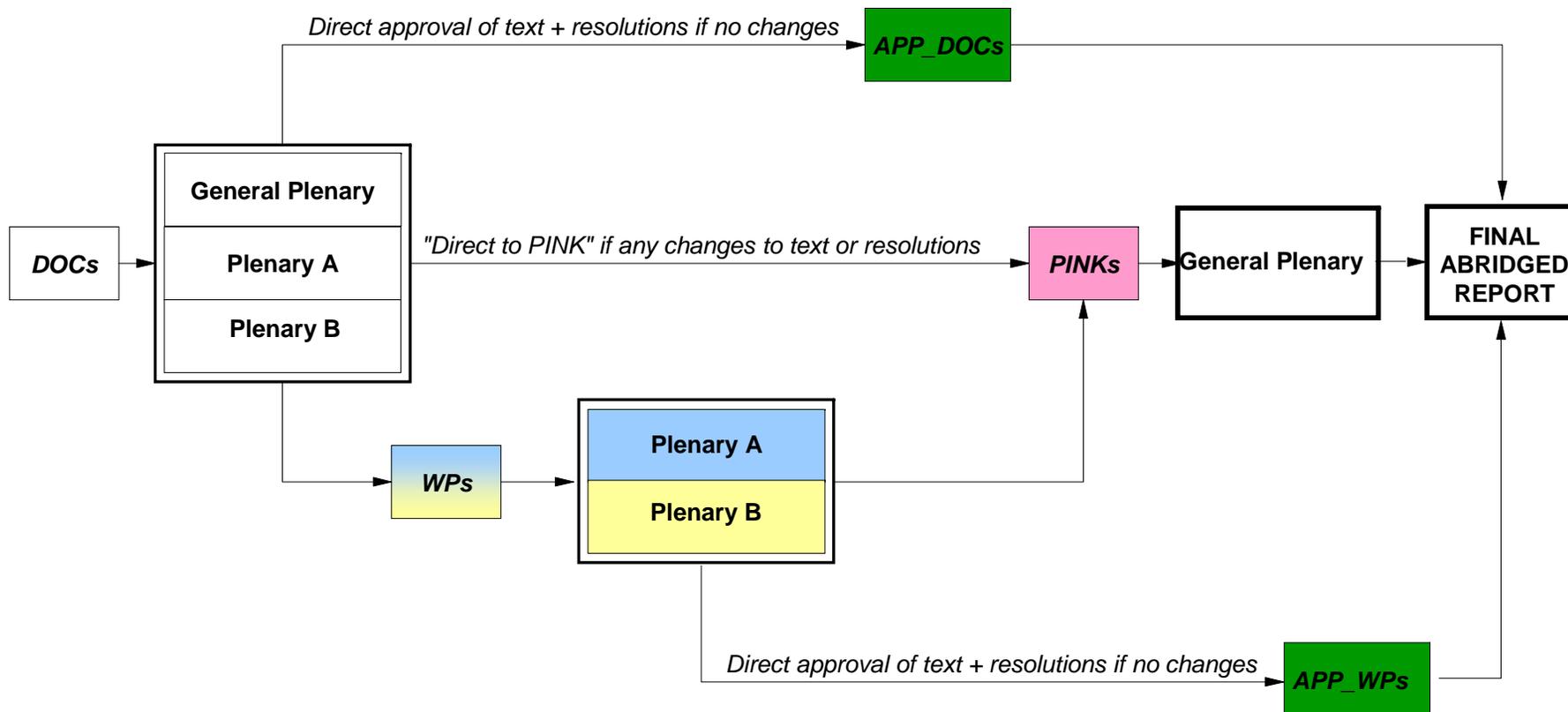
	Friday 19 February		Saturday 20 February		Sunday 21 February		Monday 22 February		Tuesday 23 February		Wednesday 24 February		
	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	
GENERAL PLENARY MEETING ITEMS 1, 2.1-2.4, 3, 4, 12, 13, 15, 16, 17	P1 Opening at 10:00 hrs 1 2.1 2.2 2.3 2.4 4, 3		P2 12							P3 13		P4 15 PK	P5 PK 16 17
PLENARY A ITEMS 8, 9.1-9.4, 10			9.1 9.2	9.3 9.4			8 10				WP	WP	
PLENARY B ITEMS 5, 6, 7, 11		5 6 7						11			WP	WP	

Explanatory notes:

P General Plenary Sessions
 WP Consideration by Plenary of "Working Papers"
 PK Consideration by General Plenary of "PINKs"

[D] Consider the designation of a rapporteur or a sub-committee
 [F] Report to be submitted directly to General Plenary
 [I] After the Plenary Meeting
 [K] Consideration of the Report of a rapporteur or sub-committee

SIMPLIFIED FLOW CHART OF THE WORK OF THE SESSION



WORLD CLIMATE CONFERENCE-3

1. Overview

1.1 At the invitation of the Government of Switzerland, the World Climate Conference-3 (WCC-3) was held in Geneva, Switzerland, from 31 August to 4 September 2009. It was organized by the World Meteorological Organization (WMO), in collaboration with the United Nations Educational Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the Food and Agriculture Organization of the United Nations (FAO), the International Council for Science (ICSU) and other intergovernmental and non-governmental partners. The Conference was generously supported by the governments of Australia, Canada, China, Denmark, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Kenya, Namibia, Norway, Pakistan, Russian Federation, Saudi Arabia, Spain, Switzerland, the United Kingdom and the United States of America, and by the European Union, the European Space Agency, the United Nations Environment Programme and FAO. Additional in kind support was received from many other countries and organizations. Some 2,000 participants from 163 countries and 59 international organizations attended the Conference.

1.2 The First and Second World Climate Conferences had laid the foundation for building research and observational activities to understand the nature of the climate challenges and to provide the scientific bases for developing the comprehensive and sound climate services that are now being sought by all countries and in virtually every sector of society:

- (i) The First World Climate Conference (1979) influenced the establishment of a number of important international scientific initiatives, notably the WMO World Climate Programme, including the World Climate Research Programme (co-sponsored by WMO, the International Council for Science and the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization), and the Intergovernmental Panel on Climate Change (co-sponsored by WMO and the United Nations Environment Programme), which won the Nobel Peace Prize in 2007;
- (ii) The Second World Climate Conference (1990) called for the establishment of a climate convention, adding momentum to international efforts that resulted in the development of the UN Framework Convention on Climate Change in 1992. It also led to the establishment of the Global Climate Observing System and to recommendations for future activities of the World Climate Programme.

1.3 The Fifteenth World Meteorological Congress (Geneva, Switzerland, May 2007) had decided it was necessary and timely to build on these legacies, and approved the organization of World Climate Conference-3, in collaboration with other UN system agencies and partners. WCC-3 gave WMO, its partners and nations an opportunity to jointly consider an appropriate global framework for climate services over the coming decades that would help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the growing array of climate prediction and information services made possible by recent and emerging developments in international climate science and technology.

1.4 The theme of the Conference was 'Climate Prediction and Information for Decision Making' and its vision was to develop "An international framework for climate services that links science-based climate predictions and information with the management of climate-related risks and opportunities in support of adaptation to climate variability and change in both developed and developing countries".

2. Commission for Climatology participation

2.1 The president and vice-president of the Commission, Mr Pierre Bessemoulin and Mr Shourong Wang, respectively, along with Mr Michael Coughlan (member of the CCI Management Group), participated as members of the International Organizing Committee for WCC-3 (WIOC).

2.2 Many other members of the Commission for Climatology (CCI) including chairs of Open Area Programme Groups (OPAGs) and Expert Team leaders took part in the work of the WCC-3 as members of organizing committees for various segments of the programme, as speakers and as discussants, and as poster presenters.

3. Results of the Conference

3.1 Expert segment (31 August to 2 September)

3.1.1 The Expert Segment of the Conference, including some 200 speakers and 1,500 participants, reviewed a wide range of individual and community-based papers and presentations from climate science, service, application and user communities as well as the results of deliberations by a number of other major climate service stake-holder groups, in a series of sessions, forums, workshops and round-tables. Development, provision and uptake of climate services, and requirements for climate services were discussed under the following themes:

- (i) The shared challenge for climate science, services and applications;
- (ii) User needs and applications;
- (iii) The scientific basis for climate services;
- (iv) Adaptation to climate variability and change;
- (v) Societal perspectives on climate services;
- (vi) Implementing climate services; and
- (vii) Exploiting new developments in climate science and services.

3.1.2 The Conference recognized that great progress has been made over the past 30 years towards an integrated global approach to the development, implementation, operation and application of climate services in support of a wide range of societal needs in all countries and in all major socio-economic sectors. It particularly recognized the achievements under the World Climate Programme (WCP) to put in place a firm basis for the delivery of a wide range of climate services, especially its World Climate Applications and Services Programme (WCASP) and the Climate Information and Prediction Services Project (CLIPS) in the successful implementation of Regional Climate Outlook Forums (RCOFs) and Regional Climate Centres, and their support for enhanced national climate services in many countries.

3.1.3 While the discussions made it clear that the present arrangements for provision of climate services fall far short of meeting the identified needs, especially in developing countries, the conference noted that there is vast, as yet largely untapped, potential to improve these arrangements and enhance the quality and utility of climate services for the benefit of all countries and all sectors of society. There was widespread agreement among both provider and user communities that a new global framework is required to enable better management of the risks of climate variability and change and adaptation to climate change at all levels through development and incorporation of science-based climate information into planning, policy and practice.

3.1.4 The participants in the Expert Segment welcomed the extensive preparatory work by WMO and its partner organizations on the design of the proposed Global Framework for Climate Services and the consultations that had already taken place with governments through both technical and diplomatic channels. They were in full agreement that, from the scientific and operational perspective, the proposed Framework should reinforce and complement the established international organizations for the provision and application of weather, climate, water and related environmental information, forecasts and warnings and should build on, and integrate, the existing international systems and programmes for climate observations and research which are co-sponsored by WMO, other UN System partner organizations, and ICSU. WMO and user-sector organizations should enhance collaboration in the development of practical guidance on the preparation and use of climate products in different sectors and regions.

3.1.5 In its Conference Statement, the WCC-3 therefore called for major strengthening of the essential elements of a global framework for climate services:

- (i) The Global Climate Observing System and all its components and associated activities; and provision of free and unrestricted exchange and access to climate data;
- (ii) The World Climate Research Programme, underpinned by adequate computing resources and increased interaction with other global climate relevant research initiatives;
- (iii) Climate services information systems taking advantage of enhanced existing national and international climate service arrangements in the delivery of products, including sector-oriented information to support adaptation activities;
- (iv) Climate user interface mechanisms focused on building linkages and integrating information, at all levels, between the providers and users of climate services; and
- (v) Efficient and enduring capacity building through education, training, and strengthened outreach and communication;

and supported the development of the proposed Global Framework for Climate Services.

3.1.6 The full set of conclusions and recommendations of the Expert Segment of the Conference are described in the Conference Statement, which can be found at http://www.wmo.int/wcc3/page_en.php.

3.2 High level segment (3 to 4 September)

3.2.1 Heads of State and Government and other invited dignitaries expressed their views on the proposed global framework for climate services, noted the findings of the Expert Segment of the Conference and, along with ministers and other national representatives, adopted a Conference Declaration.

3.2.2 Through the declaration, the conference decided to establish a Global Framework for Climate Services (hereafter referred to as "the Framework") to strengthen the production, availability, delivery and application of science-based climate prediction and services; requested the Secretary-General of WMO to convene an intergovernmental meeting of Member States of the WMO to approve the terms of reference and to endorse the composition of a task force of high-level, independent advisors for implementing the framework, taking into account the concepts outlined in the Brief Note annexed to the Declaration; decided further that the report of the task force shall be circulated by the Secretary-General of WMO to Member States of the WMO for consideration at the next WMO Congress in 2011, with a view to the adoption of the Framework and a plan for its implementation; and invited the Secretary-General of WMO to provide the report to relevant organizations and to the UN Secretary-General.

3.2.3 The full text of the WCC-3 Conference Declaration can be found at http://www.wmo.int/wcc3/declaration_en.php and its annexed Brief Note at http://www.wmo.int/wcc3/documents/brief_note_en.pdf.

REGIONAL ACTIVITIES RELATED TO THE WORLD CLIMATE PROGRAMME

In addition to the information below, regionally pertinent information may also be found in CCI-XV/INF. 13 on the activities of OPAGs.

1. Regional Association I (RA I, Africa)

1.1 The RA I Working Group on Climate Related Matters (WGCRM) held its first meeting in Cotonou, Benin from 25 to 27 November 2008 to reinforce the climate activities within the NMHSs and particularly the implementation of the WMO Regional Climate Centres (RCCs) in the Region. The meeting established a Task Team to identify and evaluate capacities of centers, NMHSs or other institutions that express intent to become RCCs and propose a region-wide networking of potential RCCs.

Climate Data Management Systems (CDMSs)

1.2 Three workshops were held in Africa to help countries migrate from CLICOM to more capable software such as CLIDATA, CLISYS and CLIMSOF. Two CLIMSOF training workshops were held in Africa with the support of the UK Met Office in Kigali (Rwanda in September-October 2006 and Brazzaville, Congo from 23 to 27 April 2007). WMO and the UK Met Office organized a training workshop for the Enhancement of CLIMSOF capabilities of Climate Data and Metadata Exchange (Training of Trainers) in Lusaka, Zambia from 20 April to 1 May 2009. This workshop was attended by participants from Africa, the Caribbean, Asia and the Pacific.

Climate Data Rescue

1.3 Participants from Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Guinea Bissau, Guinea Conakry, Liberia, Mali, Niger, Sao Tome & Principe, Senegal and Togo attended a WMO Regional Data Rescue Workshop held at ACMAD, Niamey, Niger, in March 2006. Data rescue remains one of the highest priority issues in RA I. WMO provided support to ICPAC to rescue climate records of the East African region archived in old and obsolete magnetic tapes.

1.4 The Department of Regional Activities of the WMO (DRA) signed a Memorandum of Understanding with the International Environmental Data Rescue Organization (IEDRO) under NOAA-VCP funds to support data rescue in Kenya, Senegal, Niger, Zambia and Mali.

Climate Data homogenization and climate indices

1.5 As part of WCDMP supporting activities for climate change detection and indices and under the guidance of the joint CCI/WCRP-Clivar/JCOMM Expert Team on Climate Change Detection and Indices, WMO organized a one week seminar on climate data homogenization and climate change indices in Central Africa, Brazzaville, April 2007. The seminar was organized back-to-back with the climate data management workshop. The workshop led for the first time to the development of collaborative work involving experts from NMHSs in Central Africa, Zimbabwe, Guinea side by side with ETCCDI lead scientists.

1.6 As part of the French ACClimate project on capacity building in climate change adaptation for the countries of the Indian Ocean Commission, France sponsored an ETCCDI workshop on climate data homogenization and climate change indices held in Vacoas, Mauritius, from 19 to 23 October 2009.

