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Weather • Climate • Water

Protecting against flash floods 1

NEWS IN BRIEF

Better protection against flash floods

WMO supports Members' efforts to protect against flash flooding by improving early warning systems and strengthening local capacity to adequately respond to such extreme events.

Communities must be on the alert for flash floods, ensuring systems are in place to record rapidly rising water levels. This can provide the warning needed to start evacuating populations from areas where a flash flood is predicted to occur.

National Meteorological and Hydrological Services (NMHSs) face tough challenges in predicting when and where floods will hit. Crisis services face similar dilemmas in responding, because of the limited warning time available.

In October 2007, WMO co-sponsored a workshop with officials from NMHSs, disaster response services and local communities in central and eastern Europe, a region which has suffered significant loss of life and economic damage in floods in the recent past. The aim was to reduce the vulnerability of communities which are prone to these phenomena.

A comprehensive national strategy can help coordinate various parties to minimize loss of life from flooding and reduce the vulnerability of local communities. Awareness must be raised through schools and the media. The private sector can contribute resources for emergency response and recovery.

Some countries in the region have upgraded their monitoring, forecasting and warning capabilities, while others are struggling to secure funding needed for such investments.

WMO runs the Associated Programme on Flood Management, supporting countries through its Integrated Flood Management policy. This concept integrates land and water-resources development in a river basin under an overall water resources management system. It aims to maximize the net benefit from floodplains and minimize loss of life from flooding.

La Niña is back—but different

The El Niño/La Niña update issued by WMO on 31 October indicated that a La Niña event was underway across the central and eastern equatorial Pacific, with sea-surface temperatures as much as 1.5°C colder than normal. These conditions are expected to continue throughout the first quarter of 2008.

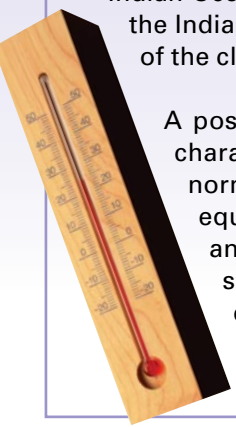
The magnitude of the current sea-surface temperature departures from normal in the central and eastern equatorial Pacific are in the middle range of La Niña events found in the historical record. It is, however, markedly different from most other such events in the past. This is due to the presence of colder-than-normal sea-surface waters across northern Australia, around the western Indonesian islands and extending to the Indian Ocean. Sea-surface temperatures in this region are typically warmer than normal during a basin-wide La Niña (see box overleaf). In addition, the sequence leading up to the event has been unusual: La Niña conditions were established only after a break in movement to such conditions during April-June.

Some regional climate patterns atypical of La Niña impacts are expected to be experienced in the surrounding continental regions as long as this situation continues. For example, rains have been unusually heavy in parts of eastern Africa, while dry conditions have persisted in many areas of Australia.

Thus, this La Niña situation requires careful consideration of geographically specific climate outlooks such as those produced by the National Meteorological and Hydrological Services (NMHSs) for optimal management of climate related risks.

LA NIÑA AND THE INDIAN OCEAN DIPOLE

The cooler-than-normal sea temperatures currently being observed between Australia and the western Indian Ocean are associated with a positive phase of the Indian Ocean Dipole, a recently identified mode of the climate system.



A positive phase of the Indian Ocean Dipole is charac-terized by the presence of cooler-than-normal sea-surface temperatures in the eastern equatorial Indian Ocean near Indonesia and Australia and warmer-than-normal sea- surface temperatures in the western equatorial Indian Ocean, near Madagascar. A negative phase of the Indian Ocean Dipole has the opposite features.

WMO will continue monitoring the emerging indications in conjunction with NMHSs.

The WMO El Niño/La Niña Update is a consensus report prepared in collaboration with the International Research Institute for Climate and Society, with contributions from NMHSs, regional and global prediction/research centres and individual experts.

Atmospheric carbon dioxide levels highest on record in 2006

The WMO Greenhouse Gas Bulletin issued at the end of November (see page 4) reveals that globally averaged carbon dioxide concentrations in the atmosphere reached their highest levels ever recorded in 2006. At 381.2 parts per million (ppm), they were up 0.53 per cent from 379.2 ppm in 2005.

