World Meteorological Organization

Abstracts for the WMO Side Event

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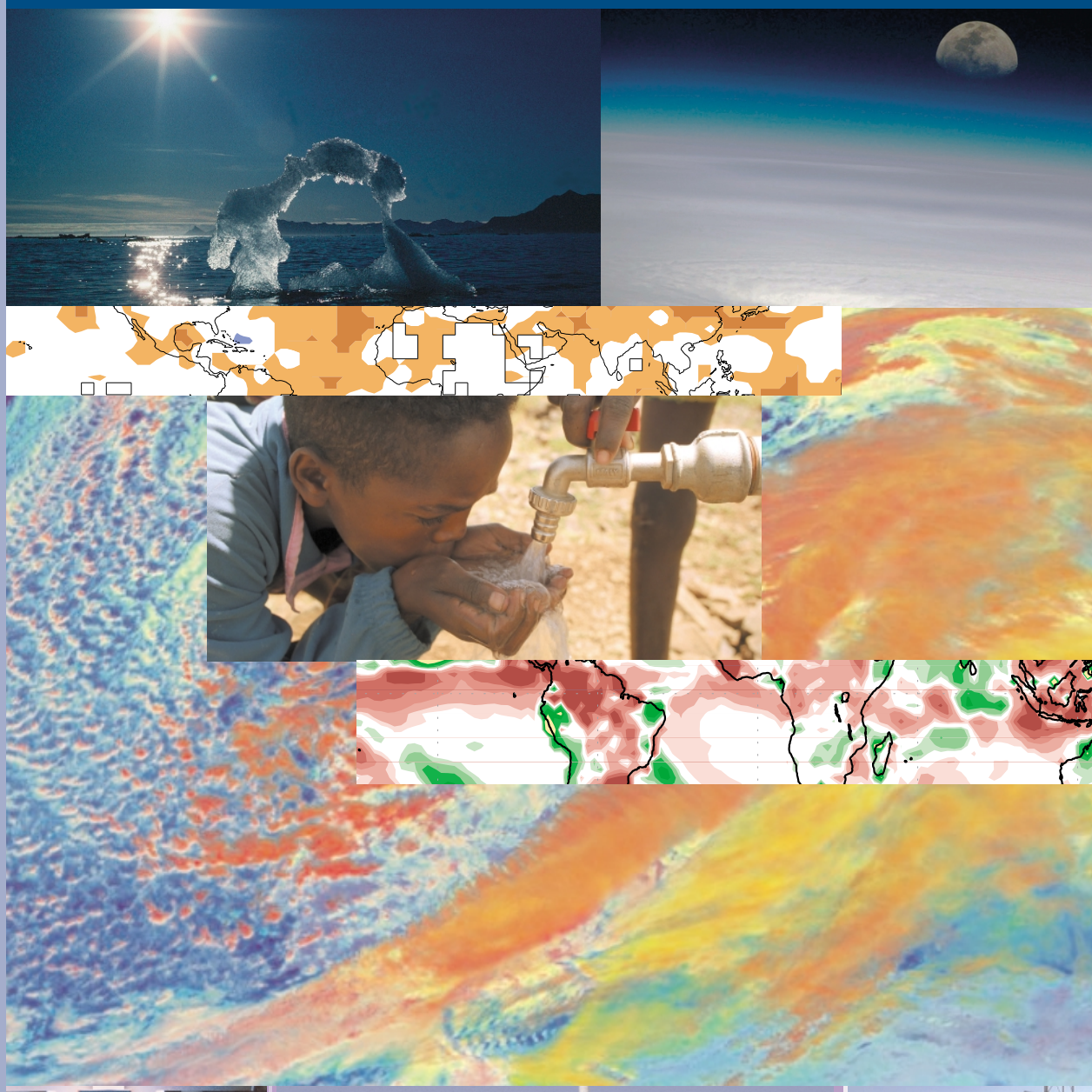
The United Nations Climate Change Conference

28 November
9 December 2005

Climate Knowledge
for Adaptation and Sustainable Development



Enhancing climate knowledge to improve adaptation to climate variability and change

World Meteorological Organization
Weather • Climate • Water

2005

Weather • Climate • Water

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for Adaptation and Sustainable Development



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FOREWORD

There is now strong scientific evidence that the earth's climate system has changed on both global and regional scales since the pre-industrial era, and that some of these changes are attributable to human activities. Higher atmospheric concentrations of greenhouse gases (GHG) and aerosols due mainly to human activities have resulted in increased global average temperatures of about 0.6 ± 0.2°C since the late nineteenth century, land areas warming more than the oceans, and the 1990s being the warmest decade of the twentieth century.

Available observational evidence indicates that regional changes in climate, particularly temperature increases, have already affected diverse sets of physical and biological systems in many parts of the world, including human systems. Examples of observed changes include the shrinking of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of mid- to high-latitude growing seasons, poleward and altitudinal shift of plant and animal ranges and decline of some plant and animal populations. These changes pose many challenges to international and national sustainable development agendas.

The role of National Meteorological and Hydrological Services (NMHSs) is fundamental in addressing these challenges. Reliable weather, climate and hydrological products and services are crucial for the successful formulation and implementation of adaptive policies and measures to respond to climate variability and change, in particular climate extremes.

WMO has been instrumental in facilitating and coordinating the contribution of NMHSs, regional and subregional meteorological and hydrological institutions to assist Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in fulfilling their obligations under the Convention, supporting the work of the Intergovernmental Panel on Climate Change (IPCC), and other related international agreements such as the 2005 World Summit.