Regional Climate Outlook Forums

1.7 RCOFs have regularly been held for the past 10 years in Africa for Southern Africa, Greater Horn of Africa and Western Africa, coordinated by SADC-DMC, ICPAC and ACMAD respectively. In a new initiative, the RCOF for Central Africa was revived after a lapse of nearly six years, and the third session of the forum (PRESAC-3) was held (Bangui, 20–24 October 2008), with support from WMO and ACMAD, whereby ACMAD provided the technical coordination of the session. An international expert review meeting of RCOFs took place in November 2008 (Arusha, Tanzania) to revisit implementation of the recommendations of the previous review (October 2000, Pretoria, South Africa); share experiences, successes and challenges; and pave the way forward for future forums. Issues addressed include forecasting methodologies and verification, communication with users, achievements in global and regional structures for production and delivery of forecast products and services, sustainability, liaison with users and linkages with UNFCCC, WCC-3 expected outcomes and other climate relevant frameworks or goals. All the RCOFs active around the world were represented at this meeting.

Regional Climate Centres

1.8 Resolution 10 of XIV-RA I (2007) established the RA I Working Group on Climate Related Matters with Terms of Reference that include, inter alia, to advise the RA I president on the implementation of RCCs in RA I. The WGCRM developed a survey on assessing needs and potential Member candidates for carrying out RCC functions. The corresponding survey was sent by the president of RA I through a formal letter to all Members and several responses were collected by the WMO Secretariat.

Climate Projects

1.9 The "Climate for Development in Africa Programme (ClimDev Africa)" has been formally approved by the Africa Union, the UN Economic Commission for Africa and the African Development Bank (in 2009). ClimDev Africa addresses both observational and climate services need in RA I. In 2009, WMO launched a project, funded by Korea International Cooperation Agency (KOICA), to strengthen the capacity of ICPAC to perform RCC functions for the Greater Horn of Africa (GHA) region, and to help GHA countries to use the outputs. The World Bank GFDRR has also funded a WMO project on climate observations and regional modelling in support of Climate Risk Management and Sustainable Development for the GHA.

Capacity building

1.10 A CLIPS Focal Point Training Workshop was held for RA I with special focus on the Mediterranean region in Tunis-Carthage, Tunisia, from 29 October to 9 November 2007. A WHO/WMO Regional Workshop on Adaptation Strategies to Protect Health under Climate Variability and Climate Change was held in Dar Es Saalam, Tanzania, in July 2008.

2. Regional Association II (RA II, Asia)

2.1 The RA II WGCRM met in Beijing, China from 7 to 8 April 2007, and in Tokyo, Japan from 7 to 8 August 2008. Implementation of RCCs in RA II formed a major work component of the Group.

Implementation of Climate Watch Systems

2.2 WMO in collaboration with China Meteorological Administration (CMA) organized a workshop on climate monitoring including the implementation of climate watch systems in RA II with focus on monsoon affected areas (Beijing, China, 10-13 November 2009). NMHSs of Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Honk Kong China, India, Japan, Lao People's Democratic Republic, Maldives, Myanmar, Pakistan, Republic of Korea,

Sri Lanka, Thailand and Vietnam were represented at the workshop and made presentations of their capabilities for supporting the climate monitoring and climate watch activities. Two sectoral institutions from Bangladesh and Japan respectively were also represented and provided user perspective.

Climate Data Management Systems (CDMSs) and climate indices

2.3 A CLIMSOF training workshop was held in Ha Noi, Viet Nam, from 12 to 30 November 2007 with participants from Bhutan, Cambodia, Fiji, Laos, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Democratic Republic of Timor Leste (East Timor) and the Socialist Republic of Viet Nam. A seminar on Climate Data Homogenization and Climate Change Indices was conducted by Lisa Alexander (Australia), Blair Trewin (Australia) and John Caesar (UK) from 3 to 7 December back-to-back with the CLIMSOF training workshop.

Regional Climate Outlook Forums

2.4 Meetings of the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRA II), cosponsored by CMA and WMO, have been held on an annual basis since 2004, in Beijing, China. More than 20 RA II NMHSs were involved in each of these activities, including institutions from other regional associations. Efforts are underway to consider an appropriate mechanism to initiate sub-regional COFs in RA II, in collaboration with the full regional annual event. CMA-JMA-KMA joint meetings on summer and winter East Asia Monsoon are held twice per year. In a meeting held on 6 August 2009 at Trieste, Italy, the Permanent Representatives of South Asian countries with WMO unanimously agreed to establish a South Asian Climate Outlook Forum (SASCOF) and to organize the sessions from 2010 onwards for generating consensus outlooks for the summer monsoon. The offer by India to host the first three sessions of SASCOF was accepted.

Regional Climate Centres

2.5 With the strong support of the RA II WGCRM, RA II established a pilot RCC network for the Region (2004), and developed an Implementation Plan (2007). Following the approval of the fourteenth session of RA II in December 2008, the RA II WGCRM developed the first draft of "Guidelines on the Eligibility of RCCs" which identified operational, coordination, data services, training/capacity building and research/development functions, and "Designation Procedures for the Establishment of the Regional Climate Centre (RCC) Network in RA II". In accordance with the Implementation Plan, Beijing Climate Center (BCC) and Tokyo Climate Center (TCC) established a joint portal site at <http://www.rccra2.org>, which was linked to the websites of BCC, TCC, NMHSs in RA II and other related institutions. In 2009, the WMO Executive Council (EC-LXI) adopted the amendment, and designated BCC and TCC as the first WMO RCCs. India, the Islamic Republic of Iran, the Russian Federation and Saudi Arabia expressed interest in joining the RA II RCC network.

Capacity Building

2.6 A CLIPS Training Workshop for RA II (Eastern Part) was held in Bangkok, Thailand in January 2007. An International Workshop on the Application of Advanced Climate Information in the Asia-Pacific Region was held in Tokyo, Japan in February 2007. A CLIPS training session on applications for urban climatology was held in January 2010, in Pune, India. Other climate-relevant events benefiting the Region include the Fourth International Seminar on Climate System and Climate Change (Beijing, China, 16-27 July 2007) and an advanced International Training Programme on Climate Change – Mitigation & Adaptation (Beijing, China, October 22-26, 2007).

2.7 Three WHO workshops (co-sponsored by WMO) on Human Health Impacts from Climate Variability and Climate Change, were held in RA II: for the Himalayas and Mountainous Asia (2005, 7 countries); Malaysia (2007, 18 countries); and Uzbekistan (2006, 7 countries). The

CCI Expert Team on Climate and Health is working with the Shanghai Meteorological Bureau, Shanghai, China, to ensure an operational Heat-Health Warning System as part of a Multi-hazard Early Warning System for EXPO 2010.

3. Regional Association III (RA III, South America)

3.1 The RA III WGCRM met in Montevideo, Uruguay from 15-17 May, 2006 and made recommendations on issues such as support for CCI, data, applications, RCCs, training, RCOFs, and capacity building.

Implementation of Climate Watch Systems

3.2 WMO organized a workshop on climate monitoring including the implementation of Climate Watch Systems in RA III (Guayaquil, Ecuador 8-11 December 2008). Regional climate related institutions including CIIFEN, CPPS and the University of ESPOLO of Ecuador co-sponsored the workshop. In addition to the NMHSs of the Region, participants from NOAA (CPC), Météo-France and Armenia attended this workshop. Participating institutions and NMHSs agreed to cooperate in the implementation of CWSs in the Region taking into consideration the CCI guidelines on climate watches. As a follow-up action to this workshop, the NOAA Climate Prediction Center (CPC) started issuing El Niño Watch in February 2009.

Regional Climate Outlook Forums

3.3 In RA III, regular RCOFs are held for the Western Coast of South America (WCSACOF) under the leadership of CIIFEN comprising the countries of Venezuela, Colombia, Ecuador, Peru, Chile and Bolivia, and Southeast of South America (SSACOF) comprising the countries of Brazil, Paraguay, Uruguay and Argentina. An annual sub-national COF was also established for the Northeastern part of Brazil (NEBCOF).

Regional Climate Centres

3.4 The RA III WGCRM recommended implementation of RCCs in RA III and proposed development and completion of a questionnaire to establish requirements and capacity in the Region. RA III (Lima, 2006) noted the offer by CIIFEN to serve as a RCC, but indicated that a network with distributed functions might serve the Region best.

Capacity Building

3.5 A CLIPS Focal Point Training Workshop for RA III was held from 8-19 August 2005 at Lima, Peru, attended by experts from twelve South American countries, the USA and Spain.

4. Regional Association IV (RA IV, North America, Central America and the Caribbean)

4.1 RA IV coordinates its climate activities through its Management Group. RA IV agreed to have a special focus on the implementation of RCCs.

Climate Data Management Systems

4.2 An advanced CLIDATA Training was organized at the CIMH in Barbados from 19 to 30 May 2008 for countries that have been successful in implementing the CLIDATA system under the SIDS Caribbean project funded by the Finnish Government: Cuba, Dominican Republic, Guyana, Jamaica, Trinidad and Tobago. This workshop was supported by the Finland VCP funds.

4.3 The following countries have installed the ClimSoft through the ClimSoft workshop organized in Trinidad and Tobago in May-June 2008: Anguilla, Bahamas, Belize, British Virgin

Islands, Cayman Islands, Dominica, Grenada, Montserrat, Netherlands Antilles and Aruba, St. Kitts & Nevis, Saint Lucia, St. Vincent and the Grenadines, and Turks & Caicos.

Regional Climate Outlook Forums

4.4 RCOFs for Central America (Foro del Clima de América Central, FCAC) are held annually. Also, the Caribbean Institute of Meteorology and Hydrology (CIMH) and the Central American Regional Committee of Hydrological Resources (CRRH) produce seasonal precipitation outlooks for the Caribbean countries of the Central America. RA IV benefits from having designated GPCs in Montreal, Canada and Washington, USA, for provision of long-range forecasts.

Regional Climate Centres

4.5 An RA IV RCC Pilot Project sponsored by the United States of America and implemented by the Central American Regional Committee of Hydrological Resources was launched in 2005 and a project to initiate RCC activities in Central America was launched in 2007 supported by the Inter-American Development Bank and the European Union. RA IV, at its fifteenth session in 2009, agreed to establish a Task Team on the development of RCCs in the Region.

Capacity Building

4.6 A WMO workshop on “Climate Variability and Change and their Health Effects in Central America: Health Vulnerability and Adaptation Planning” was held in San José, Costa Rica (6-9 August 2007).

5. Regional Association V (RA V, South-West Pacific)

5.1 The RA V WGCRM met in Singapore from 7 to 10 February 2006. The working group made several recommendations on climate data rescue and management, seasonal to interannual prediction, climate variability and trends, extreme climate events and sea level activities.

Climate Data Management Systems

5.2 The first CLIMSOFT training workshop held in Fiji, August 2005 was attended by participants from ten countries in the Pacific Region, namely: Cook Islands, Fiji, Kiribati, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu and Vanuatu. It was the first CLIMSOFT training and several countries in the Region continue to use the CLIMSOFT system.

Climate Observations

5.3 The Pacific Islands GCOS Technical Support Maintenance Center based in New Zealand continued to make strides to improve GCOS station performance in the Region.

Climate Information Services

5.4 Due to a collaborative effort by the US, Australia, and the International Pacific Research Center in Honolulu, a server was implemented in July 2007 to accommodate the web and data needs for PI HYCOS, GCOS, and GOOS. The USA Pacific Region Integrated Climatology Information Products project was implemented to assist coastal decision-makers to reduce their vulnerability to economic, social, and environmental risks.

Regional Climate Outlook Forums

5.5 The Australian Bureau of Meteorology has implemented a Pacific Island – Climate Prediction Project (PI-CPP) to strengthen PI NMS capacity to meet users' needs in climate prediction through providing a proven seasonal prediction system and training in its prudent use. The pilot focused on predictions for sugar cane in Fiji, the fisheries industry, water/drought management, agriculture, health, media and communications, and renewable energy sources. Ten South Pacific countries are participating regularly through an On-line Climate Outlook Forum. The Region has demonstrated cost-effective implementation of the RCOF process, through teleconferencing and Internet communications among the participants and experts. Island Climate Update (ICU) and the Pacific ENSO Applications Center (PEAC) are other forms of RCOF implementation in the Region.

Regional Climate Centres

5.6 The RA V Task Team on RCC services and seasonal to inter-annual prediction has recommended consulting with existing organizations in the four sub-regions with the purpose of developing and implementing a plan to create a proposed virtual RCC with its multiple nodes. In May 2006, RA V approved implementation and a survey of RA V Members identified the requirements of the Members. The Region is now pursuing the implementation of RCCs as per the designation criteria adopted by WMO in 2009.

Capacity Building

5.7 The International Research Institute for Climate and Society (IRI) and the Association of South East Asian Nations (ASEAN) Specialized Meteorological Centre (ASMC) conducted a joint training workshop on the ASEAN Seasonal Inter-annual Climate Prediction and its Applications in Singapore in May 2007. The workshop provided participants with an overview of seasonal forecasting methods, with a focus on statistical downscaling. The central theme was the tailoring of forecasts for risk management applications. A CLIPS workshop on 'Communicating about ENSO: Developing a common Understanding', was held in Honolulu, Hawaii in April 2008. A Training Workshop on Climate Variability and Predictions in the Indian Ocean Basin, was organized by NOAA with co-sponsorship by WMO, at Hanoi, Vietnam, 22-29 June 2009. Several countries from Asia and Africa participated in this workshop.

Climate Services for risk management and adaptation

5.8 The USA's Pacific Regional Integrated Sciences and Assessment (RISA program) supports an integrated program of climate risk management. With an emphasis on reducing Pacific Island vulnerability to climate-related extreme events such as drought, floods and tropical cyclones, RISA focuses heavily on sustaining a dialogue with decision-makers and emphasizes the effective engagement of communities, governments and businesses in developing policies to build resilience and sustainability in key sectors.

6. Regional Association VI (RA VI, Europe)

6.1 The fifteenth session of RA VI took place from 18 to 24 September 2009 in Brussels/Belgium. As a result of a simplified work structure of the Association, aligned with the new structure of the WMO Secretariat to ensure a consistent approach in the implementation of WMO programmes, a Working Group on Climate and Hydrology was established. Its climate-related Terms of References comprise, for example, assistance in the full implementation of the RA VI RCC Network, advice and reporting on climate change research findings and adaptation needs, the further implementation of the RCOF mechanism, guidance on data rescue etc.

Climate Data Rescue and Homogenisation

6.2 WMO, the NMHS of Spain (EAMET) and the University of Rovira i Virgili in Spain sponsored a workshop on data rescue and digitization of climate records in the Mediterranean basin which took place in Tarragona, Spain, 28-30 November 2007. The workshop led to the set up of the Mediterranean Data Rescue initiative (MEDARE) which was subsequently endorsed by EC-LX.

Climate Monitoring and Assessment

6.3 Coordinated by the RA VI WGCRM, and supported by its respective questionnaire on RA VI Operational Climate Monitoring Requirements, RA VI Members reached important progress towards a consistent RA VI-wide climate monitoring capability. The annual WMO Statements on the Status of the Global Climate were prominently supported by RA VI Members and translated into the German and Hungarian languages through voluntary efforts by experts from the NMHSs of Germany and Hungary.

