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NEWS IN BRIEF

Ozone depletion

The Scientific Assessment of Ozone Depletion: 2006 published by WMO and the United Nations Environment Programme in August says that the stratospheric ozone layer that protects life on Earth from excessive solar radiation will recover 5-15 years later than previously expected.

The report says that the ozone layer over mid-latitudes (30°-60°N and S) should recover by 2049, five years later than anticipated by the previous assessment in 2002. Ozone over the Antarctic should recover by 2065, 15 years later than earlier predictions.

Because of special conditions within the Antarctic vortex (a natural cyclone of super-cold, super-fast winds), the Antarctic ozone hole is expected to recur regularly for another two decades.

The later projected date of recovery over mid-latitudes is primarily the result of upward revisions in the amounts of certain chlorofluorocarbon (CFC) gases used in refrigerators and other equipment, from which much of both types will eventually be released. Higher estimates of future production levels of a CFC substitute that, although much safer, still causes some depletion is another factor.

Health impacts of ultraviolet radiation

According to the World Health Organization (WHO), excessive exposure to the Sun kills some 60 000 people around the world every year. Its report "Global burden of disease of solar ultraviolet radiation" is the first systematic examination of the issue. It is estimated that 48 000 deaths are caused every year by malignant melanomas and the other 12 000 by skin carcinomas.

WHO works closely with WMO to monitor ultraviolet (UV) radiation through the Global Solar UV Index. Developed in collaboration with the United Nations Environment Programme and the International Commission on Non-Ionizing Radiation Protection, the Index measures UV radiation levels at the Earth's surface and serves as an important vehicle to alert the public about the dangers of overexposure to the Sun's harmful rays.

Recovery of the Antarctic ozone layer will take place later than previously calculated due to the greater age of air in that region. This essentially means that ozone-depleting molecules take longer to reach (and also dissipate from) the stratosphere, a factor not previously taken into account.

First Arctic ozone bulletin

To mark the International Day for the Protection of the Ozone Layer on 16 September, WMO launched the first bulletin detailing depletion of the ozone layer over the Arctic. The new WMO product paints a comprehensive picture of ozone depletion in the region which—in contrast with the Antarctic—sustains a substantial number of inhabitants.

Unlike the Antarctic also, areas of depletion in the Arctic are more mobile, shifting erratically and exposing northern parts of the globe such as Alaska, Canada, Greenland, northern Europe and Siberia to harmful UV-B rays. The degree of ozone loss experienced in any one winter depends on the meteorological conditions.

The Arctic ozone bulletin will provide invaluable input for the upcoming International Polar Year 2007-2008.

WMO also produces a regular bulletin on the state of the ozone layer over the Antarctic.

Public weather services

Improving products and services and their dissemination

The broadcast media have a particularly significant role to play in the communication of public

weather services and NMHSs need to work closely with them. Surveys in developed countries have indicated the need for improved precision and accuracy and more timely warnings of severe weather. They also highlighted the benefits of improved seasonal forecasts, especially of rainfall and temperature.

Verification results are a powerful tool for assessing performance and WMO encourages NMHSs to use them to improve their products and services. A basic verification of temperature forecasts from WMO's World Weather Information Service (WWIS) Website (see the August 2006 edition of *MeteoWorld*) started in January 2005. As such information could be useful, especially for developing countries, the aim is now to expand it to all regions and communicate individual statistics to NMHSs.

Other proposed actions to improve the WWIS Website is the inclusion of precipitation type and amount; the progressive introduction of more severe or abnormal weather information with emphasis on disaster prevention and mitigation; and the publication of a user guide for distribution to the general public and major media organizations.

To improve forecast quality, a WMO Expert Team will assess a pilot project on numerical weather prediction (NWP) city-specific forecasts by providing appropriate techniques and software to NMHSs. Specialized training courses will be organized for capacity building purposes.