On this landmark occasion of the eleventh session of the Conference of the Parties (COP11) to the UNFCCC and the first session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP1), this brochure aims at providing all stakeholders with information

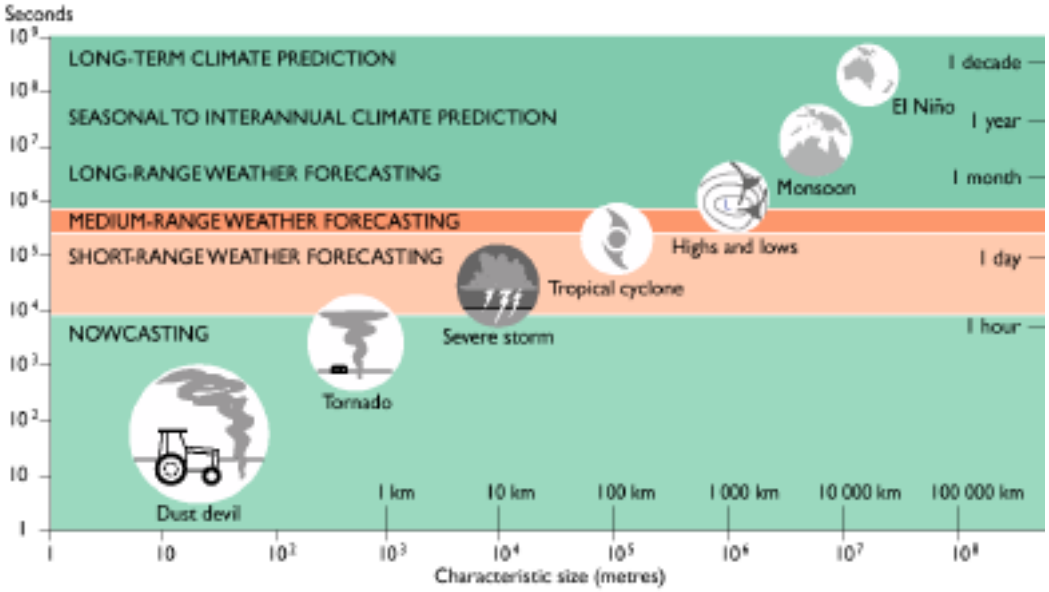
on how climate knowledge is used for enhancing adaptation to climate variability and change. Hence the theme for the brochure is *'Enhancing climate knowledge to improve adaptation to climate variability and change'*. The brochure highlights the real-life experience of NMHSs and collaborating organizations and institutions in several parts of the world in utilizing climate knowledge to formulate and implement appropriate adaptive response policies for climate extremes.

For those Parties who have not yet fully utilized the services of WMO, NMHSs and collaborating partners in their adaptation to climate variability and change decision-making process, the information contained in this brochure should provide an incentive to do so. For those already using these services, this document should help remind us that enhancing climate knowledge to improve adaptation strategies and achieve sustainable development is an ongoing, lifetime endeavour.

(M. Jarraud)
Secretary-General

Introduction

Climate and weather impact both natural and human systems, which are influenced by climate variability and change on different temporal and spatial scales. The ability of human and natural systems to successfully respond and adapt to the adverse impacts of climate variability and change is rapidly and losses associated with climate extremes are rising. The international community has recognized that adaptation is a necessary strategy on all scales to complement mitigation efforts. Together, they can help achieve sustainable development objectives.



Examples of the range of climate and climate related hazards on different temporal and spatial scales that are monitored, detected and forecast by the National Meteorological and Hydrological Services under the aegis of WMO.

determined by a number of factors. These include access to the right climate information, capability to use the information and incorporate it in mainstream decision-making where sensitivity to climate variability and change is but one among many factors to consider.

There is growing recognition that addressing climate variability and change through stabilization of greenhouse gases in the atmosphere at a level that would prevent dangerous interference with the natural climate system, as stipulated under Article 2 of the UNFCCC, should no longer be the only focus of ongoing international efforts to address the problem. Three factors are at the core of this emerging recognition. Societies are becoming increasingly interdependent, the climate system is changing

The main aim of this brochure is to contribute to the emerging debate on adaptation to climate variability and change and sustainable development. Specifically, the brochure provides Parties attending COP11 and COP/MOP1 with information on the activities carried out by WMO, NMHSs and partners to mainstream climate knowledge into adaptation and sustainable development decision-making. It also contributes to ongoing efforts to foster a common, coordinated response by the United Nations system to climate variability and change, in the light of the 2005 World Summit and a number of newly emerging initiatives and partnerships such as the 2005 G8 Gleneagles Summit to advance the international Climate Agenda.

WMO, NMHSs and the United Nations Climate Change Conference

The United Nations Climate Change Conference is a historical event: the Parties to the UNFCCC are meeting for the eleventh time; 2005 marks the entry into force of the Kyoto Protocol; and the conference will be the first meeting of COP/MOP1.

Key issues related to adaptation and sustainable development on the agenda include;

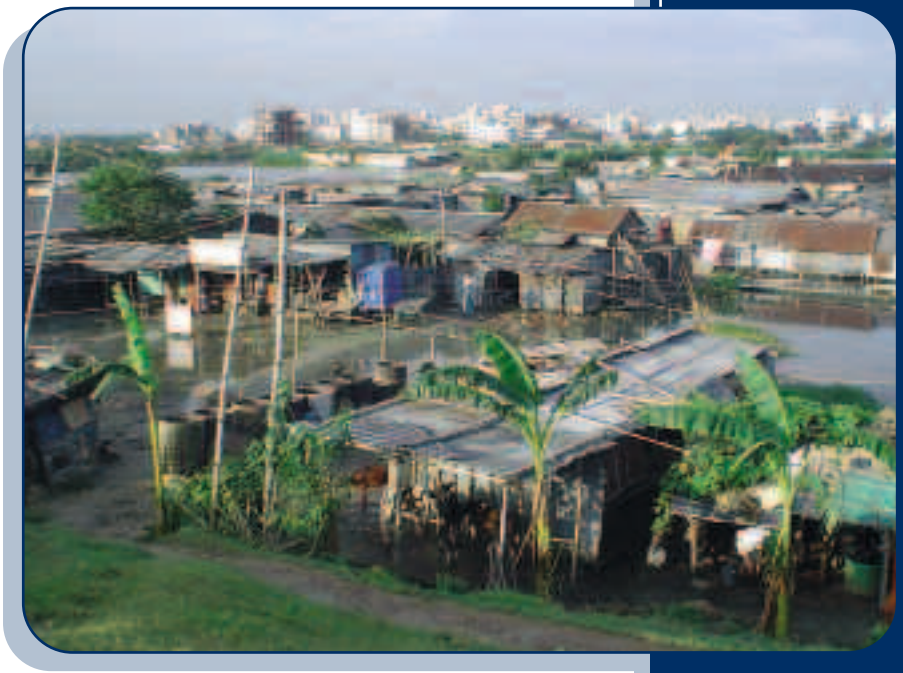
- Capacity building under the Kyoto Protocol
- Adaptation Fund
- Implementation of the Buenos Aires programme of work on adaptation
- Capacity building for developing countries (non-Annex I Parties) under the UNFCCC
- Special needs of Least Developed Countries (LDC)
- Implementation of the Global Climate Observing System (GCOS)
- Development and transfer of technologies
- Assessment of funding to assist developing countries in fulfilling their commitments under the UNFCCC, and
- Continuation of activities implemented jointly under the joint implementation pilot phase.