Climate Prediction and Modelling Research

6.4 RA VI Members hosted a number of important events, like the World Modelling Summit for Climate Prediction (May 2008, Reading, UK), the WCRP Seasonal Prediction Workshop (June 2007, Barcelona, Spain), the Workshop on Evaluating and Improving Regional Climate Projections (February 2009, Toulouse, France), etc. and continued hosting the International Project Offices of the WCRP CliC, CLIVAR and SOLAS projects. BALTEX (Baltic Sea Basin) and HyMeX (Mediterranea) regional experiments were carried out under the umbrella of the WCRP Global Energy and Water Cycle Experiment (GEWEX).

Regional Climate Outlook Forums

6.5 With SEECOF-1, the South-Eastern Europe Climate Outlook Forum, RCOF process has been initiated in RA VI. SEECOF-1 was held from 11 to 12 June 2008 in Zagreb, Croatia, co-sponsored by the World Bank, WMO and the NMHSs of Croatia, Germany, Slovenia and Switzerland. SEECOF-2, as part of the European Commission funded activity under the Regional Programme on Disaster Risk Reduction in South-eastern Europe, was held from 23 to 27 November 2009 in Budapest, Hungary. A WMO WCRP IPY Workshop on CLIPS in Polar Regions was held in September 2008 in St. Petersburg, Russian Federation, and developed an agreement to work towards the establishment of a Polar Climate Outlook Forum (PCOF), as an IPY legacy initiative.

Regional Climate Centres

6.6 As a result of a RA VI RCC Implementation Meeting (20-21 October 2008, Geneva, Switzerland), and after extensive communication amongst RA VI Members, the RA VI WGCRM had developed an RA VI RCC Implementation Plan, which was endorsed by the president of RA VI in June 2009. The pilot RA VI RCC Network in its current design consists of three nodes, representing consortia of NMHSs and covering the climate data, climate monitoring and Long-rang Forecasting domains.

Capacity Building including CLIPS training

6.7 Amongst other activities, the RA VI WGCRM organized a Training Workshop on Capacity Building in Climate-related Matters in Yerevan, Armenia from 2 to 5 October 2006. A series of training workshops on the use of satellite data for climate monitoring for technical staff of NMHSs from Central and Eastern Europe was organized under the auspices of the EUMETSAT Satellite Application Facility on Climate Monitoring.

Climate Services for risk management and adaptation

6.8 Three major global WMO conferences directly relevant to climate adaptation were hosted in the Region during the previous intersessional period, namely the WMO Conference on Living with Climate Variability and Change: understanding the uncertainties and managing the risks (Espoo, Finland, 17-21 July 2006), the WMO Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services (Madrid, Spain, 19-22 March 2007) and the World Climate Conference-3 (Geneva, Switzerland, 31 August-4 September 2009).

OVERALL COORDINATION OF CLIMATE ISSUES AND INTER-AGENCY COLLABORATION

1. Current United Nations Climate Change Coordination

1.1 The United Nations System Chief Executives Board for Coordination (CEB) submitted a document to COP-14 in Poznan, December 2008, entitled *'Acting on Climate Change: The UN System Delivering as One'* through its High-Level Committee on Programmes (HLCP). <http://www.un.org/climatechange/pdfs/Acting%20on%20Climate%20Change.pdf>. This document brings together information on climate-related activities undertaken throughout the United Nations system, including its agencies, funds and programmes, as contributed by the respective entities. In this joint practice, Executive Heads in the United Nations system have mobilized the wide range of expertise and knowledge available within their organizations to focus on priority areas and specific deliverables which follow the approach defined in the negotiation and in pursuance of broader mandates and capacities already existing in the system. The initiative brings together expertise and ongoing work in diverse areas ranging from science and technology to agriculture, transport, forestry and disaster risk reduction, to address both mitigation and adaptation. It also brings together the normative, standard setting and knowledge sharing capacities of the system with its operational reach in order to support the most vulnerable. The United Nations system is positioning itself as an effective conduit of international action on an unprecedented scale. The overall objective is to maximize existing synergies, eliminate duplication and overlap, and optimize the impact of the collective effort of the UN system. The convening agencies including WMO have been asked to work in close collaboration with the UNFCCC Secretariat.

UN Climate-Related Activities

<i>Focus areas</i>	<i>Conveners</i>
Adaptation	HLCP collectively
Technology transfer	UNIDO, UN-DESA
Reduction of emissions from deforestation and degradation	(REDD) UNDP, FAO, UNEP
Financing mitigation and adaptation action	UNDP, World Bank Group
Capacity building	UNDP, UNEP
 <i>Cross-cutting areas</i>	
Climate knowledge: science, assessment, monitoring and early warning,	WMO, UNESCO
Supporting global, regional and national action	UN-DESA, UN Regional Commissions, UNDP
Climate-neutral	UN UNEP
Public awareness	UNCG, UNEP
 <i>Sectoral areas</i>	
Energy	UN-Energy
Agriculture	FAO, IFAD, WFP
Water	UN-Water
Oceans	UN-Oceans
Forestry & Fishery	FAO
Transport	IMO, ICAO, UPU
Health	WHO
Disaster Risk Reduction	ISDR, WMO
Human Settlements	UN-Habitat
Education	UNESCO
Industry	UNIDO, WIPO

1.2 WMO and UNESCO jointly take the lead on United Nations system coordination in the area of “science, assessment, monitoring and early warning (knowledge base)” as a key cross-cutting area within the United Nations system. HLCP invited the Secretary-General to continue consultations with UNESCO.

2. UNFCCC

2.1 WMO continues to contribute fully in line with the United Nations climate strategy elements, support the UNFCCC negotiation process within an agreed framework, and contribute to the implementation on the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change and other activities mandated by Congress.

2.2 The WMO core contribution in addressing climate variability and change was founded by the three top-level objectives, which WMO should deliver and communicate in a manner enabling engagement with the United Nations system to support other organizations with its infrastructure and scientific expertise, to fulfill their missions, as well as to draw upon the expertise and resources available from the United Nations system members.

2.3 The UNFCCC at COP-11, Nairobi, adopted the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change (NWP). It is structured around nine work areas, namely: methods and tools; data and observations; climate modeling, scenarios and downscaling; climate related risks and extreme events; socio-economic information; adaptation planning and practices; research; technologies for adaptation; and economic diversification.

2.4 The Nairobi Work Programme is a five year programme (2005-2010) implemented by Parties, intergovernmental and non-governmental organizations, the private sector, communities and other stakeholders. Its objective is to assist all Parties, in particular developing countries, including the least developed countries and small island developing States to:

- (i) Improve their understanding and assessment of impacts, vulnerability and adaptation to climate change;
- (ii) Make informed decisions on practical adaptation actions and measures to respond to climate change on a sound scientific, technical and socio-economic basis, taking into account current and future climate change and variability.
http://unfccc.int/adaptation/sbsta_agenda_item_adaptation/items/3633.php

2.5 In response to the UNFCCC Nairobi Work Programme, WMO submitted a “Concept paper: on the role of WMO and National Meteorological and Hydrometeorological Services (NMHSs) in the Implementation of the Nairobi Work Programme”, in November 2006. WMO has a leading role in the following areas of activities within the NWP: methods and tools; data and observations; climate modeling, scenarios and downscaling; climate related risks and extreme events; and research. http://www.wmo.int/pages/prog/wcp/cca/documents/cca1-concept_paper.pdf

2.6 Every year, WMO participates in the UNFCCC COP and SBSTA sessions and makes statements in the Plenary of those meetings. WMO also organizes side events and prepares Position Papers, specifically for COP sessions. These Papers have improved the understanding of Parties on the role of science for adaptation to climate change and better decision making.
<http://www.wmo.int/pages/prog/wcp/cca/documents/PositionpaperpreparedforCOP14.pdf>

2.7 The Bali Action Plan (Decision 1/CP.13), adopted at COP-13 in Bali, December 2007, identifies adaptation as one of the five key building blocks required (shared vision, mitigation, adaptation, technology and financial resources) for a strengthened future response to climate change to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012. The Bali Action Plan is negotiated under

the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) for COP-15. <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3>

2.8 The UNFCCC Bali Action Plan includes specific components of disaster risk reduction strategy, risk management and risk transfer, and NMHSs are engaged with climate change and disaster risk reduction partners to ensure that meteorological and hydrological services are appropriately recognized in the negotiated texts of climate change adaptation.

3. UNEP

UNEP initiated establishing a multifunctional Global Climate Change Adaptation Network and seeks to mobilize the resources of relevant regional centres and ground networks to enhance key institutional capacity for adaptation in a synergistic and coherent manner. The objective is to build climate resilience of vulnerable human systems, ecosystems and economies through the mobilization of knowledge and technologies to support adaptation capacity building, policy-setting, planning and practices, piloting adaptation interventions and planning longer-term adaptation efforts. The focus areas would be ecosystems, arid lands, water, low land mountains and SIDS. WMO participation in the planning process of the proposed network will contribute to UNEP's initiative through GFCS.

The core Network functions are:

- (i) Mobilizing knowledge and technology by improving their availability, accessibility and usability for user-communities at all levels;
- (ii) Piloting adaptation options, demonstrating and disseminating the best practices;
- (iii) Assembling and providing packages of adaptation services including knowledge, technology and capacity, to support adaptation actions taken by governments, practitioners and communities;
- (iv) Supporting the increased integration of adaptation options into national and regional development planning processes and practices;
- (v) Promoting synergies and collaboration between various disciplines, groups of practitioners, sectors, and regions, through the above functions.

4. Future IPCC activities

4.1 IPCC has already started the preparation of the Fifth Assessment cycle (AR5), and in particular the identification of benchmark scenarios (or representative concentration pathways) and a Special Report on managing risks of extreme events to advance climate change adaptation.

4.2 The 30th and 31st sessions of the IPCC took place in Turkey and Indonesia, in April and October 2009, respectively. The IPCC is currently outlining its Fifth Assessment Report (AR5). It will comprise of the contributions of the three IPCC Working Groups and a Synthesis Report which will integrate and synthesize the information. The Working Group I Report will address the physical science basis and would be finalized in 2013. Working Group II will address impacts, adaptation and vulnerabilities and Working Group III mitigation of climate change. The Reports of Working Groups II and III would be finalized in early 2014 and the Synthesis Report at the end of 2014.

4.3 As has been the case in the past, the outline of the AR5 will be developed through a scoping process which involves climate change experts from all relevant disciplines and users of IPCC reports, in particular representatives from governments. Gaps in knowledge, evolving understanding in relevant scientific technical fields as well as information needs of policymakers

will be addressed in this context. As a first step, experts, governments and organizations including WMO involved in the Fourth Assessment Report have been asked to submit comments and observations in writing. WMO has contributed those comments as input to the Scoping Meeting of experts, held in Venice, Italy, in July 2009.

4.4 In a next step governments and participating organizations will be asked to nominate experts, which can act as authors and reviewers for the three Working Groups contributions to the AR5. The selection of authors will be done by the IPCC Bureau as stipulated in the IPCC procedures. The writing process is likely to start in the second half of 2010 for Working Group I and early 2011 for Working Groups II and III. The Panel has requested that the new scenarios and models currently developed by the scientific community are transferred in a timely manner into development of the Fifth Assessment Report, in particular in relation to impacts, adaptation and vulnerability.

4.5 Two Special Reports are currently under preparation. As for all Special Reports, their preparation follows the same procedures as for the Assessment Reports.

4.5.1 The Special Report on “Renewable Energy Sources and Climate Change Mitigation” is carried out under the leadership of the IPCC Working Group III and will be released in 2010. The first Lead authors meeting has been held in January 2009 in San Jose, Brazil, and a second one will convene at the end of August. This Special Report aims to provide a better understanding and broader information on the mitigation potential of renewable energy sources: technological feasibility, economic potential and market status, economic and environmental costs-benefits, impacts on energy security, co-benefits in achieving sustainable development, opportunities and synergies, options and constraints for integration into the energy supply systems and in the societies. It will also assess resources by region and impacts of climate change on these resources.

4.5.2 The preparation of the Special Report on “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation” commenced as its outline was approved by the Panel at its 30th Session last April. This Special Report will consider three types of extreme events: the ones for which climate change has or will amplify occurrence - as floods and droughts; the ones in which trends outside the domain of climate will increase exposure or vulnerability to climate-related extremes - for instance coastal development increasing exposure to storm surges; and new kinds of potentially hazardous events and conditions that may occur as a result of climate change - such as glacial lakes outburst. The report will include 9 chapters. Three of them will focus on managing the risk at different levels in the society: community based responses; national scale and international responses. Two main case studies will be carried out throughout all chapters, while the last chapter will be entirely dedicated to case studies. The UN International Strategy for Disaster Reduction (ISDR) will participate in the preparation of the report which is planned to be released in 2011.

5. GCOS

5.1 The GCOS Secretariat submitted to EC-LXI the draft Progress Report on the Implementation of GCOS 2004-2008, which assessed progress by Members and other “agents of implementation” in advancing the 131 actions specified in the 2004 GCOS report, “Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC”.

5.2 The WMO Executive Council has called on the World Climate Research Programme and the Global Climate Observing System (GCOS) to continue providing coordination of data reprocessing and reanalysis efforts, and urged them and sponsors to continue their support for efforts spanning the full record of instrumental observation and for the climate system as a whole. The president of CCI has regularly attended the GCOS Steering Committee meetings since 2006 and enhanced interaction with that body on systematic observations.

5.3 The new vision for the space-based GOS will address climate observation needs among its core objectives and a high-level goal that there should be no gap in the satellite-based climate records, in accordance with the GCOS Climate Monitoring Principles. The homogeneity of such records should be secured through overlap, as appropriate, and intercomparison of consecutive missions, continuity of instrument capability, and appropriate ground-truthing efforts.

6. WCRP

6.1 The World Climate Research Programme (WCRP) had a review meeting with ICSU in 2008. Among a number of issues, the review had emphasized:

- (i) Societal needs of the research that will underpin mitigation strategies and climate adaptation;
- (ii) Societal and policy relevance that will sustain the Programme in the long run and make the necessary resources easier to acquire;
- (iii) Implementation plan for activities emerging from the Strategic Framework in 2005 as well as the observations of accelerated climate change.

6.2 The WCRP has multiple mechanisms for partnerships, moving from basic research to applied research. It coordinates international efforts in bottom up approach and provides interface. Nevertheless, the user groups should be defined more clearly. In line with its long-term plans, WCRP input to WCC-3 furthered seamless research on seasonal/interannual to decadal timescale prediction through centennial prediction timescale, with an emphasis on supporting the transition from basic research to the applications domain. Presently the accuracy for decadal prediction does not meet the needs for policy advice and further research efforts are being made to address this. The JSC meeting focuses on implementation of the WCRP plan in two phases, namely, from now to 2013 and post 2013 period.

