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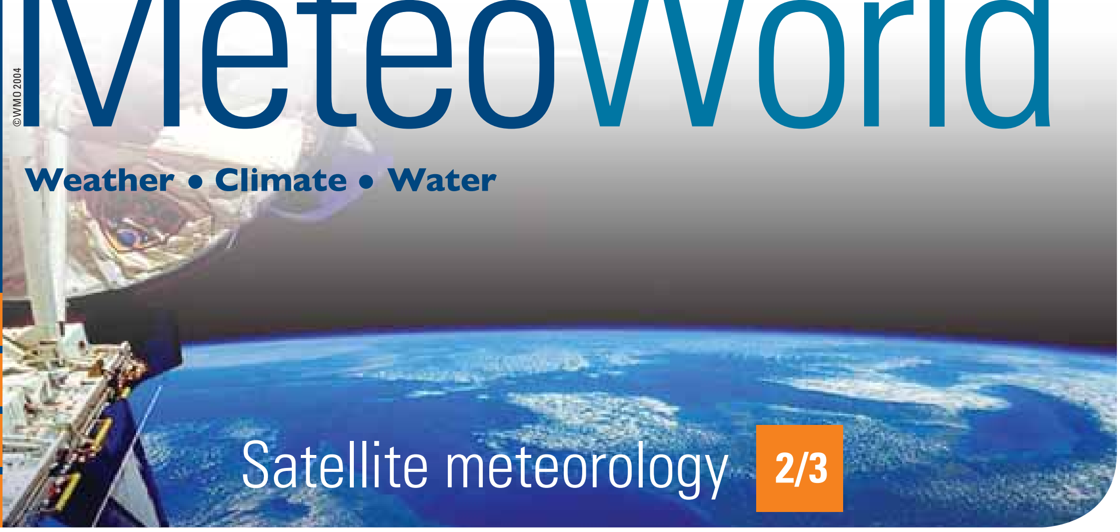


NEWS IN BRIEF

2006 Antarctic ozone hole most serious on record

This year's hole in the Antarctic ozone layer was the most serious on record, exceeding that of 2000. Not only was it the largest in surface area (matching 2000) but also suffered the most mass deficit, meaning that there was less ozone over the Antarctic than ever previously measured.

Measurements were taken by instruments on board satellites of the US National Atmospheric and Space Administration (NASA) and the European Space Agency (ESA). The measurements were validated by surface-based observations of the WMO Global Atmosphere Watch ozone network. (Each agency uses different instruments hence the values obtained are slightly different.)

NASA instruments showed that, on 25 September 2006, the area of the hole reached 29.5 million km^2, compared to 29.4 million km^2 reached in September 2000.

According to ESA, the ozone hole area reached 28.0 million km^2 on 25 September 2006, very close to the maximum in 2000, which peaked at 28.4 million km^2.

The ozone mass deficit in 2006 was measured at 39.8 megatonnes on 1 October, higher than in 2000, which peaked at 39.6 megatonnes on 29 September. Mass deficit is the amount of ozone missing from a vertical column of air compared to a baseline measured many decades earlier, before severe ozone depletion appeared.

This year's hole was caused by the continuing presence of peak levels of ozone-destroying substances in the atmosphere, combined with a particularly cold stratospheric winter.

For more information about monitoring the state of the ozone layer, see the box on page 2.

Greenhouse gases

WMO's Greenhouse Gas Bulletin, published in November 2006, reveals that globally averaged concentrations of carbon dioxide in the atmosphere in 2005 reached their highest levels ever recorded. Quantities of carbon dioxide were measured at 379.1 parts per million (ppm)—an increase of 0.53 per cent from 377.1 ppm in 2004.

After water vapour, carbon dioxide, methane and nitrous oxide are the three most prevalent greenhouse gases in the Earth's atmosphere (in that order). Greenhouse gases are some of the major drivers behind global warming and climate change.

Concentrations of nitrous oxide also reached record highs in 2005, up 0.19 per cent from 318.6 parts per billion (ppb) to 319.2 ppb while methane remained stable at 1 783 ppb.

Helping countries adapt to climate change

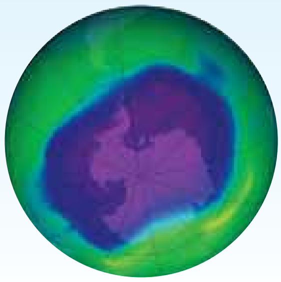
High on WMO's agenda are activities to assist developing countries reduce the negative impact of natural hazards and so enhance socio-economic development. In this connection, WMO seeks to help such countries, especially those in Africa, adapt to the potential adverse consequences of global warming. Africa's emissions of harmful greenhouse gases to the atmosphere are minimal, yet the continent is at great risk from their negative impacts on the environment, especially drought and desertification and flooding.

