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## 2015 Likely to be Warmest on Record

The global average surface temperature in 2015 is likely to be the warmest on record and reach the symbolic and significant milestone of 1°C above the pre-industrial era. WMO concludes that this record high is due to the combination of a strong El Niño and human-induced global warming.

A five-year analysis carried out by WMO shows that the 2011–2015 period has been the warmest five-year period on record, with many extreme weather events influenced by climate change. The global average sea-surface temperature record, which was set in 2014, is likely to equalled or surpassed in 2015. The global average temperatures over land from January to October suggest that 2015 is also set to be one of the warmest years on record.

Highlights of 2015 include:

- **Ocean heat and sea level rise:** Oceans have been absorbing most of the accumulating excess energy due to human-emitted greenhouse gases, resulting in higher temperatures and sea levels. The latest estimates indicate that the global average sea level in the first half of 2015 was the highest since satellite observations became available in 1993. Significant warmth has also been recorded across large areas of the ocean. In October, the U.S. National Oceanic and Atmospheric Administration (NOAA) declared that record global ocean temperatures had led to a global coral bleaching event.
- **Regional temperatures:** Significantly warmer than average temperatures were recorded over the majority of observed land areas. One notably cold area was the Antarctic, where a strong anomaly in atmospheric patterns, known as the Southern Annular Mode, lasted for several months.
- **Heatwaves:** Many countries and regions have been affected by heatwaves and high temperatures. Several maximum temperature records were broken.
- **Rainfall and drought:** While a number of areas have suffered from high rainfall, which have caused flooding and landslides, others

have experienced dry, warm conditions, which have caused long-term drought and development of wildfires.

- **Tropical cyclones:** Globally, 84 tropical storms formed between the start of the year and 10 November, compared to the 1981–2010 annual average of 85. There were 25 named storms recorded in the North-west Pacific basin, 4 in the Northern Indian Ocean and 9 in the Southern Pacific. Six typhoons made landfall in China.

## Greenland Ice Loss

One of Greenland's glaciers is losing five billion tonnes of ice a year to the ocean, according to researchers. While these new findings may be disturbing, they are reinforced by a concerted effort to map changes in ice sheets with different sensors from space agencies around the world.

It is estimated that the entire Zachariae Isstrom glacier in north-east Greenland holds enough water to raise global sea levels by more than 46 cm. Jeremie Mouginot, University of California Irvine, said "The shape and dynamics of Zachariae Isstrom have changed dramatically over the last few years. The glacier is now breaking up and calving high volumes of icebergs into the ocean, which will result in rising sea levels for decades to come."

As one of the first regions to experience and visibly demonstrate the effects of climate change, the Arctic serves as an indicator for change in the rest of the world. It is therefore critical that polar ice is monitored comprehensively and in a sustained manner.

The value of international organizations joining forces to understand aspects of our planet such as this cannot be underestimated. These current findings are a prime example of how different satellite observations and measurements from aerial surveys by various space agencies are being used. The Polar Space Task Group has been coordinating the collection of radar data over Greenland and Antarctica and European Space Agency (ESA) radar observations going back to the ERS and Envisat satellites through to Sentinel-1A were used in the new study.

Scientists have determined that the bottom of Zachariae Isstrom is being rapidly eroded by warmer ocean water mixed with growing amounts of meltwater from the ice sheet surface. Jeremie Mouginot

said “Ocean warming has likely played a major role in triggering the glacier’s retreat, but we need more oceanographic observations in this critical sector of Greenland to determine its future”.

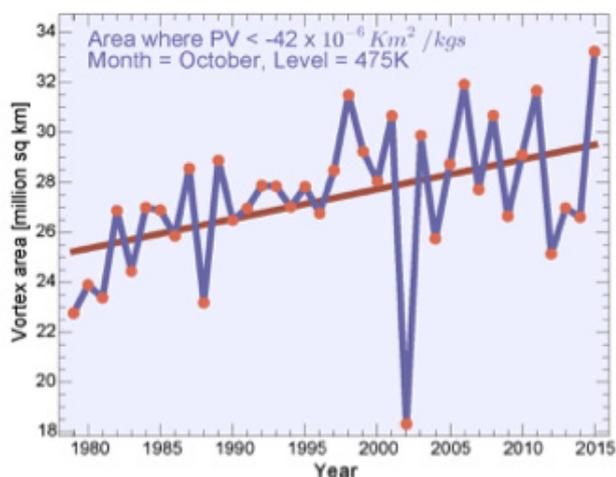
ESA’s Climate Change Initiative treats the Greenland ice sheet as an “essential climate variable”. The initiative has assembled comprehensive datasets for scientists to understand exactly how sensitive regions are changing and to help predict how the rest of the world will be affected. These data are now being extended by the Sentinel-1 mission, which adds several terabytes of data daily.