6.3 There is close interaction between the Commission for Climatology (Open Programme Area Group on Monitoring and Analysis of Climate Variability and Change) and other relevant WMO Programmes, in particular WCRP/CLIVAR and JCOMM. That collaboration led to excellent and sustained work on climate change indices with direct benefits to the Members' efforts in assessing and monitoring climate extremes, regionally and locally, as well as to the IPCC work. As a result it is expected that the CCI/CLIVAR/JCOMM Joint Expert Team work plan for the current CCI intersessional period will continue to assist NMHSs in developing and least developed countries in using the knowledge developed through that work plan. Furthermore, the Technical Conference, preceding CCI-XV, in Antalya, February 2010 will include a one-day joint meeting between the CCI and the Joint Scientific Committee (JSC) for the World Climate Research Programme (WCRP). The Conference will focus on how both climate variability and change impact on sustainable development, and on how the WCRP climate research community and other partners can work with the Commission for Climatology (CCI) to improve WMO's responses to the needs of Society in this regard.

6.4 The workshop on Future Climate Change Research and Observations: GCOS, WCRP and IGBP Learning from the IPCC Fourth Assessment Report (Sydney, Australia, 4-6 October 2007) recognized an increasing demand by decision makers for climate change information required for adaptation and the assessment of impacts and vulnerability, and that significant gaps still existed in our ability to observe, understand and predict climate with the required level of detail. It called on WCRP and its projects to develop strategies for future climate research that would be aimed at continuous substantiation of climate predictions and projections and the workshop identified requirements of communities studying impacts, vulnerability and means of adaptation to climate change. The workshop recognized the long-term climate record as a key foundation for adaptation and reinforced the high importance of adequate support to existing

GCOS networks for effective use of both research-based and operational observations in climate monitoring.

6.5 WMO Executive Council has requested the Commission for Climatology and relevant WMO Programmes, including the co-sponsored WCRP and GCOS, to identify current activities relevant to adaptation and gaps to be addressed for provision for the needs of key socio-economic sectors for climate information for climate-risk management, and to take steps to incorporate those in future priority setting and planning. In particular, there is a need to assist NMHSs in developing reliable climate scenarios, and to assess the inherent uncertainty. Those efforts had to address, among others, WMO commitments to the UNFCCC Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change, and cover methods and tools (for example, RCOFs, CLIPS, downscaling and scenarios) and data and observations (DARE, data exchange, climate system monitoring, etc.), and be in line with the recommendations of the WMO Conference on Living With Climate Variability and Change: understanding the uncertainties and managing the risks (Espoo, Finland, 17–21 July 2006).

6.6 There is a need to foster the transition of results from climate research to the operational practices of NMHSs. On this basis the Commission for Climatology and the WCRP Joint Scientific Committee will establish a mechanism to identify the requirements of Members for, and to facilitate development and operational implementation by Members of, appropriate climate prediction techniques, and to provide technical guidance to NMHSs in contributing to solutions to problems associated with climate variability and climate change, and with climate-related hazards.

WMO STRATEGIC PLANNING AND RESULTS-BASED MANAGEMENT

1. Implications of WMO Results-based Management for the CCI

1.1 The Fifteenth World Meteorological Congress (Cg-XV) approved a new framework for the Results-based Management (RBM) of the Organization. The approval of the RBM approach included the implementation from 2008 of the Strategic Plan that defined three Top Level Objectives, five Strategic Thrusts and eleven Organization-wide Expected Results. The Operating Plan and the Results-based Budget for the period 2008-2011 direct the programmatic implementation activities of the Organization.

1.2 Cg-XV, through Resolution 27 (Cg-XV) on the WMO Strategic Plan, requested the technical commissions to adhere to the direction and priorities set forth in the Strategic Plan and to organize their programme structures and activities so as to pursue the top-level objectives and to achieve the expected results.

1.3 The sixtieth session of the Executive Council (EC-LXI, June 2009) requested that within the WMO strategic planning process, each technical commission should prepare a note on lessons learned, experiences gained and prospective challenges in the course of the implementation of the current WMO Strategic Plan, which would be used in the preparation of the next Plan. It agreed that technical commissions should develop Operating Plans for 2012–2015 based on the experience gained through the development of the Operating Plan for the fifteenth financial period.

1.4 The EC-LXI noted that the presidents of technical commissions (PTC) had held extensive discussions on RBM and actions towards the improvement of the efficiency and effectiveness of the Commissions and aligning activities to the WMO Strategic Plan during their meeting held in Geneva, Switzerland from 2 to 4 February 2009. It noted that the PTC recognizes the cross-cutting nature and the principal and important role of the WMO Programmes. It noted with satisfaction the suggestions given by PTC for consideration by the Executive Council Working Group on Strategic and Operational Planning (EC WG/SOP) indicating the need for further exploring the outlined concept, which suggested alternatives for conducting technical commission meetings.

2. Monitoring and Evaluation of the WCP

The sixtieth session of the WMO Executive Council (EC-LX, June 2008)

2.1 EC-LX requested the Secretary-General to pursue the development of a comprehensive WMO Monitoring and Evaluation (M&E) System Plan in a practicable, feasible and cost-effective way for presentation at its sixty-first session (June 2009).

2.2 The Council further decided that the development of the WMO M&E System should, inter alia, take into account lessons learned and M&E tools and methodologies available in a number of NMHSs.

The sixty-first session of the WMO Executive Council (EC-LXI, June 2009)

2.3 The Council noted the report of its Working Group on WMO Strategic and Operational Planning (Geneva, 16–18 March 2009) on matters related to the WMO Monitoring and Evaluation (M&E) Plan. The Council stressed the importance of the WMO M&E System for a successful implementation of RBM in WMO and endorsed the following recommendations of its WG/SOP:

- (a) The WMO M&E Plan should be used as the action plan for the development and Implementation of the WMO M&E System, including a Preparatory Phase (2009), a

M&E Pilot Phase (2010–2011) and the full M&E System (as of 2012), with reporting by the Secretary-General to EC on progress made;

(b) Selection of Expected Result 5 and Expected Result 8 for the Pilot Phase (2010–2011).

2.4 The Council requested the technical commissions to contribute to the M&E process through collecting and assessing monitoring and performance information related to programmes under their technical responsibility.

2.5 The Council requested that an evaluation of the Pilot Phase be conducted and submitted to Cg-XVI. In this context, the Council noted that the Secretariat had already developed the M&E framework for Expected Result 5, which would be used in the Pilot Phase. It reiterated the need for a cost prudent approach for the implementation of the M&E System and requested that the evaluation of the Pilots include a realistic assessment of the costs and workload for the Full Implementation Phase of the System.

3. WMO Strategic and Operating Plans (2012-2015)

3.1 The strategic direction of WMO in its planning is driven by a set of Global Societal Needs (GSNs) which form an over-arching framework for defining its strategic thrusts and high-level expected results. Through its Strategic Plan, the WMO focuses its planning, programmes and the activities, especially those of the NMHSs, on achieving results that will provide the best possible support to the safety and welfare of its Member countries and make a contribution to meeting the GSNs, including enhancing the global economy and addressing global environmental issues, through the provision of information and services. WMO has identified 5 strategic thrusts and 8 Expected Results to address these GSNs (see Table 1). A set of strategic priority areas have also been identified to define the focus for the planning period 2012 to 2015. They include:

3.1.1 Strategic Priority Area 1: Global Framework for Climate Services

The Heads of States and Governments, Ministers and Heads of Delegations present at the World Climate Conference-3 (WCC-3), decided to establish a Global Framework for Climate Services to help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the growing array of climate prediction and information services made possible by recent and emerging developments in international climate science and technology.

3.1.2 Strategic Priority Area 2: Disaster Risk Reduction

Disaster risk reduction is a strategic priority for WMO due to the fact that major disasters exact very high costs and dislocations in many countries, especially in developing and least developed countries and is at the core of the WMO mission and those of the NMHSs. WMO will address the information needs and requirements of the disaster risk management community, effectively and in a timely fashion, through a coordinated approach, and working with its partners.

3.1.3 Strategic Priority Area 3: Capacity Building

Many developing and least developed countries lack the institutional infrastructure to provide even the most basic services to their governments and society. Institutional capacity-building is a priority for these countries to provide the necessary national capabilities and expertise for addressing environmental and development issues. Management education and training, as well as scientific and technical skills development, are essential.

3.1.4 Strategic Priority Area 4: Weather, Climate and Water Research, Predictions and Services

The WMO Executive Council established a Task Team on Research (EC-RTT) to report on ways to “strengthen and promote the linkages between climate, weather, water and environmental research to enable NMHS and other related services to provide improved services in the next decade”. The EC-RTT recommended a major change in the paradigm for prediction research, recognizing that the traditional boundaries between weather forecasting, seasonal forecasting and climate prediction have eroded while the need for information from prediction systems has expanded to include new and novel variables and products, particularly with respect to atmospheric constituents and climate change.

3.1.5 Strategic Priority Area 5: WMO Integrated Global Observing System (WIGOS)

One of the major purposes of the World Meteorological Organization (WMO), as laid down in its Convention, is “To facilitate worldwide cooperation in the establishment of networks of stations for the making of meteorological observations as well as hydrological and other geophysical observations related to meteorology, and to promote the establishment and maintenance of centres charged with the provision of meteorological and related services. Accordingly, WMO Members operate, in a coordinated manner, complex networks in space, the atmosphere, on land and over oceans.

The following schematic diagram shows the global societal needs, strategic thrusts and distribution of Expected Results.

Table 1: Global Societal Needs, Strategic Thrusts and Organization-wide Expected Results

3 Global Societal Needs	Strategic Thrusts	8 Expected Results
1. Improved protection of life and property (related to impacts of hazardous weather, climate, water and other environmental events and increased safety of transport on land, at sea and in the air).	I. Improving service quality and service delivery.	1. Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate and water and related environmental predictions, information and services in response to users' needs and to enable their use in decision-making by all relevant societal sectors.
		2. Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate and water and related environmental elements.
		3. Enhanced capabilities of NMHSs to produce better weather, climate, and water and related environmental information, predictions and warnings to support in particular climate impact and adaptation strategies.
		4. Enhanced capabilities of Members to access, develop, implement and use integrated and interoperable surface-based and space-based systems for weather, climate and hydrological observations as well as related environmental observations, based on world standards set by WMO.
2. Poverty alleviation, sustained livelihoods and economic growth (in connection with the Millennium Development Goals) including improved health and social well-being of citizens (related to weather, climate, water and environmental events and influence).	II. Advancing scientific research and application as well as development and implementation of technology	5. Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and environment science and technology development.
	III. Strengthening Capacity Building	6. Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates.
	IV. Building and enhancing partnerships and cooperation.	7. New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategies.
3. Sustainable use of natural resources and improved environmental quality.	V. Strengthening good governance.	8. An effective and efficient Organization.

4. WMO Operating Plan 2012–2015

The WMO Operating Plan is designed to translate the top-level objectives, expected results and key outcomes described in the Strategic Plan into specific initiatives and projects, which are needed to achieve the desired outcomes. The WMO Operating Plan, which serves as a foundation for the WMO results-based budget, distinguishes the contribution of WMO Members, technical commissions, regional associations and the Secretariat.

The WMO Operating Plan is build upon the following elements:

- Programme deliverables and activities, which provide specific approaches to address the expected results and key outcomes;
 - Cross-cutting initiatives and other mechanisms for achieving the expected results;
 - Performance metrics to assess progress in the implementation of the WMO Operating Plan;
 - Mechanisms for monitoring and evaluating the implementation of the WMO Operating Plan.
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WMO QUALITY MANAGEMENT FRAMEWORK

1. What is a Quality Management System?

The ultimate goal of a QMS is to encourage and to support the continual improvement of the quality of the delivered services and products. A QMS consists of a set of rules (procedures) that an organization decides to follow in order to achieve its objectives related to the quality of its products. Such a system contains, for example, rules concerning the general management of the organization and makes reference to the technical procedures which have to be followed, the quality controls which are performed on the products or services and the actions to be taken if the products or services do not comply with the requested specifications. In order to ensure the achievement of the quality objectives, it is essential that clear and unambiguous procedures are used for each specific task. For access to 'Explanatory circular on the WMO Quality Management Framework', visit the following link:

http://www.wmo.int/pages/prog/www/QMF-Web/Documentation/Other/QMF-circ_en.pdf

2. WMO Quality Management Framework and ISO

WMO is encouraging NMHSs to implement Quality Management Systems. In this context, it should be noted that the development of a WMO Quality Management Framework and the implementation of ISO 9001 are complementary and not mutually exclusive activities. However, certification according to the ISO 9001 standard has an element of international credibility and recognition that must not be ignored. EC-LXI adopted a resolution (EC-LXI, Resolution 8, Procedures to be followed in proposing common WMO/ISO technical Standards), in 2009. The resolution decides that for each proposed common Standard; the responsible body initiating the proposal should prepare comprehensive supporting documentation that includes; the benefit/cost implications to Members for adoption of WMO/ISO Standard, a full description of the cross-cutting elements, and an assessment of which elements in the common Standard could create a risk if adopted.

3. Basic Decisions and Rationale

3.1 Congress (Cg-XIV, Resolution 27) decided that WMO should work toward a Quality Management Framework for NMHSs that would eventually include and develop the following distinct though related elements:

- WMO technical standards;
- Quality management systems including quality control;
- Certification procedures.

3.2 The WMO Quality Management Framework should enable the provision of early and continuing relevant advice to Members on developing their Quality Management Systems. The need to introduce Quality Management (QM) in a systematic manner has been recognized by WMO Members and programme officers for some time and is reflected in many global and regional standards, namely those established by the regulatory documents of WMO (i.e. Technical Regulations, Manuals) and by many publications issued under the WMO scientific and technical programmes in the form of Guides.

4. The Main Steps in Setting up a Quality Management System

The introduction of a Quality Management System can be divided into five phases. Beforehand, the management of the NMHSs has to decide whether it considers it necessary to

consult an external consultant. This can help in defining the key processes, give advice as to how to implement the QM system into a hierarchical structure or simply brief the top and middle management on their role and understanding of QM.

(a) Phase 1 "Quality Policy"

The top management defines the quality policy and the quality objectives aligned with WMO argued standard policy. The quality policy needs to be understood and accepted by all staff members. The quality objectives should be measurable by quality indices, e.g., data availability, data quality, timeliness or customer satisfaction.

(b) Phase 2 "Education and Training"

Well-trained and well-informed staff members are very important for the introduction of a QMS. The objective of phase 2 is to promote and maintain staff motivation, systematic human resource development and to introduce a QM information mechanism within the organization. The management is responsible for filling in the staff position (or positions) of a quality manager and to install a QM team.

(c) Phase 3 "Process Analysis"

The processes have to be described and documented. The process analysis defines all sub-processes and records as well as the existing quality control procedures. The objective of this phase is to perform an inventory of the processes and help to prioritize the processes.

(d) Phase 4 "Realization and Implementation"

Processes have to be optimized and be focused on customers. Every single activity of a process has to be checked for standards, continuity with the following activities and for a customer-oriented output. The aim of this phase is to define the quality objectives, to create an interface to the customers, to introduce a document management system and to set-up a quality assurance system.