A recent report on impacts, vulnerability and adaptation in Africa, released by the Secretariat of the United Nations Framework Convention on Climate Change and to which WMO contributed, indicates that the continent's vulnerability to climate change is even more acute than had previously been supposed.

As well as better forecasting and early warning systems, Africa's adaptation needs include improvements in climate and weather monitoring capabilities, better

PROTECTING THE OZONE LAYER

In 1985, the Vienna Convention established mechanisms for international cooperation in research into the ozone layer and the effects of ozone depleting substances (ODSs). In 1985, also, the Antarctic ozone hole was discovered. On the basis of the Vienna Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer (commonly called the Montreal Protocol) was negotiated and signed by 24 countries and by the European Economic Community in September 1987 in Montreal, Canada. It came into force on 1 January 1989 and has since undergone five revisions. The Protocol calls for the Parties to phase down the use of man-made chlorines, primarily chlorofluorocarbons (CFCs), halons and other man-made ODSs, which contribute to the thinning of the ozone layer and allow larger quantities of harmful ultraviolet rays to reach the Earth.



The Antarctic ozone hole on 25 September 2006 (NASA)

Due to its widespread adoption and implementation it has been hailed as an example of exceptional international cooperation. The Secretary-General of the United Nations, Kofi Annan, is quoted as saying that it is "perhaps the single most successful international agreement to date...".

The annual assessments of the state of the ozone layer over the Antarctic and Arctic are based on data collected by WMO's Global Atmosphere Watch. During the Antarctic ozone hole season from late August through November, WMO issues bi-weekly bulletins on the state of the ozone layer. More information can be found at: http://www.wmo.int/web/arep/ozone.html.

links between climate research and policy-making, mainstreaming climate-change considerations into development and sectoral plans and programmes, education and awareness-raising for governments, institutions and individuals.

Drought Management Centre for South-Eastern Europe

Slovenia has been selected to host the new Drought Management Centre for South-Eastern Europe. The decision was made at a meeting hosted by WMO in Geneva with the Secretariat of the United Nations Convention to Combat Desertification (UNCCD).

Satellites and climate monitoring

Meteorological satellites offer a vast source of information for monitoring the climate system, but the full potential of this source has yet to be tapped.

Meeting the requirements will provide a vastly improved information basis from which nations can make more informed decisions on how to respond and adapt to climate change.

Requirements include information products, such as rainfall estimates, sea-ice concentrations and changes in land cover, as well as detailed specifications on accuracy, stability and spatial/temporal resolution of satellite data.

These requirements have been developed by WMO in collaboration with partner organizations that co-sponsor the Global Climate Observing System (GCOS) and the climate community at large.

Opportunities and gaps in past, existing and future satellite data records have been highlighted and specific needs for additional research have been identified.

The indispensable role of ground-based data (such as from weather stations and balloon sondes) needed to complement and ensure quality of the satellite-based information has been addressed throughout.

Once the recommendations are implemented, data for applications in many societal sectors, including agriculture, water-resource management, forestry and shipping will be more readily available to decision-makers and scientists across the globe.

Working with the WMO Space Programme and the Committee on Earth Observation Satellites, space agencies throughout the world have already begun responding to the GCOS requirements—a significant first step towards coordinated action.

WMO, for example, is incorporating the GCOS needs in the re-design of its Global Observing System.

Real-time training in satellite meteorology

More than 4 000 participants in over 100 WMO Member countries received face-to-face lectures and training in a special two-week real-time event via the Internet.

Employing the Virtual Laboratory for Education and Training in Satellite Meteorology Training, training focused on the use of data and products from meteorological and environmental satellites. Applications of such data and products include: weather forecasting, climate change monitoring, maritime safety and natural disaster prevention and mitigation.

Virtual Laboratory Centres of Excellence are based in Australia, Brazil, China, Costa Rica, Niamey and Oman.

Recent developments in meteorological satellites

Jason-2

The ground station for the new ocean observing satellite Jason-2 was inaugurated in Usingen, Germany, in September 2006. The ground station is an important part of the contribution of EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites) to the Ocean Surface Topography mission—a joint cooperative effort of the Centre national d'études spatiales (CNES) (France) and the National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA) (USA).