The information is based on observations from the WMO global carbon dioxide and methane monitoring network, a comprehensive climate network that contributes to the work of the United Nations Framework Convention on Climate Change.

The latest bulletin was issued just before the 50th anniversary of the Global Carbon Dioxide Record Symposium and Celebration (Hawaii, 28-30 November 2007), co-sponsored by WMO, and the United Nations Climate Change Conference in Bali, Indonesia (see page 3).

After water vapour, carbon dioxide, methane and nitrous oxide are the three most prevalent greenhouse gases in the Earth's atmosphere. Greenhouse gases are major drivers of global warming and climate change. Nitrous oxide concentrations also reached record highs in 2006, up 0.25 per cent from 319.2 parts per billion (ppb) to 320.1 ppb. Methane remained almost unchanged at 1 782 ppb.

The rise of 36 per cent in carbon dioxide concentrations since the late 1700s has been generated largely by emissions from the combustion of fossil fuels. Around one-third of nitrous oxide discharged into the air is from human activities such as fuel combustion, biomass burning, fertilizer use and some industrial processes. Fossil fuel exploitation, rice agriculture, biomass burning, landfills and ruminant farm animals account for some 60 per cent of atmospheric methane, with natural processes responsible for the remainder.

Accurate global atmospheric observations by 44 WMO Members are archived and distributed by the World Data Centre for Greenhouse Gases hosted by the Japan Meteorological Agency.

WMO prepares the Greenhouse Gas Bulletin in cooperation with the World Data Centre for Greenhouse Gases, the Global Atmosphere Watch Scientific Advisory Group for Greenhouse Gases and the National Oceanic and Atmospheric Administration's Earth System Research Laboratory.

Sand- and duststorms

WMO and partners are in the process of establishing a risk-reduction tool to assist countries experiencing severe sand- and duststorms.

Windstorms generated in desert areas can transport thousands of tonnes of sand and dust particles across continents and deposit them in cities. These particles consist of mineral aerosols that aggravate cardiovascular and respiratory diseases in people and animals. They can also carry disease, including spores responsible for Valley Fever in the Americas, while dust events have been linked to meningitis in arid African regions. Areas affected by duststorms have high incidences of asthma.

Desertification, which can be linked to changing climate, as well as inappropriate forestry and farming techniques, can spur erosion by sand- and duststorms. This can result in long-range airborne transport and deposition of nutrients and toxic materials, including fertilizers, herbicides, pesticides and chemical wastes that accompany soil particles.

Many countries would therefore benefit from a global warning system to coordinate and deliver advanced forecasts produced by meteorological centres. These forecasts predict when and where plumes of sand and dust will be generated and provide governments, businesses and communities with information necessary to minimize impacts.

The warning system supported by WMO Members can inform users up to five days in advance of sand- and duststorm risks via national warning and assessment centres. Two regional coordinating centres are being established in China and Spain and another is being considered in the Americas.

The work involves three groups: modellers, who produce sand and dust forecasts using numerical prediction techniques; observation experts, who generate observations and information through satellites, surface-based networks and aircraft; and users, who apply the forecasts and information. Amongst these are government agencies involved in risk reduction, the media, health experts and researchers.

Through national, regional and global cooperation, sand and dust forecasts, warnings and assessments can be better tailored to user needs.

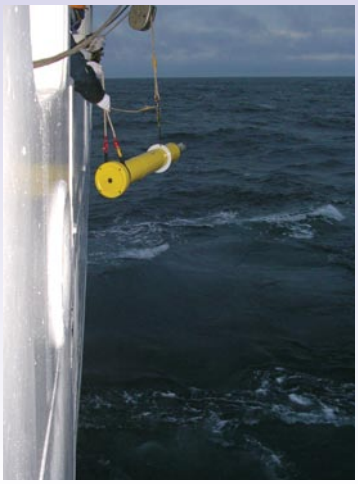
Marine meteorology

Profiling float network

On 1 November 2007, the broad-scale global array of temperature/salinity profiling floats, known as Argo, reached its initial target of 3 000 operational profiling floats. The programme started in 1998 and planned to sample the world oceans for water temperature and salinity profiles to a depth of 2 000 m and to estimate the ocean currents at that depth at a horizontal resolution of 3° x 3°.