(e) Phase 5 "Evaluation and Process Control"

All staff members have been informed and trained appropriately. The quality objectives and the quality indices have been established and serve as indicator and measure for quality. At this stage, it is highly advisable to perform an internal audit or a pre-audit to close some possible gaps in the QM system. The objective for this phase is to assess oneself and prove that you are able to continually improve your QM system.

5. Quality Management Activities of WMO

In preparation of the Quality Management related activities of the WMO programme bodies and the Intercommission Task Team on Quality Management (ICTT/QM), the WMO Secretariat conducted a survey among Members on their actions and plans relating to the introduction of QM Systems on the level of NMHSs to which many Members responded positively. The results were presented to EC-LVI which shows that most NMHSs have firm plans to establish QM Systems, several have already obtained certification in accordance with ISO standards, and others are preparing to follow within the next few years. The survey also provided valuable information on the rationale for establishing QM as an element of NMHSs policy, and on the requirements for assistance by WMO.

6. Benefits from a Quality Management System

The benefits resulting from having a quality management system are wide-ranging. Some of them are:

- Optimizes techniques to customers needs;
- Improves customer confidence and satisfaction (helps to keep customers);
- Provides better controls over operations (results are easier to control);
- Continual process improvement;
- Increases productivity and efficiency;
- Ensures prompt and effective action on faults or complaints;
- Clarifies working structure;
- Improves teamwork and communication;
- Enhances corporate image and quality awareness in the organization;
- Ensures availability of proper documentation;
- Enables quick start-up time;
- Provides systematic training to staff;
- Helps in marketing services;
- Assurance of effective management to directors and shareholders/owners.

7. Conclusion

The experience gained with the implementation of QM systems and certification in accordance with ISO standards clearly showed that a systematic application to the WMO scientific and technical programmes has a great potential for improving the efficiency of the organization of the NMHSs. The introduction of QM principles and the creation of a QM framework is therefore becoming a policy element of the international cooperation in meteorology and hydrology. Apart from the benefits NMHSs, or individual programmes, may gain from QM systems, WMO through the creation of a QM framework will improve the efficiency of its programmes and thereby foster international collaboration in meteorology and hydrology on all scales. For additional information on Quality Management Framework of WMO, visit the following link:

<http://www.wmo.int/pages/prog/www/QMF-Web/Documentation/Other/SomeConsiderations.pdf>

ACTIVITIES OF THE PRESIDENT AND THE CCI MANAGEMENT GROUP

1. The CCI Management Group met in February 2006 and March 2009 during the intersessional period. The first meeting mainly reviewed the operational aspects of the new WMO structure and priorities for the Commission's work programme, status and plans of the OPAGs and WCP support for the work of the Commission. The second meeting had a stock taking approach towards actions and achievements which have taken place since the beginning of the fourteenth period. It also reviewed the actions which needed to be completed. The Management Group had also discussed the Global Framework for Climate Services (GFCS) as an outcome of WCC-3 and the way in which CCI could contribute both to the Conference and to the Framework as well. The last but most important item of discussion in the Management Group meeting in 2009 was preparations for CCI-XV, proposed structure for the next period, workplan and Technical Conference preceding CCI-XV.

<http://www.wmo.int/pages/prog/wcp/cca/ClimateCoordinationActivitiesPreviousMeetings.html>

2. The president of CCI issued four circular letters in the intersessional period, all of which were posted on the web in English and French languages.

http://www.wmo.int/pages/prog/wcp/ccl/documents/CCI-213-CLPA-CCA-CCI_9832_en.pdf

http://www.wmo.int/pages/prog/wcp/ccl/documents/ccl212clpa-cca-ccl_15274_en.pdf

http://www.wmo.int/pages/prog/wcp/ccl/documents/CircularletterNo.2_enFINAL.doc

http://www.wmo.int/pages/prog/wcp/ccl/documents/CircularletterNo.1_enFINAL.doc

3. The following is a list of CCI president activities and achievements: participation to WMO Congress and EC sessions, including their subsidiary bodies, WMO co-sponsored meetings, CCI body sessions, WMO inter-commission sessions, Inter-agency and International programmes, main presentations and publications.

The meeting noted that the president of the Commission, in cooperation with other experts within the Commission, had produced a large number of climate-related scientific publications.

SUMMARY OF ACTIVITIES AND MAJOR ACHIEVEMENTS

- Coordination of CCI involving daily liaison with the WMO Secretariat, and frequent contacts with OPAG and ET Chairs;
- Contribution to WMO cross-cutting themes (Climate, Water and Environment; Disaster Prevention and Mitigation; Quality management; GCOS; WMO Space programme; Evolution of SMHNS and WMO; Role of WMO and NMHSs in the implementation of the UNFCCC programme on impacts and adaptation to climate change;
- Participation to ET meetings (1.1, 1.2, 2.1, 2.2, 2.3, 3.3, 4.1, 4.2, 5.2);
- Participation to CCI/CBS Inter-Commission work for updating the Manual on the GDPFS with amendments related to WMO designation of Regional Climate Centres (RCCs);
- Participation to ICTT-QMF work, especially for drafting a new volume of the WMO Technical Regulations on Quality Management;
- Deep involvement in the 3rd edition of the Guide to Climatological Practices (a draft had been made available on line to Cg-XV);
- Co-editor of upcoming WHO/WMO Guidance on Heat Health Warning Systems (a draft had been made available on line to Cg-XV);
- Involvement in MEDARE (co-chair of Steering Group);
- Participation to some brainstorming on ClimDev Africa;
- Preparation of and attendance to relevant meetings and conferences (e.g. Espoo, Madrid, Geneva, ...), and contribution to several publications (see below);
- In particular, member of the WCC-3 POC then of the WIOC and responsible person for sessions on Seasonal to inter-annual variability, on Mega Cities, and on Climate Services (Nations and Regions);
- Involvement in the development of the « WMO Initiative to Support Climate Change Adaptation (WISCCA) » in cooperation with CLW/CLPA branch, adopted by EC-LX, and its evolution towards a concept note on a Global Framework for Climate Services, which was intended to represent a basis for shaping the outcomes of WCC-3;
- Preparation of the History of CCI: Synthesis of CCI-XIII et XIV for inclusion in draft, and liaison with John Maunder, Morley Thomas, other contributors and WMO Secretariat;
- Review of papers submitted to international peer-reviewed journals and of projects reports (e.g. World Bank);
- Ongoing participation to the update of the IAEA « Safety Guide on Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations »;
- Validation of several world or continental records, with some others, in the framework of activities led by our Rapporteur on Climate Extremes Randy Cerveny (a very challenging and interesting activity!);
- Facilitation of a regional ETCCDI meeting (19-23 October 2009) for the Indian Ocean area (with financial support from French government);

- Facilitation of the ETCCDI workshop on Extremes (May 2008, De Bilt, The Netherlands);
- Discussions for implementation of RA VI RCC;
- Preparation of CCI-XV;
- Review of IPCC AR4 WG1 report for French government.

MEETINGS

1. WMO Congress and EC body sessions

- 15th WMO Congress (14-25/05/2007) and associated side meetings
- WMO Executive Council (EC) (Geneva, 20-30/06/2006, 18-27/06/2008, 2-9/06/2009)
- WCC-3 Provisional Organizing Committee (POC/WCC-3) (Geneva, 27-28/03/2006 and 27-28/11/2006)
- WCC-3 International Organizing Committee (Geneva, 3-5/09/2008, Bonn 16-18/03/2009): responsibility of parallel sessions on “Understanding and Predicting Seasonal to Inter-annual Climate Variability”, “Climate Information for Improved Planning and Management of Mega Cities”, and “Climate Services (Nations and Regions)”
- 7th session of EC WG on Climate and Environment (EC-AGCE-VII) (Geneva, 23-24/02/2006)
- EC WG on Climate and Related Water and Environmental Matters (EC WG CWE, Geneva, 27-29/03/2008, 11-13/02/2009, 21-23/10/09)
- 1st session of EC WG on Evolution of SMHNs and WMO (EC WG-ENW) (Geneva, 24-28/04/2006)
- EC Advisory Group on Disaster Prevention and Mitigation (EC-AG-DPM), (Geneva, 30/01/2007): 4 CCI projects were part of the 42 actions identified by DPM
- EC Task Team on the Integration of the WMO Observation Systems (EC-TT-WIGOS), Geneva, 31/01-2/02/2007
- Informal Meeting of Presidents of Regional Associations and Presidents of Technical Commissions (I-PRA/PTC), (Geneva, 22/05/2007, 25/06/2008, 4/06/2009)
- EC WG on WMO Strategic and Operational Planning (EC WG SOP, Geneva, 27-29/02/2008)

2. WMO (co-)Sponsored Meetings/Conferences

- Conference “Living with Climate Variability and Change (LWCVC): Understanding the Uncertainties and Managing the Risks” (Espoo, Finland, 17-21/07/2006)
- Workshop on the Role of WMO/NMHSs in the Implementation of the UNFCCC Five-year Programme on Impacts, Vulnerability, and Adaptation to Climate Change (Geneva, Switzerland, 17-18/10/2006) (preparation of the WMO statement to be delivered by WMO at SBSTA-25 in Nairobi, Kenya)
- WMO Regional Workshop on Social and Economic Benefits of Meteorological and Related Services to Society, Zagreb, Croatia, 5-6/02/2007
- International Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services, Madrid, Spain, 19-22/03/2007
- The Greater Horn of Africa 20th Climate Outlook Forum (GHACOF20) for September-December 2007 rainfall season, Nairobi, Kenya, 5-7/09/2007
- GCOS Steering Committee: Paris, 16-19/10/ 2007; Geneva, 14-17/10/2008; Paris, 27-30/10/2009
- International Symposium on the Public Weather Services (PWS): A key to Service Delivery, Geneva, Switzerland, 3-5/12/2007
- WCRP Joint Steering Committee (JSC), Arcachon, France, 31 March- 3 April 2008; Univ. Maryland, USA, 6-9/04/2009
- 1st Workshop on Climate Watches in RA III (Guayaquil, Ecuador, 8-11/12/2008)
- Workshop on Climate Watches in RA II with focus on monsoon affected areas, Beijing, China, 10-13/11/2009
- Third World Climate Conference (WCC-3), Geneva, 31/08 to 4/09/2009

3. CCI body sessions

- CCI Management Group (Geneva, Switzerland, 13-14/02/2006, 23-25/03/2009)
- Informal meeting of CCI Management Group (Espoo, Finland, 21/07/2006)
- Informal CCI MG meeting (teleconference on 17/12/2007) : progress report at mid term
- CCI Implementation and Coordination Team (ICT), Geneva, Switzerland, 9-11/10/2007. Main items addressed: designation and implementation of RCCs, Climate watches, CLIPS update
- Meeting of the Expert Team 5.2 on the Guide to Climatological Practices (CCI-GCP)(Geneva, Switzerland, 3-7/04/2006; 7-8/09/2009)
- Meeting of the Expert Team 2.2 on Climate Monitoring including satellite and marine data and products (Tarragona, Spain, 20-22/09/2006)
- Meeting of the Expert Team 4.1 on Climate and Health (London, UK, 20-22/11/2006). The principle deliverables will be the « Guidelines on Heat-Health Warning Systems »
- Meeting of the Expert Team 4.1 on Climate and Health, Geneva, Switzerland, 28/02-2/03/2007. Harmonization of contributions in view of publication
- Meeting of the Expert Team 1.2 on Observing Requirements and Standards for Climate, Geneva, Switzerland, 28-30/03/2007
- Meeting of the Expert Team 3.2 on CLIPS Operations, Verification and Application Services (teleconference), 19/06/2007
- Meeting of Expert Team 4.2 on Climate and Energy, Geneva, Switzerland, 19-21/11/2007
- International Workshop on Rescue and Digitization of Climate Records in the Mediterranean Basin (MEDARE), with ET 2.2 and 2.3. Tarragona, Spain, 28-30/11/2007
- WMO CLIPS Workshop on Communicating about ENSO: Toward Developing a Common Understanding (with ET 3.3); Honolulu, Hawaii, USA, 8-10/04/2008
- Workshop on Extremes in a Changing Climate, ETCCDI (ET 2.1), 13-16/05/2008, De Bilt, The Netherlands
- ET 1.1 expert meeting on WCP requirements for Metadata, 11-13/03/2008
- Meeting of the ET 3.1 on Research needs (teleconference): 22/01/2009
- Meeting of External Reviewers of the Guide to Climatological Practices, Geneva, 6-9/09/2009

4. WMO inter-commission meetings

- Meetings of Presidents of Technical Commissions (PTC), (Geneva, 2-3/02/2007, 18-20/02/2008, 2-4/02/2009)
- Informal Meeting of Presidents of Technical Commissions (I-PTC), (Geneva, 14/05/2007, 24/06/2008)
- Inter-commission Task Team on Quality Management Framework (ICTT-QMF) (Geneva, 25-27/04/2006, 15-17/01/2007, 28-30/10/2008). Note agreement with ISO recognizing WMO as a certification body, adoption of 8 quality management principles, and decision concerning management of mandatory publications (need for a Rapporteur in the future). The ICTT-QMF also proposed the structure and content of a new volume (IV) of the WMO Technical Regulations (WMO-No. 49) on Quality Management
- Inter-commission Task Team (CBS-CCI) on Regional Climate Centres (RCCs) (Geneva, 21-22/01/2008): update of the Manual on the Global Data-processing and Forecasting System (GDPFS) to include designation and functionalities of RCCs. Final version has been endorsed by CBS and then EC

5. Inter-Agencies and International Programmes

- EU COST Action 730 “Towards a Universal Thermal Climate Index UTCI for Assessing the Thermal Environment of the Human Being”, Ljubljana, 6-7/09/2006. Final meeting of this action took place at WMO in Geneva (15-16/04/2009). Final report to be published as a WMO publication
- WHO-Europe EUROHEAT Meeting (Budapest, 18-19/05/2006), focused on prevention of heat waves (representing WMO)
- Meetings on IAEA Safety Guide on « Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations » (IAEA Headquarters, Vienna, Austria, 17-21/11/2008 ; 30/03 to 3/04/2009)

6. EUMETNET/EMS Meetings

- EMS/ECAC Conference (European Meteorological Society/European Conference on Applied Climatology) (Ljubljana, 4-8/09/2006; Amsterdam, 29/09-3/10/2008). Co-convenor of Session 12 “International climate projects and programmes” and AC1: “Urban and building environments, tourism and recreation, health”
- ECSN Advisory Committee (EAC), Madrid, 23/03/2007 to establish EMS7/ECAM8 Programme (El Escorial, Spain, 1- 5/10/2007)
- Convenor of session: 10 (Nicholas Georgescu-Roegen session) “Social, economical and cultural aspects of severe storms” of the *4th European Conference on Severe Storms (ECSS 2007)*, Trieste, Italy, 10-14/09/2007

MAIN PRESENTATIONS

P. Bessemoulin: Perspectives on the benefits of NMHSs to social and economic development. Keynote speech at the Regional Workshop on Social and Economic Benefits of Meteorological and Related Services to Society, Zagreb, Croatia, 5-6/02/2007.

P. Bessemoulin: Societal Benefits of Climate Information and Services. International Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services, Madrid, Spain, 19-22/03/2007.