ESA’s Mark Drinkwater said “Without a routine monitoring capability, it is not possible to provide the critical data for ESA’s Climate Change Initiative to assess the impact that the rapidly changing face of Greenland has on sea level. It is clear that combinations of multi-agency radar together with Copernicus Sentinel-1A now fulfil a critical role in this monitoring task.”

The full version of this article is available on the ESA website: [http://www.esa.int/Our\\_Activities/Observing\\_the\\_Earth/Copernicus/Sentinel-1/International\\_effort\\_reveals\\_Greenland\\_ice\\_loss](http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-1/International_effort_reveals_Greenland_ice_loss).

## 2015 Ozone Hole One of the Largest on Record

The Montreal Protocol on Substances that Deplete the Ozone Layer is effective: the production and consumption of chlorofluorocarbons and halons has stopped. The atmospheric concentration of chlorine- and bromine-containing compounds is slowly decreasing after reaching a maximum around year 2000. Nonetheless, the atmosphere still contains more than enough of these compounds to cause complete destruction of ozone over a certain altitude, if temperatures drops below  $-78^{\circ}\text{C}$  for an extended period of time in the austral spring.

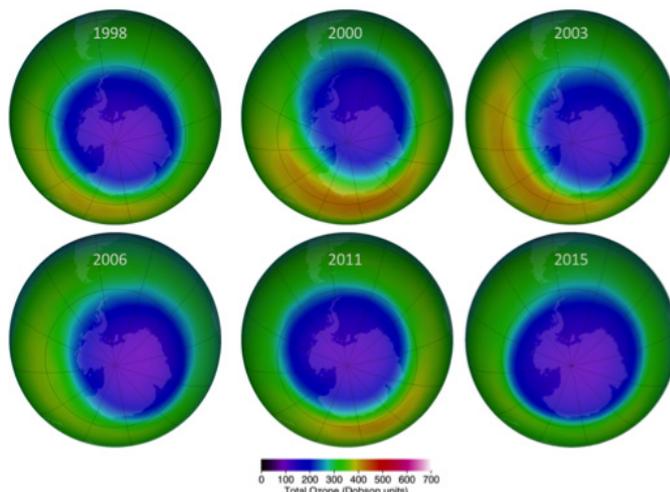


Average surface area of the south polar stratospheric vortex over the month of October from 1979 to 2015. For that time period, the 2015 vortex is the largest on record.

In 2015, the south polar stratospheric vortex has been unusually large, strong and persistent with polar cap temperatures below the 1979–2014 average during most of July, August and September and with record low temperatures in October. The low temperatures, together with the size of the vortex, have led to the formation of an ozone hole that can be compared to the large ozone holes observed in 1998, 2000, 2003 and 2006.

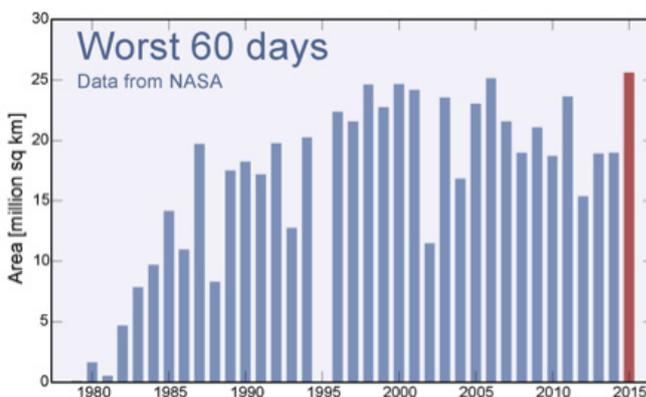
Data on the ozone hole area from the NASA Goddard Space Flight Center show that if averaged over the 60 worst consecutive days, 2015 has experienced the largest ozone hole ever seen. On the other

hand, if one considers the amount of ozone destroyed, the so-called ozone mass deficit, the 2015 ozone hole is the fifth largest on record after 1998, 2000, 2001 and 2006.