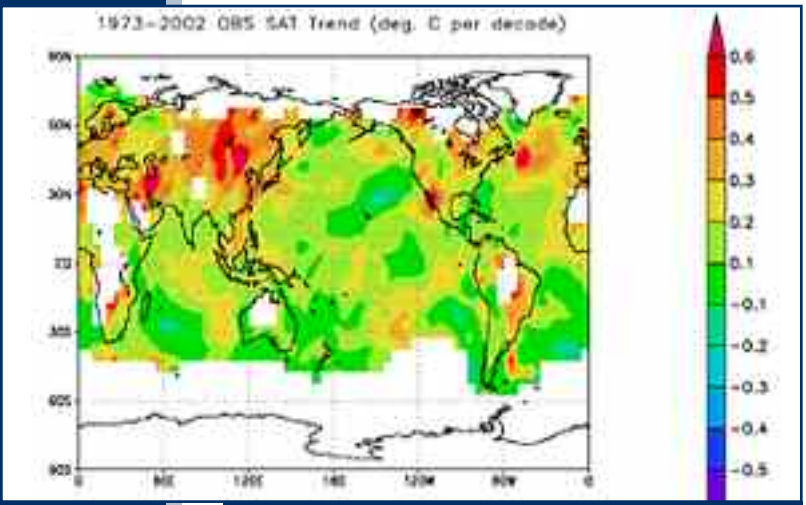
The successful elaboration and implementation of decisions relating to the above issues by the Conference, will greatly benefit from the on-going work of WMO, NMHSs, and partners, whose activities, coordinated under the international Climate Agenda, fall under four fundamental areas:

- Climate observations;
- Climate data management and data exchange;
- Climate research, modelling and predictions;
- Climate products and services;
- Capacity-building, education and training services spanning various aspects of the above four areas.

The goal of the international Climate Agenda is to foster global cooperation in providing an authoritative international scientific voice on climate variability and change, and to assist societies in the application of climate information and knowledge to national sustainable development.

Maintaining public safety, health, welfare and poverty alleviation are key objectives of the work of WMO, National Meteorological and Hydrological Services and partners

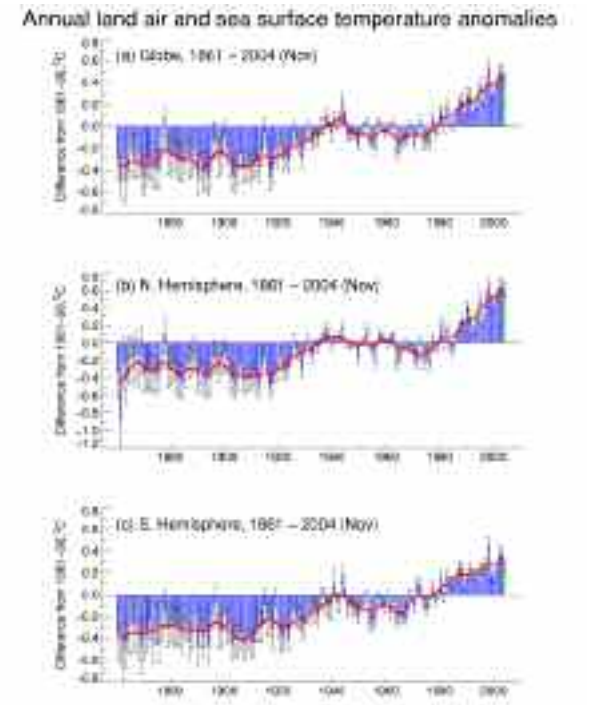




Temperature trends over the last 30 years (1973-2002) (Courtesy: Jones and Parker observed dataset)

The Climate Agenda is an integrating and catalytic agent for initiating and coordinating activities in the areas of data collection, research, applications and training. It also supports the provision of authoritative assessments on climate science, social and economic impacts and possible mitigation and adaptative response strategies for climate variability and change, especially through the work of the IPCC. Such assessments provide the scientific and technical basis for adopting national and international response policies and measures within the United Nations multilateral environmental agreements aimed at the implementation of international and national sustainable development agendas. It also provides crucial support to enable individual Members of the United Nations to fulfill their commitments under these multilateral agreements and conventions.

As the climate system continues to change, there is an urgent need to further enhance climate monitoring and assessment as well as climate change prediction skills. The building of appropriate adaptation and vulnerability assessment capacities, particularly in developing countries, is also a major emerging priority. Sound scientific knowledge, well-supported global climate monitoring and ongoing climate research are fundamental in designing new international agreements to support the work of the UNFCCC.