P. Bessemoulin: Presentation of the CCI activity report over the 14th financial period. WMO Congress XV, Geneva, Switzerland, 7-26/05/2007.

P. Bessemoulin: Action Plan from the Madrid WMO Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services". The Greater Horn of Africa 20th Climate Outlook Forum (GHACOF20) for September-December 2007 rainfall season, Nairobi, Kenya, 5-7/09/2007.

P. Bessemoulin: Development of User-Driven Climate Products and Services for Key Socio-Economic Sector Applications. International Symposium on the Public Weather Services (PWS): A key to Service Delivery, Geneva, Switzerland, 3-5/12/2007.

P. Bessemoulin: Joint CCI/Clivar/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). WCRP Joint Steering Committee, Arcachon, France, 31/03-3/04/2008.

P. Bessemoulin: WMO/CCI perspectives for CCI ET 2.1 (ETCCDI). Workshop on Extremes in a Changing Climate, De Bilt, The Netherlands, 13-16/05/2008.

P. Bessemoulin: i) Climate Variability and Climate change; Key issues including current status on extremes;
ii) The WMO Commission for Climatology : Vision, Structure and Work Plan. *1st Workshop on Climate Watches in RA III*, Guayaquil, Ecuador, 8-11/12/2008.

P. Bessemoulin: WMO DARE activities. International conference organized by the French National Library, Paris, France, 5-7/03/2009.

P. Bessemoulin: WMO Perspectives on Weather, Climate, Water and Environment Observation and Monitoring over the next 15 years. Senior level Meeting Global setting for European Environmental Monitoring: Measuring what we must manage. Copenhagen, Denmark, European Environment Agency, 13-15 May 2009.

P. Bessemoulin: i) Climate Variability and Climate change; Key issues including current status on extremes; ii) The WMO Commission for Climatology : Vision, structure and work plan. *Workshop on Climate Watches in RA II*, Beijing, China, 10-13/11/2009.

PUBLICATIONS

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ACTIVITIES OF THE VICE-PRESIDENT AND THE IMPLEMENTATION COORDINATION TEAM

1. The CCI Implementation/Coordination Team met in October 2007 during the intersessional period. Chaired by the vice-president of the Commission, the team was informed of the status and plans of the OPAGs and the regional association's Working Groups on Climate-related Matters and discussed activities related to the work of these groups requiring coordination and/or implementation. Amongst these activities were Regional Climate Centres, CLIPS, Climate Watches and Capacity Building. The ICT agreed on a set of respective recommendations as well as its workplan.
2. The ICT proved to be an important information exchange platform between the Commission and the regional associations, allowing for effective transfer of both CCI activities into regional projects and operations and regional requirements into the Commission's work.
3. As a key issue, the Team discussed steps towards the formal designation of Regional Climate Centres. The meeting proposed related coordination mechanisms with CBS and developed a set of mandatory and highly recommended functions of RCCs. The ICT agreed on a follow-on meeting of CCI, CBS and regional experts, which successfully developed the amendments required for the Manual on the GDPFS to support formal WMO designation of RCCs or RCC-Networks.
4. Dr Wang Shouroung, vice-president of the Commission and chair of the CCI Implementation/Coordination Team (ICT) discharged his duties during the intersessional period which mainly fell in four areas.
5. The vice-president of the Commission supported capacity building on regional and global climate monitoring, prediction and climate information application and services, especially those capabilities on monitoring and early warning on extreme climate events in China and Asia. Under his guidance, the WMO East Asian Monsoon Activity Center (EAMAC) and WMO Global Producing Center for Long Range Forecasts (GPC-LRF) in Beijing are both in operating well. The Regional Climate Centres in RA II (BCC and TCC) play an important role in CLIPS and CLIMATE WATCH under the CCI framework, including the tailored climate service products. The RA II RCC Network home page, hosted by both BCC and TCC are in good shape.
6. The vice-president of the Commission was involved in organizing activities related to the 4th and 5th IPCC Assessment Reports. He nominated lead authors and authors from China to contribute to the preparation of various parts of the 5th Assessment Report. He emphasized that experts from the Commission and NMHSs should be involved in the IPCC climate impact assessment processes. A national project entitled "Studies on Strategy of Adaptation to Climate Change in China" was supervised by the vice-president of CCI, and a special report will soon be published.
7. He served as a member of the WCC-3 International Organizing Committee (WIOC), actively promoted the WCC-3 in CMA and identified scientists to contribute to different WCC-3 sessions. Furthermore, he broadly disseminated the conference information. In WCC-3, he delivered a talk on "Developing a Global Climate Service System to Enhance Climate Hazard Risk Management" in the round table meeting. The round table emphasized the importance of improving the accuracy of climate predictions and enhancing the capacity-building for climate hazard risk assessment and early warning services. After WCC-3, the long term development plans of climate operation and research in China and the strategy of Beijing RCC development are formulated under his guidance.

8 Dr Wang noted that from 2005 to 2009, five sessions of Forum on Regional Climate monitoring, prediction and assessment in Asian Region (FOCRAII) were successfully held and provided a platform for sharing the experience of seasonal to interannual climate prediction methodologies and systems as well as prediction products. In addition, other climate forums and workshops, Joint Meeting on East Asian Winter Monsoon, CLIPS Training Workshop for RA II (Eastern Part) and international Workshop on the Application of Advanced Climate Information in the Asia-Pacific Region have been organized in Asian countries. As a consequence the social awareness on climate prediction and climate information application has been improved.

9. The vice-president of the Commission attended the second meeting of the CCI Management Group, February 2009 and presented his progress report of activities.

ACTIVITIES OF THE OPAGs

1. OPAG 1 – CLIMATE DATA AND DATA MANAGEMENT

1.1 General

1.1.1 Data and observations are the basic requirement of any climate activity. ET 1.2 (Expert Team on Observing Requirements and Standards for Climate) had a meeting in Geneva 28-30 March 2007 and developed a work-plan. It included three major tasks, namely:

- Develop an updated list of standards for Automatic Weather Stations (AWS) for climate purposes;
- Develop, or contribute to, a Guidelines document for climate observational standards in developing countries;
- Complete the Guidelines on Quality Assurance/Quality Control of surface meteorological data” which was initiated in 2005.

There has been good progress in the second task which is led by Dr William Wright, the ET leader from the Bureau of Meteorology, Australia.

1.1.2 WCDMP collaborated with DRR on Observations and Data Requirements for Catastrophe Insurance (CAT) and the chair of ET 1.2 attended an expert meeting on “Requirements of Catastrophe Insurance and Weather Risk Management Markets” held by WMO, in Geneva 5-7 December 2007. The meeting made several recommendations including modernization of observing networks and data management systems, data rescue, raising political awareness on the potential contribution from the NMHSs, and capacity building of NMHSs.

1.1.3 WCDMP interacted closely with GCOS AOPC on CLIMAT messages and CLIMAT TEMP. GCOS AOPC concluded that there was no need to continue CLIMAT TEMP messages, nevertheless, EC-LX requested CCI to assess the impacts of a possible discontinuation of CLIMAT TEMP on other domains, such as applied climatology, research, aviation, etc. The WMO Secretariat had liaised with the president of the Commission to develop a questionnaire which was sent to all Members. The Secretariat will analyze and compile the replies.

1.2 Climate Data Management including Metadata

1.2.1 The Expert Team on Climate Data Management met from 3 to 6 November 2006 in Nairobi, Kenya, and initiated several tasks including the finalization of the Guidelines document on Climate Data Management, which was done successfully and published in English, French and Spanish. An expert meeting focusing on WCP requirements for Metadata was held in Toulouse, from 11 to 13 March 2009 which involved four ET 1.1 experts as well as other experts from WMO and Météo-France with special focus on Metadata and WIS. The Meeting also reviewed other ET 1.1 tasks related to CDMSs. There was a consensus that CCI needs to further explore the WMO core profile for its suitability to represent the minimum level of description needed for climate metadata exchange. The CCI MG noted that CDMS has become a continuous issue and that WMO should provide further guidance to NMHSs in choosing the best CDMSs when there are many options (either commercial or open sources). Furthermore, the issue of climate data exchange with a wider user community beyond NMHSs also needs to be considered in the future.

1.3 Future strategy for CDMSs

1.3.1 There is a joint effort between the Secretariat and ET 1.1 by which they develop an action to monitor CDMSs operationality in NMHSs and the status of successful migration from CLICOM. A survey has been sent to Members and the results of the questionnaire will help better

plan WMO future actions in supporting CDMSs and define the level of capacity building needed in various regions with respect to the upgrading and the maintenance of the new installations.

1.4 Climate Data Management Systems, Interoperability and WIS

1.4.1 WCDMP, in collaboration with the UK Met Office and the WIS project office, launched a Demonstration Project to develop data and metadata interfaces for CLIMSOFT to the emerging standards for data interoperability, including the WMO Core Profile of the ISO Metadata standard. EC-LX had endorsed the project and urges Members and CCI to extend the concept of this project to other Climate Data Management Systems being operated at NMHSs.

1.4.2 The Expert Team on Climate Data Management (ET 1.1) is developing an approach for Climate Metadata Discovery and Exchange considering the WMO Core profile and the WIS (Ref. ET meeting in Toulouse, 11-13 March 2009) and had proposed an action to develop new model description for CDMSs addressing interoperability, based on WMO Metadata Core Profile and ISO standards in addition to new features and functionalities.

1.4.3 A meeting of the Expert Team on Climate Data Management extended to other experts and representatives of HMEI held in Casablanca, Morocco in October 2009 initiated the development of the main parts of the document "Updating the requirement for CDMS" and finalized a model of description for the Climate Database Management Systems.

1.4.4 The CCI MG had welcomed the initiative of ET 1.1 in preparing a guidelines document for NMHSs in developing and Least Developed Countries to assist them in implementing, operating and producing climate information using updated technologies and requirements for Data Management and the associated data management procedures based on international standards for an improved climate data services.

1.5 Rescue, Preservation and Digitization of Climate Records

1.5.1 The Expert Team on the Rescue, Preservation and Digitization of Climate Records (ET 1.3) met in Bamako, Mali, Bamako in May 2008 and reviewed the progress of several DARE related projects such as the NOAA-NCDC CDMP project, the BOM CLIMARC project, the CMA-DARE project, and the non-profit International Environmental Data Rescue Organization (IEDRO) initiative to rescue historical data in several countries in Africa and Latin America.

1.6 MEDARE Initiative

1.6.1 WMO, in collaboration with AEMET-Spain and the University of Rivera y Virgili in Tarragona, organized a workshop on Data Rescue in the Mediterranean Region which led to the setting up of a Mediterranean Data Rescue Initiative whose main objective is to develop, consolidate and progress climate data and metadata rescue activities across the Greater Mediterranean Region (GMR). The long-term goal of MEDARE is to develop a comprehensive high quality instrumental climate dataset for the GMR with a focus on the Essential Climate Variables (ECV) of the Global Climate Observing System (GCOS). The meeting brought together climatologists from the National Meteorological and Hydrological Services in the GMR, scientists from universities, research centers and other international climate-related institutions and projects. The meeting was informed that EC-LX had endorsed the initiative and requested to develop similar projects in other regions.

1.7 Capacity Building

1.7.1 During the fourteenth intersessional period, there had been substantial efforts in modernizing climate data management systems in various regions, mostly supported through VCP. WCDMP has organized training workshops for developing countries and LDCs in the Pacific SIDS, Caribbean, East Africa, Central Africa and South East Asia, funded by the UK VCP. The

Commission took note of WMO's support to ACMAD and ICPAC in Africa on DARE activities and was informed that NOAA had contributed to WMO Trust Fund to support DARE in Africa.

2. OPAG 2 – MONITORING AND ANALYSIS OF CLIMATE VARIABILITY AND CHANGE

2.1 Climate Change Indices workshops

2.1.1 The ET 2.1 (Joint CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices) met in Niagara-on-the Lake, 14-16 November 2006 and WCDMP organized two seminars on climate indices back-to-back with CLIMSOF training workshop to maximize the benefits of those events. Furthermore, two other events had also been organized for Central Africa in Congo, Brazzaville, April 2007 and for South East Asia, in Hanoi, December 2007. The meeting in Africa had produced a peer reviewed paper entitled "Changes in temperature and precipitation extremes in western central Africa, Guinea Conakry, and Zimbabwe, 1955-2006", published in AGU Journal of Geophysical Research, Vol. 114, in January 2009.

2.1.2 Similar projects on climate change indices were being planned by ETCCDI and the Secretariat for other regions through various funding sources. It welcomed the ETCCDI initiative in developing a guideline document on "Extremes in a changing climate". The Secretariat released publication with wide distribution both in print and on the web. http://www.wmo.int/pages/prog/wcp/wcdmp/wcdmp_series/documents/WCDMP_72_TD_1500_en_1.pdf

2.1.3 The creation of extremes indices has contributed in overcoming the constraints of accessing raw data. Many decision makers need data on extremes in their daily work, but the challenge is to acquire sufficient knowledge to validate them. As regards to climatic indices, the Management Group has emphasized the need for temporal high resolution data (sub-daily or daily at least).

2.2 WMO annual statements on the status of the global climate

2.2.1 WMO continued the publication of the statement in all languages and made early coordination with Members and a large number of institutions to enhance inputs from developing and Least Developed Countries. Due to lack of sufficient funds, the 5-year summary statement on the status of the global climate was not published as was recommended by CCI-XIV. Nevertheless, due to the length of the report, just the abstract, introduction and, for each chapter, only the short overview section and figure captions, would be translated, as this would meet CCI needs.

2.3 ET 2.2 Work plan

2.3.1 The Expert Team on Climate Monitoring including the Use of Satellite and Marine Data and Products (ET 2.2) met in September 2006, in Tarragona, Spain and developed a sound work plan. The ET 2.2, in collaboration with the Secretariat, developed a useful website, produced a pamphlet on its activities and provided voluntary translation of the BAMS Article on the State of the Climate in Arabic, Chinese and Spanish; however due to lack of funds they were not published.

2.3.2 The CCI MG welcomed the establishment of a useful website (<http://wmo.asu.edu/>) on climate weather extremes by the Rapporteur on Climate Extremes, Prof Randall Cerveny at Arizona State University (USA), and welcomed the OPAG-II chair proposal to strengthen this activity by nominating a second expert in the future and for Prof Randall Cerveny to continue to serve as the Rapporteur in the next intersessional period.

2.3.3 The CCI MG considered the importance of phenological data and noted that phenological observations would be useful for various purposes, especially as it has implications to

climate change in agriculture, biodiversity and so on. It welcomed the publication of the WMO Guidelines on Plant Phenological Observations (WMO/TD-No. 1484 / WCDMP-No. 70)

2.3.4 The ET 2.2 would review its work plan during its second meeting and focus on Satellite Climate Monitoring. It was informed that the aim of the Sustained coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) which is being implemented by the WMO Space Programme was to establish a network of facilities ensuring continuous and sustained provision of high-quality satellite products related to the Essential Climate Variables (ECV), on a global scale, responding to the requirements of the Global Climate Observing System (GCOS).