Argo data have permitted a reduction in the uncertainty of ocean heat storage calculation, thereby improving estimates and

WMO ensures that all parts of the world affected by dust- and sandstorms have access to forecast and analysis products.



Canadian Argo float being deployed in the Bering Sea on 24 October 2007 (Photo: Hiroshi Matsunaga)

forecast of sea-level rise caused by thermal expansion. Argo is now playing a key role in improving seasonal climate forecasts. Its data are routinely being used in coupled ocean-atmosphere models, together with satellite products and other data from *in situ* observing systems.

The completion of this implementation phase has allowed more countries to be involved. More than 30 countries and the European Union are now participating in Argo. An effective data system capable of delivering real-time and delayed-mode data has now been developed, as well as a widespread user community covering both research and operational applications. Overall reliability of the system has been improved and the float lifetime extended to four years.

Sustainability over the decadal time-scale remains an issue, since most of the national Argo programmes are still supported through research funding. Sustainability is justified for both research and operational applications. Argo data are increasingly being used for ocean and climate modelling.

Argo is now between its implementation phase and its sustained maintenance phase, which will last for at least the next decade. It will optimize the array's design, address new challenges (e.g. extending float life-time beyond four years) and enhance further the quality and usefulness of the data. The value of Argo will be fully demonstrated and exploited.

The Argo array is the centrepiece of the *in situ* ocean observing system promoted by the Joint Commission for Oceanography and Marine Meteorology, co-sponsored by the Intergovernmental Oceanographic Commission of UNESCO and WMO. Argo is a pilot project of the Global Ocean and Global Climate Observing Systems.

Forecasting storm surge

Storm surges constitute a significant marine hazard, with a potential for causing serious loss of life, damage and inundation of valuable low-lying coastal areas. Since they are closely associated with tropical cyclones and extra-tropical storms, National Meteorological Services are normally charged with implementing warning and forecast services for storm surges.

The need was identified to enhance storm surge forecasting capabilities and to complement other international efforts. These include a series of capacity-building workshops on storm surge and wave forecasting which assist the development of marine-related hazard warning systems.

WMO and the Intergovernmental Oceanographic Commission (UNESCO), through their Joint Commission for Marine Meteorology (JCOMM), organized a scientific/technical symposium for the exchange of ideas and information related to tropical and extra-tropical storm-surge modelling, forecasting and hindcasting. It also provided input to the development of products such as flood maps and Geographical Information System tools.

Areas for future research and development were pinpointed and input was developed for the dynamic part of the Guide to Storm Surge Forecasting that is currently being prepared by JCOMM, emphasizing new developments.

The Symposium provided guidance/technical support for National Meteorological Services and other national agencies providing storm surge forecasting and warning services.

STORM SURGE

Storm surge is an abnormal rise of water due to a tropical cyclone or an extra-tropical storm—an oceanic event driven by meteorological forces. Potentially disastrous surges occur along coasts with low-lying terrain that allows inland inundation, or across inland water bodies such as bays, estuaries, lakes and rivers. For riverine situations, the surge is sea water moving up the river.

For a typical storm, the surge affects some 150-200 km of coastline for a period of several hours. Larger, slow moving storms may impact considerably longer stretches of coastline.

Damage from a coastal storm surge

Climate change and tourism

Tourism is one of the largest economic sectors and an integral part of modern societies in both developed and developing countries. It is a vital element in poverty-reduction efforts and for the achievement of the UN Millennium Development Goals. Tourism is, however, vulnerable to climate variability and change, with some activities known to have an impact on climate itself.

The Second International Conference on Climate Change and Tourism (Davos, Switzerland, October 2007) was a joint activity of the UN World Tourism Organization, the United Nations Environment Programme and WMO. It underscored the need for the tourism sector to respond rapidly to climate change if it is to develop in a sustainable manner. It was agreed that this would require action to: mitigate greenhouse-gas emissions arising especially from transport and accommodation activities; adapt tourism businesses and destinations to changing climate conditions; apply existing and new technologies to improve energy efficiency; and secure financial resources to assist regions and countries in need.

A report entitled Climate Change and Tourism: Responding to Global Challenges, commissioned in the context of the Davos meeting, is being prepared. It will provide the basis for developing practical tools that can be used by tourism policy-makers and managers to foster the sustainable growth of the industry.