Data and products from Ensemble Prediction Systems (EPS) have the potential to change the way forecast information is provided to the user community. In view of certain inherent risks in the interpretation of the information, education of the user community is vital for maximum benefit and to avoid confusion. WMO is encouraging major NWP centres having EPS capability to work with smaller NMHSs to develop a range of products which would help them use EPS effectively.

They will also be encouraged to make available material on the use of EPS. Collaboration with other organizations will improve the communication of probabilistic information to the user community.

Mobile communication devices utilizing GIS and GPS technology can effectively aid delivery of public weather service products. It is envisaged that the next generation of forecast workstations will be able to readily retrieve observations, nowcast and prognostic information from databases and assist in the preparation of such products and their delivery through multiple communication pathways.

Sustainable development

National Meteorological and Hydrological Services (NMHSs) play an important role in the alleviation of poverty and the mitigation of the impacts associated with natural disasters and a wide range of other sustainable development issues, such as water resources, agriculture, energy (heating in cold periods, cooling in hot periods) and health.

Essential ingredients of effective weather information products include relevance, reliability, timeliness, diversity of dissemination channels, and consistency.

Investments in NMHSs can reduce loss of life, property and productive capacity through the development of more timely and reliable early warnings and delivery systems that can lead to improved mitigation actions and preparedness planning. Improvements in water management, food security, health and energy can also be demonstrated through proper planning and mitigation mechanisms.

WMO provides recommendations and guidance for assisting the NMHSs of developing countries to assess and enhance the socio-economic and environmental

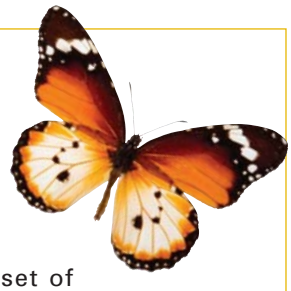
Recently issued

WMO Bulletin Volume 55 No. 3 (July 2006) on the theme: "Flooding and sustainable development"

Drought monitoring and early warning: concepts, progress and future challenges (WMO-No. 1006)

Weather, Climate and Water Services for the Least Developed Countries (fold-out)

COPING WITH THE BUTTERFLY EFFECT



Numerical models and data assimilation systems have improved enormously so that today's three-day forecast is as good as a one-day forecast 15 years ago. Despite this, a numerical weather prediction for several days ahead can still have significant errors. This is partly because of the chaotic nature of the atmosphere, as was first highlighted by E. Lorenz in the early 1960s. (Prof. Lorenz received WMO's most prestigious award, the IMO Prize in 2000.) Very small errors in the initial conditions can develop into large errors in the forecast—the so-called butterfly effect.

A perfect forecast system is not possible for a number of reasons, particularly because the state of the atmosphere at the start of the forecast cannot be known with absolute accuracy. Tiny errors in the initial state will be amplified such that, after a while, the forecast becomes useless. This sensitivity varies, depending on the atmospheric state but, typically, the main weather patterns can be forecast reasonably well up to 6-8 days in mid-latitudes. Beyond that, uncertainties in the forecasts can become large.

To cope with this uncertainty, ensemble prediction systems (EPS) are used. Instead of running a single forecast, the system is run a number of times from slightly different starting conditions. The complete set of forecasts is referred to as the *ensemble* and individual forecasts within it as *ensemble members*. The initial differences between ensemble members are very small and compatible with observation errors and model assumptions. When they are compared with observations, therefore, it is impossible to say which members fitted the observations better. All members are equally likely to be correct but, for several days ahead, the forecasts can be quite different. Corresponding probabilities of occurrence can be derived from the ensemble which, however, require specific interpretation skills. EPS products are particularly useful for longer-range forecasts and predictions of extreme events.

CLIMATE VARIABILITY AND CHANGE

Climate variability and change affect major social, economic and environmental sectors and are significant factors in their sustainable development. Policy formulation and operational decision-making in climate-sensitive sectors can be improved by more widespread use of climate knowledge and information in managing risks and exploiting opportunities (climate-related risk management).