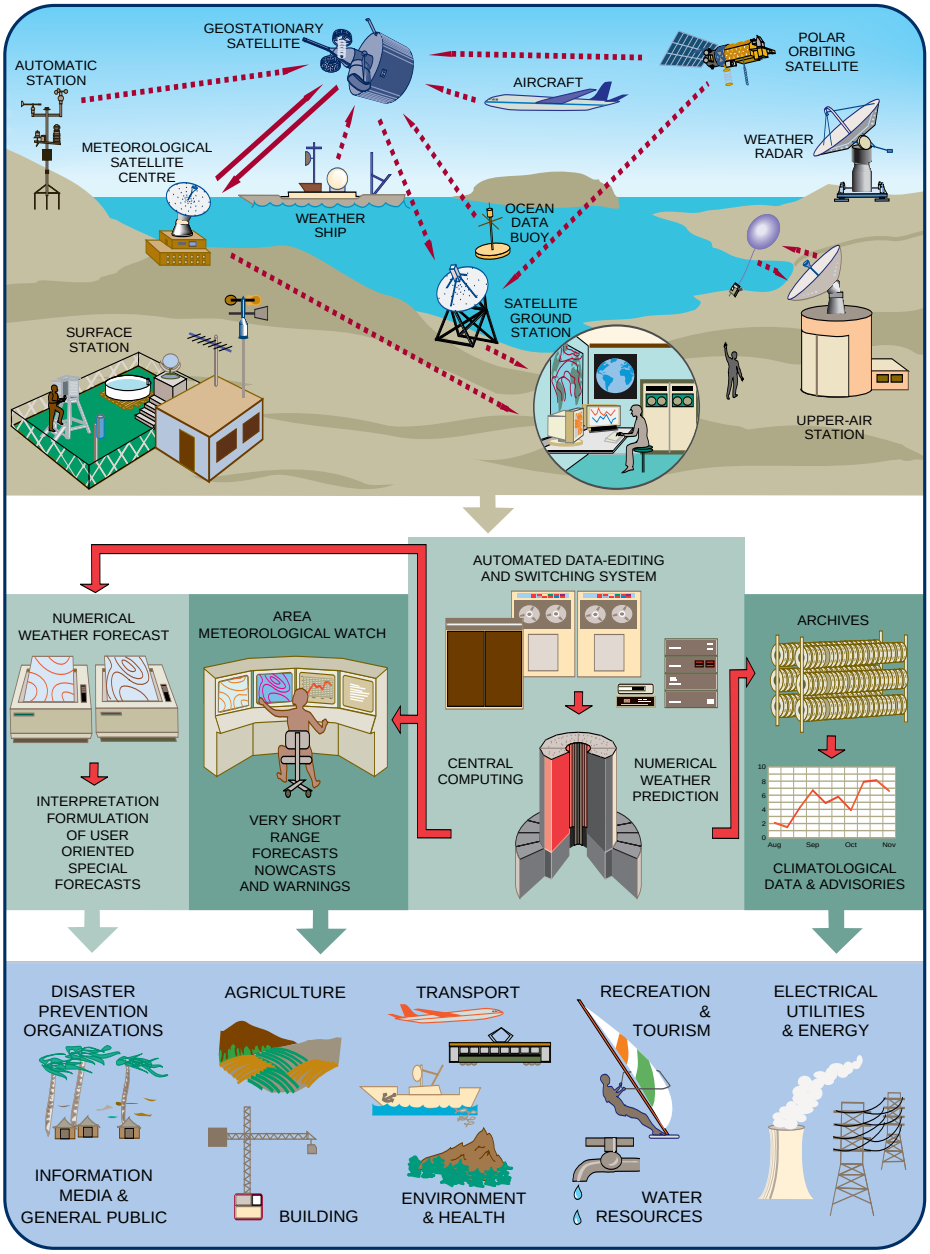


(Courtesy:
UK Hadley Center)

Powerful new computers such as the Earth Simulator in Japan will make possible major advances in climate modelling
(Courtesy: Earth Simulator Center/JAMSTEC

Integrated Observing System

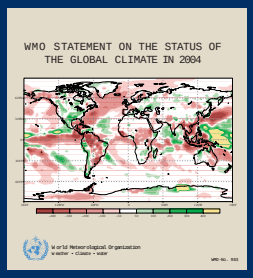
Climate monitoring is vital to further advance our understanding of the complexity of the climate system and its predictability. WMO's Integrated Global Observing System (WMO-IOS) comprises complex observing networks in space, in the atmosphere, on land and at sea. The data and associated climate information that are collected and disseminated to users, keep all stakeholders informed of the state of the climate and the natural environment. Observations programmes such as the Global Climate Observing System (GCOS) and the Global Ocean Observing System (GOOS) will continue to play a major role in collecting the required data for the development of climate information and prediction services, and will thus be important components of the Global Earth Observing System of Systems (GEOSS).



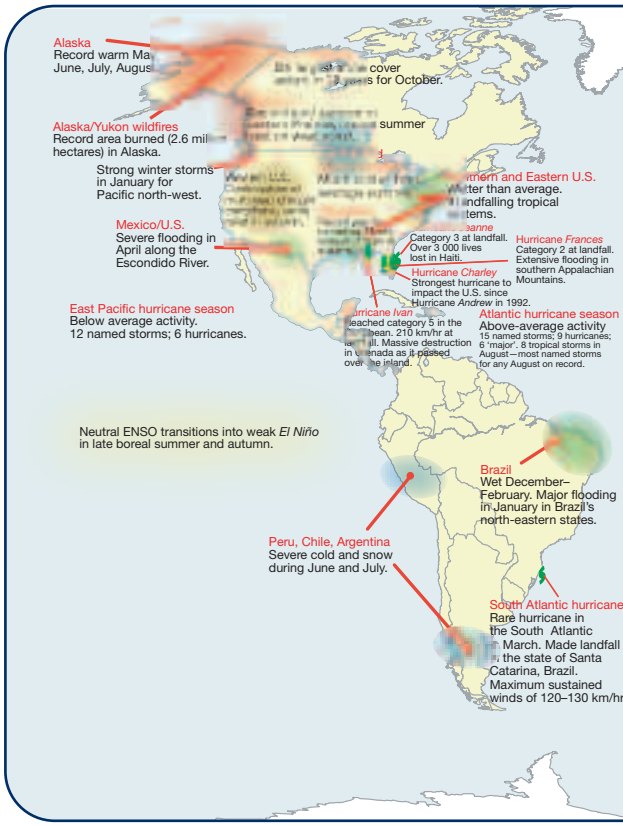
WMO's basic systems.

Climate data and monitoring

Understanding the predictability of individual components of the climate system makes it possible to address the predictability of the total climate system. This can only be achieved through sustained development of comprehensive, dedicated global observing and climate data management systems. Furthermore, the collection of high-quality data from existing observing systems is crucial for uses in modelling climate processes, detecting human-induced climate change, monitoring climate variability, developing climate applications and services and addressing the adverse impacts of climate on natural and human systems. The WMO Statement on the Status of the Global Climate, which provides annual scientific information on the status of the global climate and its variability and the US NOAA compilation of significant climate anomalies and weather events in 2004, are examples of the numerous climate products that are produced using data collected from global observing networks managed by WMO, NMHSs and their partners.