These activities are an integral part of the UN system effort to develop a common framework in responding to the climate change challenge to "deliver as one".

United Nations Climate Change Conference

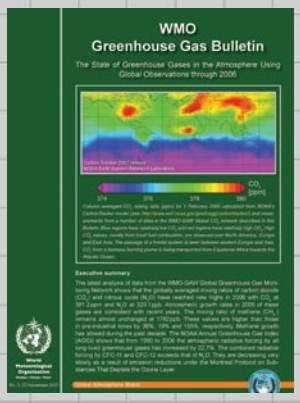
WMO participated in the 13th session of the Conference of the Parties to the UN Framework Convention on Climate Change and the third meeting of the Parties to the Kyoto Protocol (Bali, Indonesia, 3-14 December 2007).

WMO emphasized the role of science in understanding the

Recently issued

WMO Bulletin 56 (4), October 2007 (theme "International Polar Year 2007-2008")

Climate information for adaptation and development needs (WMO-No. 1025)



WMO Greenhouse Gas Bulletin 2006 (See also http://www.wmo.int/pages/prog/arep/gaw/ghg/ghgbull06_en.html#ghgbulletins.)

future projections and potential impacts of climate change.

Together with two of its co-sponsored programmes, the Global Climate Observing System and the World Climate Research Programme, WMO held a side event entitled "Improved decision-making for climate adaptation: providing a science base". Speakers described a science-based approach to adaptation to climate variability and change and how climate observations and modelling skills can help provide the information needed for adaptation. This perspective promotes the role of science in national adaptation strategies.

Furthermore, WMO and the Secretariat of the Intergovernmental Panel on Climate Change organized exhibition booths to showcase the role of climate science in the work of the UN Framework Convention on Climate Change.

As part of preparations for the Bali Conference, WMO prepared the brochure "Climate information for adaptation and development needs" (see left), as well as a position paper on WMO's contribution to improved decision-making for climate adaptation (http://www.wmo.int/pages/cop13/index_en.html).

Aviation meteorology

National Meteorological Services (NMSs) fulfil a large variety of tasks and functions and have a multitude of user groups with different needs and requirements, a major one being aviation.

They invest in meteorological observation systems, forecasting efforts and research programmes to improve and expand their services and the International Civil Aviation Organization (ICAO) stipulates the "user pays" principle. This allows for the recovery of costs for air navigation services from civil aviation by the service providers.

Aeronautical meteorological services form part of air navigation services and are, therefore, recoverable from users.

In order to assess whether NMSs are receiving an equitable contribution towards their cost, the aeronautical meteorological services to civil aviation need to be analysed. WMO has helped design an institutional framework for the East African Community (Burundi, Kenya, Rwanda, United Republic of Tanzania and Uganda), which will make appropriate cost recovery a reality.

In view of the question of national airspace and the international nature of civil aviation, there is a need to standardize and have in place a regional/national quality management framework. WMO and ICAO have developed guidance materials to assist NMSs in implementing such frameworks.

World Meteorological Organization

World Meteorological Organization
7 bis, avenue de la Paix, PO Box 2300
CH-1211 Geneva 2, Switzerland
Tel.: +41 (0) 22 730 83 14 / 83 15
Fax: +41 (0) 22 730 80 27
Internet: http://www.wmo.int

We welcome your comments about MeteoWorld and look forward to hearing from you: jtorres@wmo.int

COMING EVENTS

15-16 January: WMO Consultative Meetings on High-level Policy on Satellite Matters—eighth session (New Orleans, Louisiana, USA)

16 -18 January: Fifty-ninth session of the WMO Bureau (New Orleans, Louisiana, USA)

28-30 January: Climate Observation and Services in the Central America and Caribbean Region (Belize City, Belize)

11-15 February: Commission for Hydrology Advisory Working Group—third session (Geneva)

27-29 February: First Meeting of the EC Working Group on WMO Strategic and Operational Planning (Geneva)

3-5 March: Fourth Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction (Geneva)

7-19 April: Workshop on Hurricane Forecasting and Warning, and Public Weather Services (Miami, Florida, USA)

8-10 April: Workshop on Communicating about ENSO: Toward Developing a Common Understanding (Honolulu, Hawaii, USA)