The WMO Conference in Espoo, Finland, in July 2006 entitled "Living with climate variability and change" reviewed opportunities and constraints in integrating climate risks and uncertainties into the mainstreams of decision-making where sensitivity to climate variability and change is but one among many factors to consider.

The experts attending the Conference considered the principles of risk assessment and management within broader institutional and policy frameworks of decision-processes in, among others, agriculture, water-resource management, disease control, power generation and disaster mitigation. The goal of the Conference was to make substantial progress in the establishment of an operable agenda for climate-related risk management and to propose an enduring process for future work.

Climate-related risk management requires multi-disciplinary collaboration and the cross-disciplinary exchange of information. Collaborative mechanisms should

be developed that facilitate and improve activities for the benefit of all. These include the evaluation of current activities and better assessments of their value; the establishment of datasets; research; the development of decision-support tools; capacity-building; ongoing evaluation of outcomes; and suitable financial mechanisms.

The Conference was a WMO contribution to efforts to achieve the international development goals established under the 2000 United Nations Millennium Declaration (the UN Millennium Development Goals). (See box overleaf.)

benefits of applying weather, climate and water information and products for a wide range of user communities, including the media.

In the agricultural sector, there is a clear recognition of the usefulness of weather and climate information but, in other sectors, it is not always so evident. The interaction of NMHSs with those sectors in a sustained and constructive dialogue is a prerequisite for effective services and products. Users need to be aware of NMHSs, the services they provide, and how the information can be used to improve decision-making and reduce weather- and climate-related risks and impacts. Their specific requirements for information and products need to be identified.

WMO therefore encourages NMHSs to make themselves and their products and services more visible and user-friendly. It also promotes the establishment of end-to-end systems, in which stakeholders participate in the development of products and risk-based decision-support tools and receive training to fully understand how to apply these tools in the decision-making process.

Providing useful services and products to end users means that NMHS staff need constant education and training. This is another focus of WMO activities.

Weather observations made at sea

Much progress has been made in recent years with regard to the implementation of operational in situ marine observing systems in support of weather forecasts, marine safety services, climate research and ocean modelling.

A substantial decline has occurred, however, in the number of Voluntary Observing Ships (VOS) recruited by Member countries under WMO's VOS Scheme in recent years. In the mid-1980s, some 7 000 ships were routinely reporting weather observations in real-time but this number dropped to about 2 500 in 2006.

In accordance with the provisions of the International Safety of Life at Sea (SOLAS) Convention, contracting governments are encouraged to collect meteorological data from selected ships which are provided with tested observing instruments. The real-time data received from observing ships are essential for the provision of weather forecast services to the mariner, including the Maritime Safety Information forecasts and warnings issued by the international NAVTEX and SafetyNET systems. Furthermore, they provide a valuable delayed-mode data source for studying the changes in climate that have become a matter of global concern in recent years.

Observing ships are recruited by National Meteorological Services on an entirely voluntary basis. Because the cost of the instruments and data transmissions is almost always borne by these Services, no charges are incurred by the ship, shipowner or ship operator.

The reason the number of recruited ships has decreased in recent years is partly because of the changing dynamics of modern ship operations, such as reduced manning levels and sudden changes in vessel ownership, flag and trading patterns. Competitiveness among commercial shipping companies and acts of piracy have also complicated the problem, as VOS ships' positions may appear on public Websites. This makes it difficult for VOS operating countries to maintain continuity of observations and to ensure adequate training for the observing officers.

Efforts are being made by WMO and the Intergovernmental Oceanographic Commission (UNESCO) through their Joint Technical Commission for Oceanography and Marine Meteorology to overcome these problems. Solutions being explored include increased use of automatic systems, initiating negotiations with ship builders for designing ships that would facilitate installation of meteorological instruments, making efforts in keeping the most reliable and stable ships within the fleet, and preventing VOS positions from appearing on public Websites. More details on marine observations can be found at http://www.wmo.int/web/aom/marprog/marprog.html.