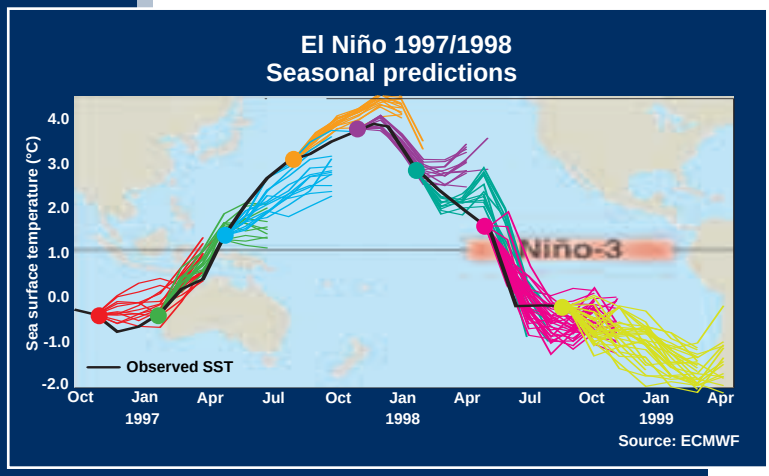
WMO Statement on the status of the global climate system for 2004



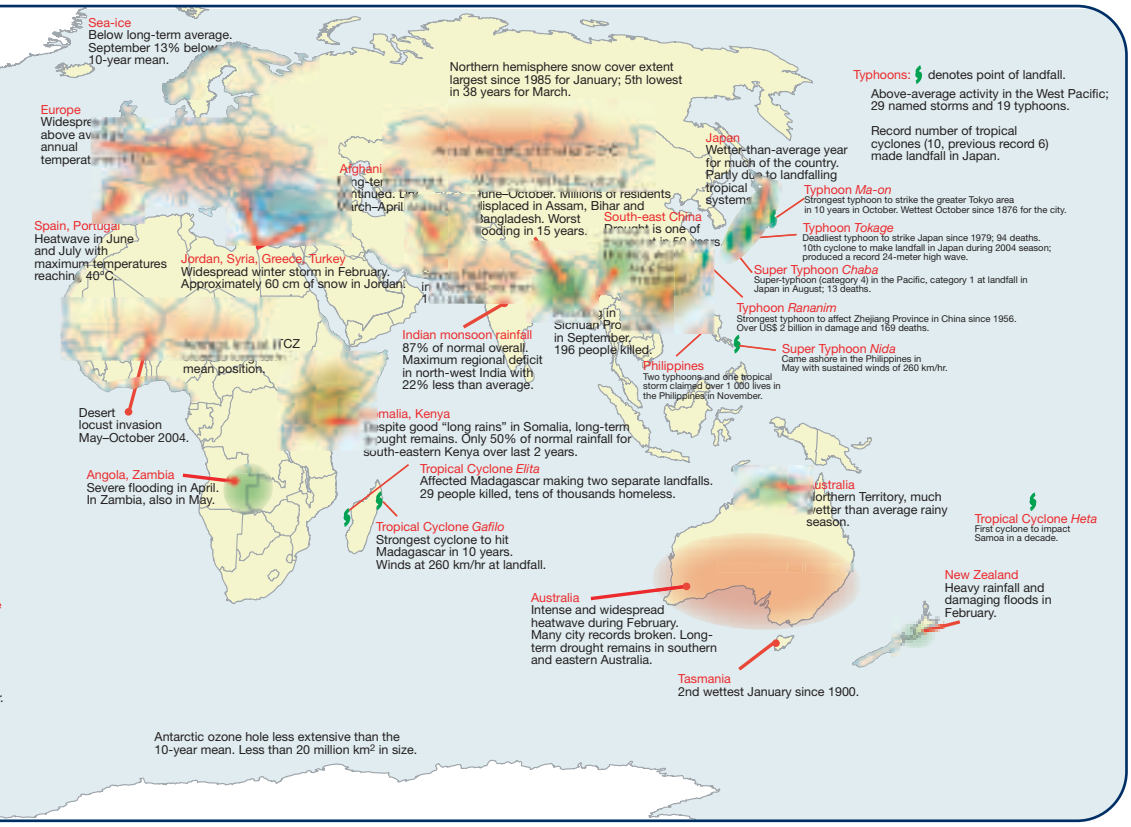
Climate research, modelling and prediction

Climate research, modelling and prediction have been, and will continue to be at the forefront of international efforts to advance knowledge in the accuracy and skills of seasonal and interannual and possibly decadal climate predictions and the effects of human activities on the climate system. To achieve these, the international climate research and modelling community has adopted a multidisciplinary approach and organizes large-scale observational and modelling projects, each of which focuses on aspects of climate too large and complex to be addressed by any one nation or individual scientific discipline. The Tropical Ocean and Global Atmosphere (TOGA) project (1985-1994), for example, established the physical basis for the understanding and prediction of El Niño temperature signals and associated changes in global climate. This led to a major breakthrough in operational seasonal climate forecasting.

The World Ocean Circulation Experiment (WOCE) (1982-2002), arguably the biggest and most successful global ocean research



ENSO forecasts, such as this one for the 1997/1998 event, have become possible through intensive research efforts in the field of seasonal predictions. The various colours represent multiple model runs (forecasts) initiated at different times of the year (Courtesy ECMWF)



Significant climatic anomalies and weather events in 2004.
(Courtesy: US NOAA National Climatic Data Center)

programme to date, collected observations of the world's oceans of unprecedented quality and coverage and led to the development of important new ocean observing techniques and improved understanding of physical processes in the ocean. The Arctic Climate System Study (ACSYS) (1994-2003) is another example of a successful climate research project to examine the complex and interrelated pieces of the Arctic climate system to ascertain its role in the global climate system.