The 2015 ozone hole is larger and more concentric around the South Pole than in other years as shown in this graphic of average total ozone column over the month of October for years with large ozone holes. (map source <http://ozonewatch.gsfc.nasa.gov/>).

As long as the amounts of chlorine and bromine in the atmosphere remain high, one can expect large ozone holes to occur if the stratospheric temperatures remain cold into the spring. According to the WMO/UNEP Scientific Assessment of Ozone Depletion, a statistically significant decline is not expected in the size of the Antarctic ozone hole before 2025. In the meantime, large ozone holes are possible. In the long run, as chlorine and bromine decline, the annually recurring ozone holes will become increasingly smaller, eventually disappearing around 2070.



Area of ozone hole, averaged over the worst 60 consecutive days using data from NASA and based on observations from the series of TOMS instruments and the OMI instrument. The averaging and plotting was carried out by WMO.

## El Niño Conference

One of the strongest El Niño events ever measured is currently under way. It is already causing droughts and flooding in different parts of the world and affecting food production, water availability, public health and energy supplies. It is in this context that Columbia University, in Pallisades, United States of America (U.S.) hosted an international El Niño Conference to increase the scientific understanding of the current El Niño event and help boost resilience to anticipate global socioeconomic impacts on 17 and 18 November.

The last major El Niño in 1997–1998 wreaked widespread havoc and erased years of development gains. The world is much better prepared for this year’s event, but the socioeconomic shocks will still be profound. The Conference found that overall, since 1997–1998, models and forecasts are improving, countries and regions have greater capacities to generate and interpret forecasts, institutions are more adept at using climate/El Niño information for planning, preparedness and prevention, and there is greater awareness of El Niño, its impacts and what to do about it.

Going forward, the Conference identified needs for continued improvement in forecasts, for greater engagement from those that have experience and expertise with implementation of major climate services projects, for systematic support for full-suite implementation of relevant climate services, for more efforts in areas such as communication and visualization, and for comparative analysis of the impacts of the current event compared with the 1997–1998 baseline.

One of the key messages from the Conference was that the current El Niño is not the same as the 1997–1998 event, its effects on regional climates will not be the same and its socioeconomic impacts will be different. Though forecasts have improved and confidence in them increased, the lessening of socioeconomic impacts is highly dependent on better preparation and appropriate and timely actions at country and local levels.



Watch the WMO animation that explains the 2015–2016 El Niño event.

Conference participants noted that the use of previous El Niño events as analogues to this and future El Niño events is increasingly untenable because the climate in which these events occur is changing. They underlined that in addition to climatic factors, the risks and outcomes related to this event will also be a product of many other significant changes in the socioeconomic context. This event is a factor in 2015 being the warmest year on record, but associated temperature spikes are nonetheless occurring in the context of a consistently upward global temperature trend. They further noted that El Niño occurrences need to be taken into account when assessing regional precipitation trends and dry conditions that exacerbate fires, which release more CO<sub>2</sub> into the atmosphere.

The Conference was jointly organized by WMO, the International Research Institute for Climate and Society (IRI), part of Columbia University’s Earth Institute, the U.S. Agency for International Development (USAID) and the U.S. National Oceanic and Atmospheric Administration (NOAA).

## Studying Climate Using History

Surprisingly, the study of history is increasingly becoming an important area of investigation in weather and climate change. Frequently, scientists who take part in the WMO Commission for Climatology (CCI) special ad hoc weather extremes committee must become quasi-historians. These committees are created on an “as-needed” basis to assess potential world and regional weather extreme records, such as maximum and minimum temperatures, highest and lowest pressures and precipitation levels.

While many investigations are evaluations of new and recent weather extreme observations, several have involved examination of older records whose existence have just come to light or whose validity have been questioned. Such is the case in the recent evaluation of the “new” cold extreme for WMO Region V (South-west Pacific).