Training Iraqi meteorologists

Within the framework of WMO education and training activities, the Jordan Meteorological Department has organized two intensive training events for some

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30 meteorologists from the Iraq Meteorological Organization. Most of the trainees were young graduates with little or no operational experience in meteorology who will be operating aeronautical meteorological offices.

They received theoretical and practical training in various topics with emphasis on aviation meteorology. The training was carried out at the Meteorological Training Centre and at the National Weather Forecasting Centre in Amman, Jordan.

These events support the efforts of the Iraq Meteorological Organization to rebuild its capacity and rehabilitate its human resources through bilateral agreements and collaboration with neighbouring and other WMO Members.

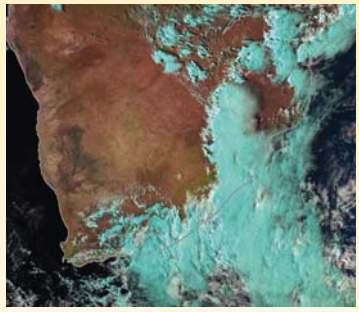
Severe weather forecasting

Numerical weather prediction (NWP) systems have become increasingly relevant and indeed essential to the severe weather forecasting process. A growing number and variety of sophisticated outputs, currently available from NWP producing centres are of potential benefit to severe weather forecasters in many National Meteorological and Hydrological Services (NMHS).

A severe weather forecasting demonstration project is being organized as a series of regional subprojects whose scope is to explore and test the usefulness of the NWP products currently available. The aim is to improve severe weather forecasting services in countries where sophisticated model outputs are not currently used. The principal focus is on heavy precipitation that could cause serious flooding, and strong, destructive winds.

It is planned that the first subproject will be carried out in the south-eastern region of Africa, over one year, beginning in early November 2006.

A number of global and regional NWP centres and the national centres of Botswana, Madagascar, Mozambique, South Africa, the United Republic of Tanzania and Zimbabwe will be participating. The Pretoria (South Africa) Regional Specialized Meteorological Centre will act as the single Regional Centre for collecting and synthesizing all the weather and forecast data and products. It will produce a daily severe weather forecast guidance product to be made available to all National Meteorological and Hydrological Services of the region.



Severe weather in southern Africa where heavy rain frequently causes catastrophic flooding. Satellite imagery is an increasingly useful tool (image courtesy of EUMETSAT)

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UN MILLENNIUM DEVELOPMENT GOALS

WMO contributes to the implementation of the eight United Nations Millennium Development Goals (MDGs) in collaboration with other UN agencies and organizations, in particular with respect to MDGs 1 and 7, by 2015:

1—Eradicate extreme poverty and hunger

- Reduce by half the proportion of people living on less than a dollar a day;
- Reduce by half the proportion of people who suffer from hunger.

7—Ensure environmental sustainability

- Integrate the principles of sustainable development into country policies and programmes;
- Reverse loss of environmental resources;
- Reduce by half the proportion of people without sustainable access to safe drinking water.

A few of the many areas where WMO contributes to the MDGs are agricultural meteorology and food security, the application of weather and climate information, water-quality monitoring and water-resources management, air quality and ozone depletion.

COMING EVENTS

28 October-3 November: Commission for Agricultural Meteorology—14th session

6-8 November: Technical Conference on the WMO Information System (TECO-WIS) (Seoul, Republic of Korea)

9-16 November: Commission for Basic Systems—extraordinary session 2006 (Seoul, Republic of Korea)

20-23 November: Worldwide Synthesis Conference of the WMO Flood Forecasting Initiative (Geneva)

21-22 November: CAeM Technical Conference: "How can we better meet the Current and Future Needs of Aviation ?" (Geneva)

21-30 November: Sixth WMO International Workshop on Tropical Cyclones (San José, Costa Rica)

23 November-1 December: Commission for Aeronautical Meteorology—13th session (Geneva)

4-6 December:: Technical Conference on Meteorological and Environmental Instruments and Methods of Observation (TECO-2006) (Geneva)

7-14 December: Commission for Instruments and Methods of Observation – 14th session (Geneva)