These research and modelling programmes have greatly improved our understanding of key climate processes and resulted in significantly improved climate models, as well as better operational weather and ocean forecasting models. Improved modelling of the climate system has provided increasingly accurate simulation and prediction of natural climate variations, giving more confidence in projections of human-induced climate change. This also has provided the

scientific underpinning for each of the IPCC assessments that in turn contribute to the ongoing UNFCCC negotiations to address climate change.

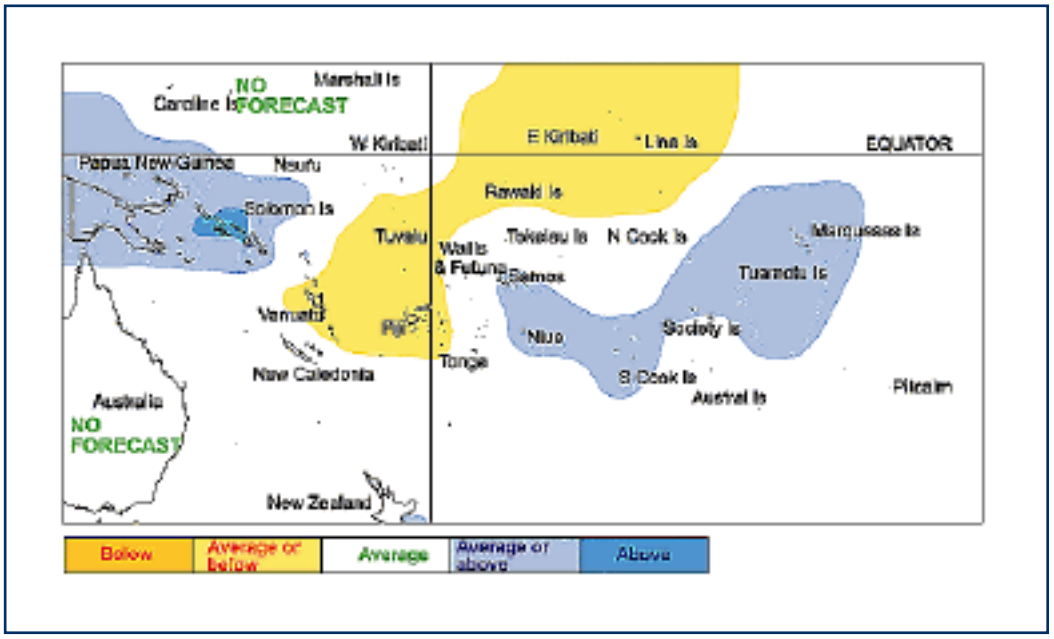
New research programmes include the analysis and prediction of earth system variability and change such as seasonal prediction, monsoon prediction and sea-level rise.

Climate knowledge for adaptation and sustainable development

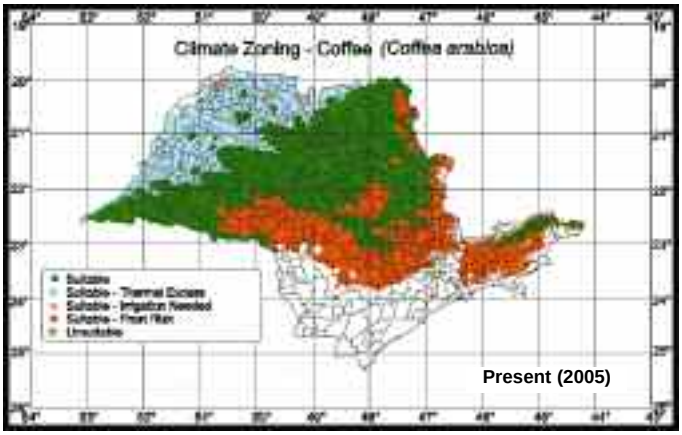
The use and application of climate knowledge and services to maintain public safety, health and welfare, to alleviate poverty and to promote sustainable development are a key objective of WMO, NMHSs and their partners' activities.

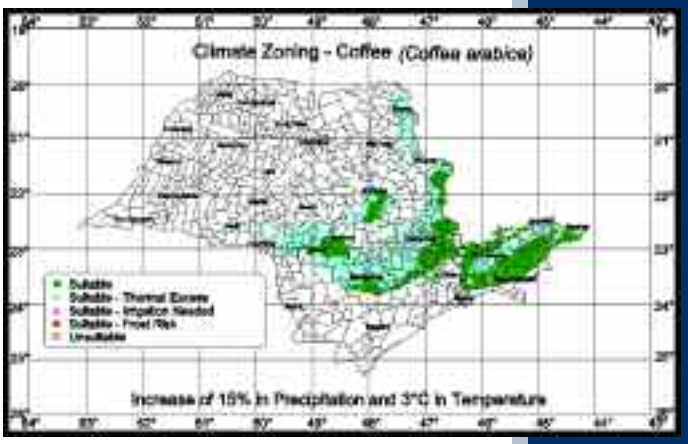
Ensuring that these applications and prediction activities result in understandable, consistent, high-quality and reliable products for user groups helps individuals, businesses, governments and others make effective decisions that maximize on the benefits of climate, and reduce the risks of climate-related hazards for lives and economies. Partnership is vital in this regard. A model example of this partnership in action is the joint project between WMO, the Council of Regional Organizations in the Pacific (CROP), Pacific Islands' NMHSs and climate prediction centres in Australia, France, New Zealand and USA in the preparation of the monthly Island Climate Update (ICU) bulletin. The ICU provides an overview of the present climate in the tropical South Pacific islands with an outlook for the coming months to assist in the dissemination of climate information in the Pacific region.