NOAA and EUMETSAT will be responsible for operating the system and for the near-real-time product distribution. CNES and NASA are the developing agencies for the Jason-2 satellite.

Jason-2 is scheduled for launch in June 2008.

Recently issued

WMO Bulletin Volume 54 No. 4, (October 2006) on the theme: "The WMO Information System"

Guidelines on the Role, Operation and Management of National Hydrological Services (Operational Hydrology Report No. 49, WMO-No. 1003)

Legal and Institutional Aspects of Integrated Flood Management—Case Studies (WMO-No. 1004)

MetOp takes about 100 minutes to orbit the Earth (ESA)

MetOp

The MetOp-A spacecraft was launched from Baikonur, Kazakhstan, in October. METOP-A is the first of a series of three polar-orbiting meteorological satellites to be operated by EUMETSAT over the next 15 years on a mid-morning orbit, crossing the equator southwards at 09h30 (Local Solar Time), as part of the NOAA-EUMETSAT Initial Joint Polar System. Its payload includes eight different instruments for atmospheric sounding and various meteorological and environmental applications, namely the prototype infrared atmospheric sounding interferometer.

Marine meteorology

Data from drifting buoys

WMO co-sponsors, with the Intergovernmental Oceanographic Commission of UNESCO, a body entitled the Data Buoy Cooperation Panel. The Panel meets every year to evaluate the status and discuss the development of data buoy technology, the application of collected data to scientific research or operational services, and new programme initiatives.

This year, for the first time, tsunami monitoring systems were included as a specific theme within the programme and enhanced cooperation was proposed with the Intergovernmental Coordination Group for the Tsunami Warning and Mitigation System in the Indian Ocean and its Pacific Ocean counterpart.

The Panel agreed that it would promote regional capacity-building initiatives and pilot projects. For example, countries need to develop their wave-measuring networks for, amongst other applications, data assimilation into coupled atmosphere-ocean wave models for real-time forecasting activities, and subsequent verification.

An Iridium satellite data telecommunication pilot project has been established to demonstrate the feasibility of using that technology for buoy data collection. The aim is to deploy some 50 drifters equipped with Iridium technology during this period (see box below).

Nowcasting for public weather services

Together with experts in related fields, WMO has been working on the possibilities of maximizing nowcasting systems, generating new or improved public weather service products for community benefit and transferring nowcasting technology from developed to developing countries.

WMO has assisted in the organization of forecast demonstration projects to test and verify nowcasting applications in an end-to-end forecast process during the Olympic Games. The first forecast demonstration project was successfully carried out in 2000 in Sydney, Australia, and another will be conducted Beijing, China, in 2008.

Experience has shown the importance of providing the warnings in a comprehensive yet user-friendly way and of including advice on the type of response actions to be taken.

While an end-to-end process to convey the warning information to the community at risk is the goal, many countries do not yet have the technical capability to develop an effective nowcasting service.

Nowcasting systems can provide timely and useful information on severe weather hazards in real-time but the degree of sophistication in the level of nowcasting applications varies widely. Regional cooperation in the use of nowcasting techniques and technology transfer would be a means of overcoming some of these problems.

WMO is in the process of helping prepare a proposal on the application of nowcasting technology, targeting developing countries, in support of safety of life and protection of property.

Risk assessment in agricultural meteorology

In many parts of the world, extreme weather and climate events—such as severe droughts, floods, storms, tropical cyclones, heatwaves, freezing episodes and extreme winds—are major risk and uncertainty factors impacting the performance and management of agricultural systems. WMO, in collaboration with a number of partner agencies, assists countries to establish a process of assessing these risks and uncertainties and then developing strategies to cope with them.

Preparedness planning, risk assessment and improved early warning systems can lessen the vulnerability of society to weather and climate risks. Enterprise diversification, contract hedging, crop insurance, weather derivatives and weather index insurance play key roles in formulating agricultural risk management strategies. Crop insurance strategies and schemes reduce the vulnerability of farming

PROFESSOR DR VILHO VÄISÄLÄ AWARD

The 2006 Professor Dr Vilho Väisälä Award for the most outstanding research paper on meteorological instruments and methods for observation was presented to Joseph P. Pichamuthu (India) on 31 October 2006.

The award was made in recognition of his work in the area of meteorological optical range, which is fundamental to the safe landing of aircraft. Mr Pichamuthu developed a way to compute the true visual range in any direction under any weather condition.