2.4 Climate Watches

2.4.1 As recommended by CCI-ICT, WMO organized the first workshop on the implementation of climate watch systems in RA III (Guayaquil, 8-11 December 2008). The workshop had developed an implementation plan for the Region involving NMHSs, CIIFEN, ESPOL, CPPS and WMO (including RA III, its Working Group on Climate Matters and the WCDMP). The meeting supported the Secretariat plan to organize a second workshop of this kind which would be held in RA II and would focus on Monsoon affected areas.

3. OPAG 3 – CLIMATE INFORMATION AND PREDICTION SERVICES (CLIPS)

3.1 General

3.1.1 All the three Expert Teams in the OPAG have met: ET 3.1 (Expert Team on Research Needs for Intraseasonal, Seasonal and Interannual Prediction, including the Application of these Predictions) in November 2008, ET 3.2 (Expert Team on CLIPS Operations, Verification and Application Services Operations Co-Lead and Overall Expert Team Coordinator) in September 2007 and ET 3.3 (Expert Team on El Niño and La Niña) in August 2007 and considered their work plans during the intersessional period. The meetings of ET 3.1 and 3.2 were preceded by one-day “Open Seminars” on a theme relevant to the team’s main focus, in collaboration with the local hosts. These Open Seminars were very successful and helped to enhance the visibility of CCI and also in facilitating broader discussions of the ETs’ work. The teams, as well as the OPAG Chair/Co-Chair, have also interacted with each other through teleconferences.

3.2 Research Needs for Intraseasonal, Seasonal and Interannual Prediction

3.2.1 ET 3.1 recognized the needs of information at scales smaller than those provided by global models in both seasonal to interannual prediction and climate change domains (including emerging capabilities in decadal prediction), particularly to meet the climate information requirements of applications (including demonstration of usefulness and value of climate information). Considering that downscaling is a crucial activity for both domains whatever the method used (statistical, dynamical or hybrid), the team worked on the development of a guidance document on best practices in downscaling, the preliminary draft of which is available. The focus of the guidance document is seasonal prediction, although the concepts are also relevant to downscaling of climate change scenarios.

3.2.2 ET 3.1 considered CCI-CBS-WCRP linkages to be crucial for a collaborative and complementary approach to address the seasonal prediction problem, and actively pursued these linkages by involving the concerned experts in its deliberations. A draft statement on the Multi-Model Ensemble (MME approach) has been developed by the ET.

3.2.3 ET 3.1 has developed a guidance document on consensus methods for seasonal forecasts. The relevant aspects of the RCOF Review 2008 outcomes have also been integrated into this document.

3.2.4 A new design for RCOF operations has been developed for Western Africa in collaboration with ACMAD, IRI and Météo-France, which also involved collaborative efforts between ET 3.1 and ET 3.2. This has been endorsed by PRESAO-12.

3.2.5 Seasonal to interannual prediction may be considered as the first step to implement adaptation to climate change. ET 3.1 notes that decadal prediction will fill the gap between seasonal prediction and climate change timescales and that CLIPS needs to actively consider decadal prediction and its applications.

3.2.6 ET 3.1 has actively contributed to capacity building in CLIPS training activities, and also in facilitating the use of Climate Predictability Tool (CPT) developed by the IRI. The ET agreed that CPT is a very useful and practical tool for operational seasonal prediction, and that a critical review along with other similar packages can help in its wider usage. The ET has worked towards creating a resource base for sustained CPT training and development.

3.3 CLIPS Operations, Verification and User Liaison

3.3.1 A draft updated version of Technical Note 145, with a revised title of “Socio-economic Benefits of Climate Services” was compiled by ET 3.2 consisting of a collection of sector-specific papers written by a wide range of experts. The papers were edited by Dr Mickey Glantz, and the final version is being processed for publication as a technical document under the WCASP Series.

3.3.2 The WMO Conference on Living with Climate Variability and Change: Understanding the Uncertainties and Managing the Risks was successfully held in Espoo, Finland, during 17-21 July 2006. The outcome of the conference was synthesized in the form of the Espoo Statement, which was endorsed by Cg-XV and was widely distributed including UNFCCC COP sessions. The draft report of the Espoo Conference has been made available on WMO web pages. The final report is under process for publication and distribution.

3.3.3 The RCOF process has completed more than 10 years, and the leading role of several longstanding RCOFs in Africa and South America in developing the RCOF concept has been widely recognized. The process has also greatly helped in regional networking of climate service providers and liaison with the core socio-economic sectors. WMO organized an international expert review meeting on RCOFs (Arusha, United Republic of Tanzania, 3-7 November 2008) on this occasion. All the currently active RCOFs around the world were represented at this meeting, which reviewed the current status and discussed possible approaches for future evolution of the RCOF process. This review meeting was structured around a few key issues central to the RCOF operations and their further development, and around the development of position papers devoted to each of those issues. The position papers address issues related to promotion of tools and techniques for RCOFs. ET 3.2 played a key role in the review meeting.

3.3.4 Draft guidance on best practices for verification of seasonal forecasts has been developed by ET 3.2 to complement CBS guidelines on standardized verification systems (SVS). This comprehensive approach discusses issues including the size of the forecast region, gridding etc., describes probabilistic forecasts, recommends procedures and instructions on how to interpret forecast results; and covers uncertainty. Annexes to this document include a step-by-step calculation with data and a glossary of definitions on verification terms. The draft has been peer-reviewed, and the revised final draft is under preparation.

3.3.5 ACMAD and IRI have prepared a comprehensive verification of RCOF products in Africa, and have submitted this to WMO and others for comments. It was also presented at the recent RCOF Review held in 2008. ET 3.2 played a key role in this verification project, and recommends that training materials on verification be developed based on these new documents.

3.3.6 The RCOFs concept is being extended to northern latitudes, and was discussed with a broad audience at the recent Polar CLIPS workshop in St. Petersburg, Russian Federation. It was

noted at this workshop that there is great interest in extending the CLIPS concept to high latitudes, but that at present there is limited skill in seasonal prediction for these regions. The concept of a Polar Climate Outlook Forum (PCOF) has received considerable encouragement, and is recognized as a WMO contribution to the IPY Legacy.

3.3.7 A draft compilation of terminology focused on climate prediction has been developed by ET 3.2.

3.4 El Niño and La Niña

3.4.1 WMO has been successfully issuing consensus-based El Niño/La Niña Updates, which are well-received worldwide. ET 3.3 actively participated in the development of these updates, and also provided guidance on their structure and development process.

3.4.2 WMO, with the support of ET 3.3 and NOAA, organized a CLIPS Workshop on “Communicating about El Niño-Southern Oscillation (ENSO): Towards Developing a Common Understanding” during 8-10 April 2008 in Honolulu, Hawaii, USA. In addition to the ET members, distinguished physical scientists, operational meteorologists and climatologists, media, and users of ENSO information participated in the workshop. ET 3.3 led the scientific organization of this workshop, which discussed several key aspects related to ENSO communication such as ENSO definitions/indices, vocabulary (e.g., cold/warm event, strong/weak), ENSO information procedure, such as the WMO El Niño/La Niña Update, distinction between ENSO phenomenon and impacts, media perception of ENSO, user and public awareness of ENSO, etc., and made a number of recommendations to promote a common understanding of the phenomenon to develop guidance on best practices.

3.4.3 ET 3.3 discussed the development of an Atlas on impacts of El Niño/La Niña, and developed an outline and some demonstrative examples. The ET recommends that the initial version of the atlas may be in the form of web-based products, which can gradually pave the way for a stable hard copy version. Through informal consultations, CIIFEN offered to participate in the Atlas development process and host it on its website.

3.5 OPAG-3 Perspectives

3.5.1 OPAG-3 is closely aligned with the ICT recommendation that CLIPS be concluded as a project in 2015. This might not imply that CLIPS activities would be terminated, but it may no longer continue as a project beyond the agreed sunset date. WCC-3 outcomes could be considered as the logical evolution of CLIPS into operational climate services around the world. Appropriate ways and means need to be explored to mark the conclusion of CLIPS project, highlighting CLIPS achievements, identifying the challenges and determining its legacy. The OPAG has further recommended that, for the remainder of the CLIPS project, the focal point network should be re-established and reinforced. The cooperation with WCRP in CLIPS activities has improved significantly through the participation of their experts in OPAG-3, but it needs a formal process to facilitate sustained and effective collaboration.

4. OPAG 4 – CLIMATE APPLICATIONS AND SERVICES

4.1 General

4.1.1 The work of the OPAG was accomplished through a number of meetings, teleconferences, conference participation, projects, publications, etc., and was organized in four Expert Teams on Climate and Health (ET 4.1); Climate and Energy (ET 4.2); Climate and Tourism (ET 4.3); and on Urban and Building Climatology (ET 4.4). The OPAG successfully delivered many of its intended deliverables and all those who contributed to these accomplishments are appreciated for their leadership, and generous allocation of their time and expertise to these outcomes. Where needed, work yet to be completed or recommended for modification, as well as

challenges faced by the Expert Teams in this intersessional period are also noted. Three Expert Teams in the OPAG have met and considered their work plans during the intersessional period. ET 4.3 on Climate and Tourism decided to conduct its business without any physical meeting, and to use the available resources to facilitate the work on certain agreed deliverables. The teams as well as the OPAG Chair/Co-Chair have also interacted with each other through teleconferences. The following are some salient aspects of the work done/being done by the specific ETs under OPAG-4:

4.2 Climate and Health

4.2.1 A major component of the work of ET 4.1 has been the development of a joint (WMO and the World Health Organization (WHO)) guidance document on Heat/Health Warning Systems (HHWS), 'Heat Waves and Health: Guidance on Development of Warning Systems' (Prof. Glen McGregor, lead Ed.). A meeting of authors was held in Geneva, Switzerland (March 2007), and a draft version of the Guidance was presented to WMO Members at the Fifteenth World Meteorological Congress (May 2007). Efforts are underway to finalize the guidance document, to initiate the peer review process involving both WMO and WHO experts, and to arrange for its joint WMO-WHO publication.

4.2.2 In a project led by Dr Christina Koppe (Deutscher Wetterdienst) and hosted by Dr Jianguo Tan (Shanghai Meteorological Bureau), some members of the ET and relevant HHWS experts have assisted in the development of an intercomparison of HHWS models, as part of a Multi-Hazard Early Warning System (MHEWS) demonstration project for Shanghai, China. An operational HHWS is a component of the Shanghai MHEWS which will be showcased during Expo 2010. This experience can provide useful inputs for similar activities in other countries vulnerable to health risks from heat waves. A meeting was held in July 2009 (Shanghai, China), where it was agreed to produce a new joint brochure (WMO, WHO, UNWTO, if possible) on health risks of extreme heat for major outdoor events, to be available by the first quarter of 2010.

4.2.3 ET 4.1 has also been promoting climate-health partnerships in contributing to the efforts of WMO in liaising with WHO, the International Society for Biometeorology, EU-COST Action 730, etc.

4.3 Climate and Energy

4.3.1 As per its terms of reference, ET 4.2 considered the development of a new report under the title "Meteorological Aspects of Utilization of Renewable Energy Sources". The ET finalized a framework – content, chapter outline, lead authors and other contributors, and a timeline. Contacts were made with some proposed contributors from outside of the ET, and they tentatively agreed to contribute to the writing of the report. Progress was made in that case studies were prepared on climate and hydropower in Kenya, and on solar energy in Kenya, and on climate risk assessment for nuclear and thermal power industry, requirements of oil and gas complex for climate data, information, products and services in the high latitudes, etc.

4.3.2 ET 4.2 member Sandra Robles-Gil participated in the scoping meeting for the IPCC Special Report on Climate Change and Renewable Energy, in January 2008, and provided useful inputs (papers and reports) to the ET.

4.3.3 Keeping the establishment of the Global Framework for Climate Services in view, it may be useful to refocus the direction of this work towards meeting the requirements of energy user communities for practical information, products and services for Climate Risk Management and adaptation to climate change.

4.4 Climate and Tourism

4.4.1 In early 2008, the UN World Tourism Organization (UNWTO), the United Nations Environment Programme (UNEP) and WMO jointly published a new report entitled 'Climate Change and Tourism: Responding to the Global Challenges'. At the request of UNWTO, the ET Lead (Prof. Daniel Scott) served as the lead author. This major international review study represents a significant accomplishment for the ET.

4.4.2 In a collaborative WMO-UNWTO effort, supported by Members of ET 4.3 and other tourism experts from around the world, Prof. Scott was invited to lead the development of a Tourism Sector White Paper, covering needs and opportunities for the World Climate Conference-3 (WCC-3). Work continues to develop this report as a joint publication with UNWTO.

4.4.3 Together with UNEP, Oxford University and UNWTO, WMO co-sponsored an International Seminar on "Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices", focusing on Developing Countries and Small Island States, at Oxford University from 8-10 April 2008. ET 4.3 actively contributed to this seminar, whose aim was to discuss weather and climate information needs and utilization within the recreation and tourism sector and facilitate collaboration between tourism (industry and government) and meteorological professionals in NMHSs. It was a template for workshops that are needed in most major global tourism regions (as outlined in the ET Terms of Reference). In association with this seminar, a UNEP/UNWTO/WMO/Oxford University joint publication has been brought out as part of UNEP Manuals on Sustainable Tourism. Lessons learned from this seminar were also incorporated into the White Paper for WCC-3.

4.4.4 Work to update the 'Climate and Tourism-Recreation Bibliography' of Scott et al. (2005) was also taken up by ET 4.3, and is in progress.

4.5 Urban and Building Climatology

4.5.1 Two bibliographic reports had been completed during the previous intersessional period. It was agreed that the bibliography should be made available online with searchable options. To facilitate this, the International Association for Urban Climate (IAUC) agreed to host the bibliography on their website using appropriate free software. WMO provided support to IAUC to help them implement the online bibliography.

4.5.2 A complete draft of a new Technical Note (TN) on 'Building Climatology' was prepared by Prof John Page. This TN replaces the original TN-150 on Building Climatology also authored by Prof John Page and published in 1976. ET 4.4 is in the process of formatting and editing the draft manuscript, for peer review and publication process.

4.5.3 The outline and nature of contents for the update of TN-149 on Urban Climatology, taken up by Dr G. Mills, have been discussed by the ET and agreed. Preparation of the full draft is in progress.

4.5.4 ET 4.4 has contributed to the efforts of ET 3.2 in developing a guide to best practices in user liaison, by providing inputs relevant to urban and building climatology. The ET has also provided inputs to ET 4.1 on health-related aspects of urban and building climatology that need to be considered in developing guidance for heat-health warning systems.

4.5.5 A proposal for training paths for practicing meteorologists in NMHSs on application of meteorological knowledge to practice or urban planning and design has been developed. This provides the rationale and structure of a course that can be delivered as an online/DVD and also face-to-face. ET 4.4 has led the technical organization of a training workshop as part of CLIPS training series, with a focus on urban climatology (Pune, India, December 2009).

4.5.6 ET 4.4 has a major presence in IAUC, and the relationship is further strengthened by the Working Arrangement between WMO and IAUC approved by the governing bodies of both, and also the WMO co-sponsorship of the Seventh International Conference on Urban Climate (Tokyo, Japan, July 2009).