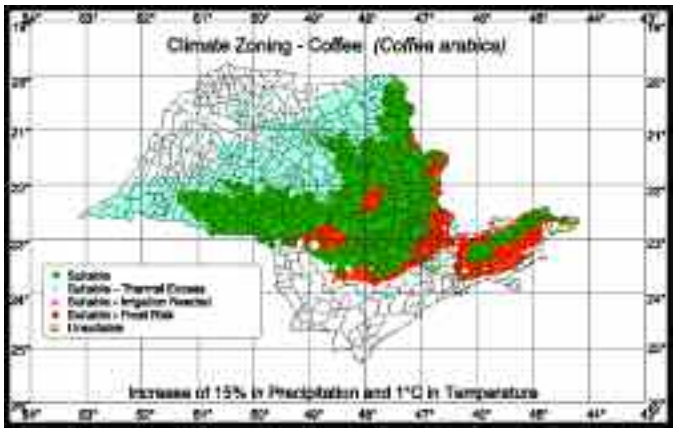
Another example is the Agritempo (www.agritempo.br) project, coordinated by the Brazilian Ministry of Agriculture and Campinas University Sao Paolo, EMBRAPA. The goals of the project are to reduce the economic losses associated with dry spells during the crop flowering and grain filling phase and excessive rain during the harvesting phase. An estimated 60% and 30% of crop losses respectively were attributed to these two phases in 1995. Since the project began, a 20% reduction in crop losses has been achieved, resulting in savings of over US$ 630 million. Agribusiness in Brazil accounted for 30% of

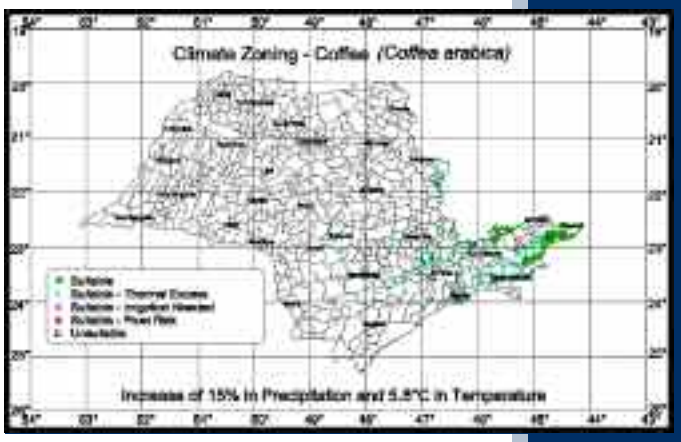


Rainfall outlooks (October-November-December 2005) for small islands in the Pacific region (Source: NIWA Science, New Zealand)





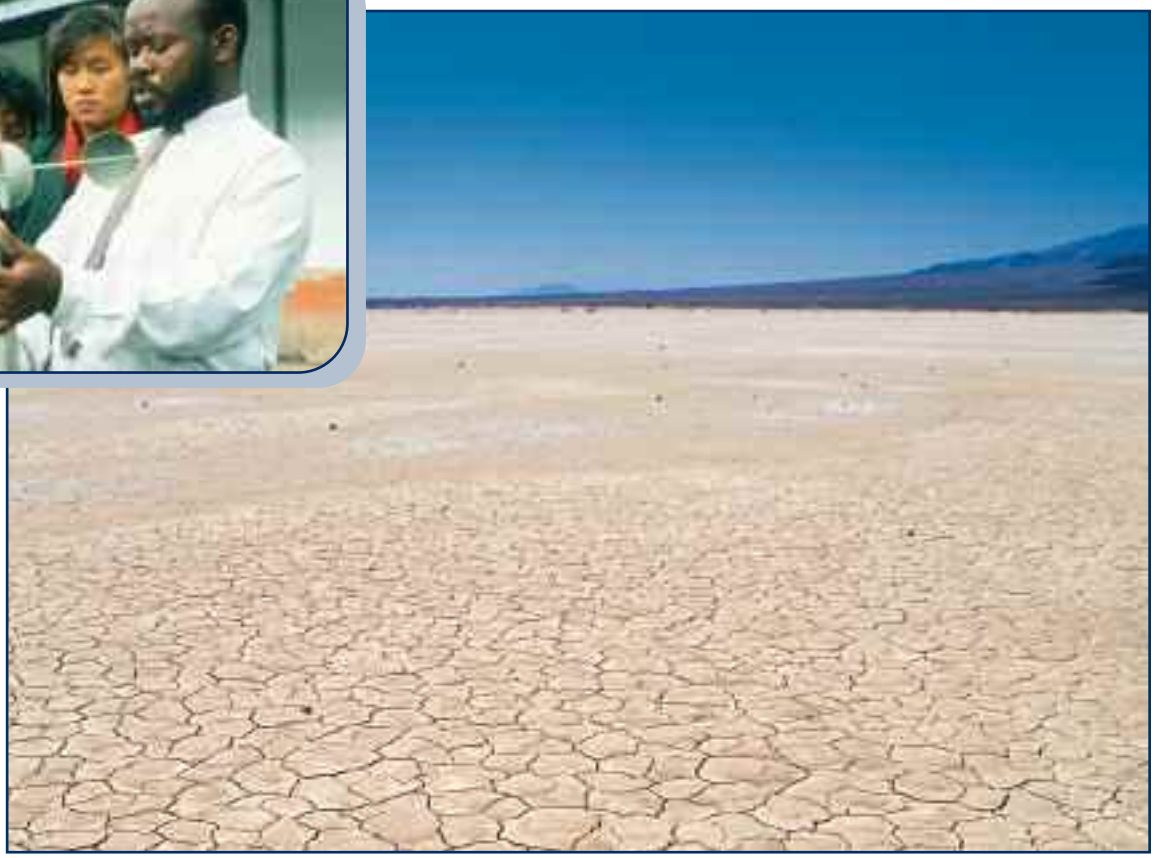




the GDP, bringing in around US$ 500 billion per year. It also accounted for about 30% of jobs. Total earnings from agribusiness exports in 2003 were US$ 30 billion. The project has about 40 million customers.

Climate zoning for coffee in Brazil, a good example of the application of climate knowledge for adaptation to changing climate conditions (Courtesy: Brazillian Agricultural Research Corporation (EMBRAPA), Campinas State University, Sao Paolo, Brazil)

(Courtesy; F. Pomamret/UNV)



Capacity-building

Capacity-building, training, education and public awareness at all levels are key to mobilizing support for international action to address climate change. It is imperative therefore for the UN system to further strengthen global partnerships in capacity building in climate science and applications.