IRIDIUM TECHNOLOGY

The Iridium satellite constellation consists of 66 active communication satellites and spares around the Earth. The system was originally to have 77 active satellites, and as such was named for the element iridium, whose atomic number is 77. Iridium allows worldwide voice and data communications using handheld devices.

The satellites are in low Earth orbit at a height of approximately 780 km. Satellites communicate with neighbouring satellites via links between satellites orbiting in the same direction. The satellites orbit from Pole to Pole with an orbit of roughly 100 minutes.

Iridium routes phone calls through space. There are four Earth stations and the space-based backhaul routes phone call packets through space to one of the downlinks. Station-to-station calls can be routed directly through space with no downlink. As satellites leave the area of an Earth base station, the routeing tables change and frames are forwarded to the next satellite just coming into view of the Earth base station.

Storm-damaged crops

communities to risks posed by weather and climate extremes.

Strategies to cope with risks include the use of seasonal forecasts in agriculture, forestry and land management to assist in the alleviation of drought and desertification and associated food shortages. The use of integrated agricultural management and crop simulation models with climate forecasting systems yield significant benefits. Strategies to improve water management and increase the efficient use of water include crop diversification and enhanced irrigation practices.

Of particularly great value is the application of local indigenous knowledge. A combination of locally adapted traditional farming technologies, seasonal weather forecasts and warning methods are important for improving harvests and incomes.

One challenge is the impact of different sources of climate variability and change on the frequency and magnitude of extreme events. Lack of systematic data collected from disasters impede future preparedness, as does the need for effective communication services for the timely delivery of weather and climate information to enable effective decision making.

Some policy options to cope with such risks are contingency planning, the use of crop simulation modelling and the use of agrometeorological services.

Recognizing the value of weather services

Weather and climate events have impacts on virtually every human being and every sector of society.

Today, there is a growing capability to provide a wide range of environmental information and services whose effective use can help reduce costs and enhance the benefits of the impact of weather, climate and water phenomena. These range from historical climate data and products to weather, climate, air-quality, hydrological and oceanographic forecasts and include future human-induced climate-change projections and scenarios.

WMO is organizing an international conference to assess those impacts on socio-economic sectors worldwide.

The conference will be held in Madrid, Spain, from 19 to 22 March 2007. It will focus on the influences and impacts of natural hazards and natural disasters, weather, climate (both natural variability and human-induced change), air quality and water, as well as ocean-related phenomena, such as tsunamis.

The conference will also focus on opportunities to use environmental information and services to reduce adverse impacts and enhance social and economic benefits in sectors such as agriculture, water resources, health, poverty reduction, tourism, transport, energy and financial services.

It will bring together decision-makers, users and service providers to demonstrate the importance of partnerships between service providers and users. It will also demonstrate that resources for the development and provision of the relevant information and services are investments with significant return to society.

Representatives of sectors which are sensitive to weather, climate and water will describe environmental impacts; how weather, climate and water information helps them make decisions and reduce risks; and how decision-making could be improved through new or upgraded services.

The event will thus be an opportunity to evaluate and enhance the social and economic benefits from the use of meteorological, hydrological and related environmental information and services, particularly in decision-making and reduction of risks. A major outcome will therefore be improved understanding of the decision-making process and how information providers need to adapt to decision-makers' needs

A comprehensive publication will subsequently be prepared on the global social and economic benefits of meteorological and hydrological information, including case-studies, best practices and recommendations

The conference is being organized with the collaboration and support of the Government of Spain, with the patronage of HM Queen Sofia.

Conference Website: http://www.wmo.ch/Madrid07/

COMING EVENTS

9-11 January 2007: Coordination Meeting of the World Weather Information Service Website Hosts (Hong Kong, China)

18-19 January 2007: Eighth Session of EC Advisory Group on Climate and Environment (Geneva)

24-26 January 2007: Joint Task Force on Hemispheric Transport of Air Pollution and WMO Workshop on Integrated Observations for Assessing Hemispheric Air Pollution (Geneva)

29-31 January 2007: EC Advisory Group on Disaster Prevention and Mitigation—2nd session (Geneva)

29 January-2 February 2007: Third International Verification Methods Workshop Emphasizing Training Aspect (ECMWF, Reading, United Kingdom) (co-sponsored by WMO)

12-13 February 2007: African Regional Seminar on African Meteorological Services, Media and Development (Ouagadougou, Burkina Faso)

14-23 February 2007: Regional Association I (Africa)—14th session (Ouagadougou, Burkina Faso)

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