4.5.7 ET 4.4 has invited NMHSs through WMO to take part in an international urban climate model intercomparison project being coordinated by its members. ET 4.4 was also invited to lead the session on “Climate Information for Improved Planning and Management of Mega-cities”, and the two corresponding White Papers in preparation for WCC-3, in collaboration with IAUC and several other experts/agencies including UN-Habitat.

4.6 OPAG-4 Perspectives

4.6.1 The CCI Management Group (March 2009) noted that the scale of activities in OPAG-4 was impressive; nevertheless, in terms of interaction with user sectors at national level, contribution from NMHSs was rather low. The Group believed that, in dealing with other UN Agencies in sectoral areas, there were further opportunities to develop cooperation. Given the establishment of the Global Framework for Climate Services, a key outcome of WCC-3, and the increased focus by WMO and partnering agencies including UNEP, UNESCO, UNWTO, WHO, FAO, etc., on development of relevant and actionable information for users for climate risk management and adaptation to climate change, the work done under OPAG 4, and the lessons learned from this and the earlier intersessional periods, would be useful to build new perspectives on the use of climate information in sectoral applications, including for agriculture/food security and water resources sectors.

5. GUIDE TO CLIMATOLOGICAL PRACTICES (WMO-No. 100)

5.1 General

5.1.1 The third edition of the Guide to Climatological Practices has been prepared by the relevant CCI Expert Team and includes six Chapters plus one Annex for Acronyms. The Expert Team has made an effort to ensure that all subjects of relevance are included. It has been agreed that the Guide is not intended to serve as a complete manual or textbook about statistical methodology.

5.2 Progress Report on Stages of Review

5.2.1 *Internal Review*

5.2.1.1 The Secretariat has conducted an internal review to get a sign-off from the relevant programmes that support the CCI (Data and climate monitoring, applications and services and climate coordination). The Secretariat made available a draft copy of the Guide to Fifteenth Congress and all relevant WMO Programmes, but only a minor feedback was received. Furthermore, the Secretariat made a contract with Dr Ned Guttman from NOAA to communicate with the rest of the team to conduct the final round of development of content before the peer-review process. Chapters 1, 2, 3, 5 (only the reanalysis section reviewed) and 6 had passed through internal review process of the Secretariat and a clean copy of them was available on WAMIS ftp server for external review.

5.2.2 *External Review*

5.2.2.1 External Review process was completed by 22 volunteered members. Each chapter was headed by one coordinator. The Secretariat organized a meeting, chaired by the president of CCI for chapter coordinators and the consultant for the Guide (Dr Ned Guttman), Geneva, 7-8 September 2009. The meeting discussed and corrected relevant parts.

5.2.2.2 The CCI MG confirmed that the president of the Commission was the 'scientific authority', for WMO to approve the document. It would also be his responsibility (with all of the ET and relevant Secretariat) to ensure all the references are there, all illustrations ready to use and all credits in place. The publications board would expect that it was all dealt with before it was submitted to them. It was also generally agreed that one review cycle should be enough, with perhaps the revised text. Further to the above-mentioned stages, the document should also go through the editing and proof reading process by LSP in the Secretariat. According to the proposal of the CCI MG in 2006, the third edition of the Guide will be published in loose leaf form making it possible to keep the material updated at regular intervals.

ROLES AND RESPONSIBILITIES OF WMO COMMISSION FOR CLIMATOLOGY VOLUNTEERS

1. Volunteerism in the work of technical commissions and regional associations

1.1 Volunteerism in the works of WMO technical commissions and regional associations has been addressed several times. At the PTC 2007 meeting (Geneva, 2-3 February 2007), the president of CCI commented on some of the issues concerning volunteerism in the work of the technical commissions and attracted wider attention to this subject. As a result, it was recognized that volunteerism played an important role in the technical commissions and programmes of WMO.

1.2 After the point was discussed again at the fifty-eighth session of the Executive Council, it was decided that the issue be brought to the attention of Fifteenth Congress which considered an item entitled '*Volunteerism in the work of technical commissions and regional associations*'.

1.3 Cg-XV agreed with the fifty-eighth session of the Executive Council that in seeking nomination for membership in technical commission and regional association subsidiary bodies (rapporteurs, working groups, Open Programme Area Groups, expert teams), especially prior to a constituent body session, the procedure should ensure that the commitment of the Permanent Representatives with WMO and the proposed experts were confirmed, as well as the availability of the professional profile, through a brief curriculum vitae, of the latter, to help ascertain their specific expertise. That would also ensure that the particular expert was aware of the nomination and had expressed his or her commitment to serve, if so selected. The identification of such national experts need not be limited to National Meteorological and Hydrological Services only.

1.4 Cg-XV further agreed that the presidents of technical commissions and regional associations be invited to provide their recommendations on how the situation on the increasing difficulty in obtaining appropriate national experts could be improved, including proposals for recognizing the valuable contribution of those national experts. In that connection, they were also encouraged to analyze the situation with respect to the performance of their subsidiary bodies as a way of identifying areas of concern on which recommendations might be proposed.

2. PTC-2008 proposals for the volunteerism

2.1 As requested by Cg-XV, the PTC-2008 meeting (Geneva, 18-20 February 2008) addressed the volunteerism and asked the president of CCI to submit his proposals. In overall consideration of volunteerism, the PTC 2008:

- (i) Recognized the important role that volunteerism plays in the technical commissions (TCs) and regional associations (RAs) subsidiary bodies;
- (ii) Reviewed all issues related to their involvement, including nomination, performance monitoring and recognition; and
- (iii) Made a number of proposals in order to improve the current situation, especially the declining number of volunteers.

2.2 The PTC-2008 proposed a number of criteria for nomination of experts as follows:

- (i) WMO work should be better advertised and promoted within NMHSs and other Weather - Climate - Water - Environment communities, in order to ensure contributions from a wide spectra of expertise, and appropriate geographic coverage;
- (ii) In seeking nomination for membership in TC and RA subsidiary bodies, especially prior to a constituent body session, the procedure should ensure that the commitment of the

PRs and the proposed experts were confirmed, as well as the availability of the professional profile, through a brief CV of the latter, to help ascertain their specific expertise, and willingness to contribute. It would be best that Nomination Committees are established early enough to have time to look at all experts personal information prior to constituent body session;

- (iii) Team members should be chosen in such a way that their volunteer work corresponds to their day activities in their home institutions;
- (iv) It appears much better that the list of proposed names has been agreed at regional association level prior to submission to the Nomination Committees, when possible;
- (v) All candidate experts should be aware of responsibilities and commitments, especially as far as coordination and participation is concerned;
- (vi) An indication of time to commit (e.g. in terms of minimum percentage of overall activity or time slots) might be useful for PR agreement to secure the necessary time for WMO work;
- (vii) Permanent Representatives should provide complete and up-to-date expert details, especially working e-mail addresses, to facilitate establishing subsidiary bodies;
- (viii) Candidate experts not selected by Nomination Committees should be informed, thanked, and encouraged to apply again for some other WMO work.

2.3 The PTC-2008 noted that performance monitoring was a key issue to ensure smooth and high quality of work flow to and within the Commission and regional groups. Consequently, it proposed the following:

- (i) The WMO Secretariat should manage the organization of subsidiary bodies meetings as early as possible within the intersessional period, in order to finalize action plans drafted following e-mail communication or teleconferences. This means that budget is setup to allow it accordingly. Otherwise it is discouraging not to have any work assigned;
- (ii) The evaluation of each subsidiary body and involved experts should be conducted by the appropriate Chairs according to the rules of result-based management. This would be particularly useful for deciding to reconduct or not the entities and/or the experts (considering anyway that there is a need for a balance between some continuity and new faces). This would also be important for experts involved, especially for the recognition of their work by their PR;
- (iii) In the situation where an expert is not contributing to the expected level, or in case of totally silent expert, there should be a mechanism (e.g. led by Management Groups or relevant OPAGs) known by every appointed expert allowing to replace them, e.g. after 2 years of insufficient contribution;
- (iv) Peer-reviewed reports produced should be published as soon as possible with names of contributors made clear, at least at subsidiary bodies websites, preferably in appropriate publication series. This is essential for performance monitoring, and if not done, discouraging for authors to realize that their work is not recognized.

2.4 The PTC-2008 proposed the following criteria to acknowledge the work and services of volunteers:

- (i) Permanent Representatives should give recognition of conducted work for WMO activities. As in most NMHSs an individual evaluation procedure is in place for rating staff members, the contribution to WMO work should be included in the list of criteria used;
- (ii) Other incentives are needed, such as issuing certificates or addressing letters of appreciation to experts concerned, with copy to their PR. This should be made generally at TC or RA president level, following proposals by OPAG or WG Chairs. Applicable rules should be established by WMO, and templates should be designed.

3. EC-LX decision for volunteerism

In pursuant to the proposal of PTC-2008, EC-LX in 2009 addressed the issue of volunteerism and approved the following:

The Executive Council at its sixtieth session agreed in principle with the suggestions of the presidents of the Commission for Basic Systems and the Commission for Hydrology to award recognition to the experts who volunteered to devote their time to undertake the activities planned by technical commissions and regional associations. It urged the Secretary-General to propose a common scheme for awarding such recognition. The Council also urged Permanent Representatives to facilitate the participation and voluntary contribution of experts, not only from the NMHSs but also from other institutions, to the activities of WMO.

PROPOSAL FOR A NEW INTERNATIONAL ANALYSIS OF LAND SURFACE AIR TEMPERATURE DATA

Submitted by UK Met Office

Executive summary

Surface temperature datasets are of critical importance for detecting, monitoring and communicating climate change. They are also essential for testing the validity of the climate models that are used to produce predictions of future climate change. The current datasets, constructed in the UK and US using different methodologies, agree in showing that the world is warming. Taken together these records provide a robust indicator of global change and form part of the evidence base that led the IPCC Fourth Assessment Report to conclude that “warming of the climate system is unequivocal”.

To meet future needs to better understand the risks of dangerous climate change and to adapt to the effects of global warming, further development of these datasets is required, in particular to better assess the risks posed by changes in extremes of climate. This will require robust and transparent surface temperature datasets at finer temporal fidelity than current products.

The current surface temperature datasets were first put together in the 1980s to the best standards of dataset development at that time; they are independent analyses and give the same results, thereby corroborating each other.

In the case of the CRU land surface temperature dataset (CRUTEM3, which forms the land component of the HadCRUT dataset) there are substantial IPR issues around the raw station data that underpin the dataset; we are actively pursuing resolution of these issues so that the base data can be made openly available. We know that several stations have already been explicitly forbidden from release by the rights' holders so we will not be able to release all the under-pinning station data.

Consequently we have been considering how the datasets can be brought up to modern standards and made fit for the purpose of addressing 21st Century needs. We feel that it is timely to propose an international effort to reanalyze surface temperature data in collaboration with the World Meteorological Organization (WMO), which has the responsibility for global observing and monitoring systems for weather and climate.

The proposed activity would provide:

1. Verifiable datasets starting from a common databank of unrestricted data at both monthly and finer temporal resolutions (daily and perhaps even sub-daily);
2. Methods that are fully documented in the peer reviewed literature and open to scrutiny;
3. A set of independent assessments of surface temperature produced by independent groups using independent methods;
4. Robust benchmarking of performance and comprehensive audit trails to deliver confidence in the results;
5. Robust assessment of uncertainties associated with observational error, temporal and geographical in homogeneities.

It is important to emphasize that we do not anticipate any substantial changes in the resulting global and continental-scale multi-decadal trends. This effort will ensure that the datasets are completely robust and that all methods are transparent.

Background

In many respects HadCRUT has been the default choice of surface dataset in all 4 IPCC Assessment Reports. However we must stress that other independent datasets are used which support the HadCRUT data. There are three centres which currently calculate global average temperature each month:

- Met Office, in collaboration with the Climatic Research Unit (CRU) at the University of East Anglia (UK);
- Goddard Institute for Space Studies (GISS), which is part of NASA (USA);
- National Climatic Data Center (NCDC), which is part of the National Oceanic and Atmospheric Administration (NOAA) (USA).

These groups work independently and use different methods in the way they process data to calculate the global average temperature. Despite this, the results of each are similar from month to month and year to year, and there is robust agreement on temperature trends from decade to decade.

All existing surface temperature datasets are homogenized at the monthly resolution, and are therefore suitable for characterizing multi-decadal trends. These are adequate for answering the pressing 20th Century questions of whether climate is changing and if so how. But they are fundamentally ill-conditioned to answer 21st Century questions such as how extremes are changing and therefore what adaptation and mitigation decisions should be taken. Monthly resolution data cannot verify model projections of extremes in temperature which by definition are (sub-) daily resolution events.

Through collaboration with NCDC we have two quality controlled, but not homogenized products at the daily and sub-daily resolution (HadGHCND and HadISD – the latter about to be submitted to peer review), spanning 1950 onwards and 1973 onwards respectively. However, because these are not homogenized, they may retain time-varying biases. It is an open scientific question as to whether homogenization is feasible at these timescales whilst retaining the true temporal characteristics of the record. In particular, seasonally invariant adjustments which are adequate for monthly timescale data will be grossly inadequate at the daily or sub-daily resolution. Clearly homogenization of these data is highly desirable but some detailed research is needed to define the best approach.

The way forward

Recognizing that no single institution can undertake such a fundamental data collection, re-analysis and verification process single-handedly, we would envisage this as a broad community effort – a ‘grand challenge’ so to speak - involving UK and international partners.

The UK would convene a workshop to be hosted by the Met Office Hadley Centre and invite key players who could plausibly create such datasets with the aim of initiating an agreed community challenge to create an ensemble of open source land temperature datasets for the 21st Century both at monthly temporal resolution and also at the daily and sub-daily timescales needed to monitor extremes. Such an approach would help distribute many of the basic tasks, ensuring that the most appropriate parties were responsible for each part as well as providing a focused framework and timeline. This effort would ideally have involvement from, and be coordinated under, the umbrella of one or more of the Commission for Climatology, the Global Climate Observing System, or the World Climate Research Programme, with assistance from other WMO constituent bodies as appropriate.

Activities that would be required within any overall programme are:

1. Creation of an agreed international databank of surface observations to be made available without restriction, akin to the I-COADS databank in the ocean domain. Note that NCDC already have substantial efforts in this regard and would be a key participant and likely host as the designated world data bank. Data to be available at monthly, daily and sub-daily resolutions;
 2. Multiple independent groups undertake efforts to create datasets at various temporal resolutions based upon this data-bank. Participants will be required to create a full audit trail and publish their methodology in the peer-reviewed literature. Strong preference will be given to automated systems and creations of ensembles that reflect the uncertainties in the observations and methods;
 3. One or more groups to create realistic test-cases of the spatio-temporal observational availability by sampling output from a range of climate simulations from a number of models, adding realistic error structures;
 4. Groups to run their algorithms against the test-cases and one or more groups, preferably completely independent, to undertake a holistic assessment based upon the results of this verification exercise from all groups.
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