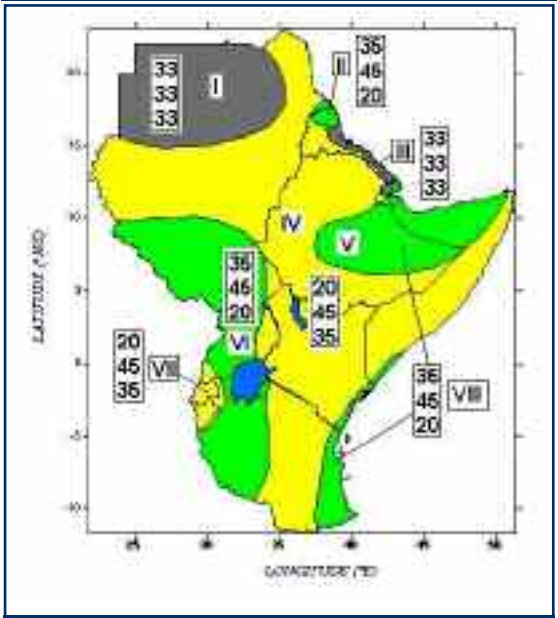
Regional Climate Outlook Forums (RCOFs), for example, is an effective mechanism use by WMO, NMHSs and partners, for capacity building at the regional level, particularly in developing countries. Capacity building initiatives such as RCOFs should continue to be supported under the UNFCCC and other related agreements, such as the 2005 World Summit.

Climate Applications, Information and Prediction Services for decision-making

WMO, NMHSs and collaborating partners have been actively promoting the use of climate information and prediction services and the practical application of this information in decision making in climate sensitive sectors, such as agriculture, food security, water resource management, human health, renewable energy, urban and building climatology and tourism, through RCOFs.

The climate prediction outlooks for the Greater Horn of Africa (GHA) region for the September to December 2005 period is an example of one of the many products coming out of RCOFs. Another product is the Food Insecurity Outlooks for the GHA region for the same period, September to December 2005.

Climate Outlooks for the Greater Horn of Africa (September-October-November-December 2005) (Courtesy: Sixteenth Climate Outlook Forum, Nairobi, Kenya, 31 August - 2 September 2005)



Zone I: Normal climate conditions over northwestern Sudan

Zone II: Increased likelihood of near-to-above-normal rainfall over northern Eritrea and the winter rainfall zone of northeastern Sudan

Zone III: Normal climate conditions over eastern Eritrea, and western Djibouti

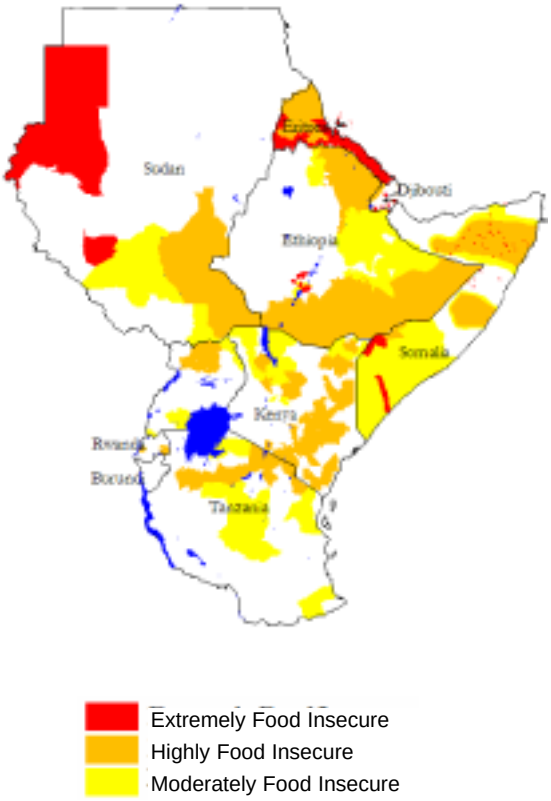
Zone IV: Increased likelihood of near-to-below-normal rainfall over central and eastern Sudan, northern, western and southern Ethiopia, much of Kenya, eastern Uganda, much of Somalia and parts of northeastern, central and southwestern Tanzania, and western Eritrea

Zone V: Increased likelihood of near-to-above-normal rainfall over eastern Ethiopia and northern Somalia

Zone VI: Increased likelihood of near-to-above-normal rainfall over southern Sudan, northern and western Uganda and western Tanzania

Zone VII: Increased likelihood of near-to-below-normal rainfall over southwestern Uganda, Rwanda and Burundi

Zone VIII: Increased likelihood of near-to-above-normal rainfall over the Tanzanian and Kenyan coasts and parts of the southern Somalia coast



Food Insecurity Outlooks for the Greater Horn of Afica (September-October-November-December 2005) (Courtesy: Famine Early Warning System Network (FEWSNET) Sixteenth Climate Outlook Forum, Nairobi, Kenya, 31 August - 2 September 2005)

Future development/strategies

WMO, NMHSs and their partners recognize the seminal role that UN agencies have played in raising public awareness of climate matters, in particular, concerns about human induced climate change. The launching of the Climate Agenda, involving an interagency, interdisciplinary effort of the UN, provides an authoritative, sound scientific base for policy makers to make informed decisions and formulate appropriate policies and measures.

WMO, NMHSs and their partners also recognize the important linkages between the UNFCCC and other international agreements and conventions, such as the 2005 World Summit as well as between climate variability and change and high-priority societal issues such as sustainable development, energy use, trade, and security. In this regard, it is clear that future climate change policies will require integration of climate

change, energy and sustainable development and that one area cannot be dealt with without addressing the other two. Through a number of new sets of strategic scientific frameworks, WMO, NMHSs and their partners will continue to work within the United Nations system to ensure that climate variability and change decision-making continues to be based on sound scientific knowledge for the benefit of society.

Photos:
NASA Earth Observatory, JAMSTEC/Earth Simulator Center, V. Aizen (FAO),
International Coral Reef Information Network, Horwath and Sandor (ICRC), AP/NOAA,
StormCenter Communications, Amit Shankar/CSE, Australian Government Department of Foreign Affairs and Trade,
Nick Cox/British Antarctic Survey, F. Pomamret/UNV

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