An international evaluation committee recently completed its assessment of a cold temperature extreme for the region. This assessment was initiated when the National Institute of Water and Atmospheric Research (NIWA) identified a “new” record for New Zealand’s coldest temperature: –25.6°C (actually –14°F), recorded at Ranfurly on 17 July 1903. Consequently, WMO CCI organized a panel of climate experts to investigate the claim.

This discovery of the 1903 extreme cold temperature record resulted from an ongoing effort to digitize old paper daily records and enter the data into NIWA’s climate database. For such old records, the CCI evaluation committee’s role becomes one of ascertaining whether there are irregularities in the record. Often, the committee has to determine whether there were specific problems and/or errors with the equipment, procedures or siting locations associated with the record under investigation. The committee evaluated the NIWA report of findings, including images of the original weather observation logs, hand-drawn synoptic weather maps and even local newspapers from 1903.

Many of the committee felt that there was a need to explore the sheltering of the New Zealand thermometers at that time. Proper station sheltering is a critical aspect of temperature monitoring. For example, an exposed thermometer can record very different temperatures, often more extreme, compared to a thermometer properly sheltered from direct sun, wind and precipitation. Consequently, WMO has set guidelines for temperature observation practices, and current temperature measurements should adhere to these standards.

However, the New Zealand 1903 temperature observation occurred so long ago that it becomes difficult to ascertain if the current WMO sheltering guidelines had been met. Was there documentation dating that far back in time to indicate that adequate sheltering of the Ranfurly thermometer occurred in 1903? A document (<http://wmo.asu.edu/wmo-region-5-lowest-temperature>) was discovered that suggested some form of standardized weather shelter was in use in New Zealand at that time. As a result, the committee’s unanimous opinion was that a new WMO Region V (South-west Pacific) record for coldest temperature had been set.

**Authors are listed on the online version: [www.wmo.int/meteoworld](http://www.wmo.int/meteoworld)**

## Power of Shared Earth Observations

A Ministerial Declaration, issued at the Ministerial Summit and twelfth plenary of the intergovernmental Group on Earth Observations (GEO)

in November, made commitments to harness and share critical environmental observations to enable leaders to make better-informed decisions for the benefit of humanity at a time of rapid global change. “As we near the historic Paris climate talks, it is clear open data and international collaboration are key to countries moving the needle on climate change,” said U.S. Interior Secretary Sally Jewell. “We can and should share Earth observation data to help address climate challenges because science and open data are critical to understanding land, water, wildlife and climate change. They must be at the heart of every policy decision – no country can solve it alone.”

The GEO ten-year Strategic Plan (2016–2025) was adopted to build the Global Earth Observation System of Systems (GEOSS). “We have reached a tipping-point where GEO has to move its focus towards successful societal delivery. We should not underestimate this formidable challenge,” said European Commissioner Carlos Moedas. South African Minister of Science and Technology Naledi Pandor reminded delegates of their “responsibility to ensure the targets of the Global Goals for Sustainable Development are met by providing adequate funding for scientific research and global collaboration.”

The GEO launched several initiatives at the plenary, including:

- An initiative to integrate Earth observations into national plans to attain the Global Goals for Sustainable Development;
- A global Marine Biodiversity Observation Network, including an Arctic to Antarctic network linking coastal observing centres in the Americas to measure species distribution and habitat;
- AmeriGEOSS, a regional programme to share Earth observation data for agriculture, disaster risk reduction, water and biodiversity, and ecosystem monitoring; and
- Renewal of GEONETCast, an initiative of China, Europe and the USA to provide critical Earth observation data to developing countries.

The GEO plenary and Ministerial Summit took place in Mexico City from 10 to 13 November. The thirteenth GEO plenary will be held in St Petersburg in November 2016.

## GFCS Adaptation Programme in the Caribbean

As a regional partner in the WMO Global Framework for Climate Services (GFCS), the Caribbean Institute for Meteorology and Hydrology (CIMH) supports national meteorological offices across the Caribbean in their quest to develop and deliver climate information through comprehensive climate services.

CIMH works with these national organizations to produce tailored climate services mechanisms such as information systems, observations and monitoring and capacity development. CIMH efforts to build climate resilience throughout the region, focusing on GFCS priority areas, are also proving to be effective. Programmes, such as Building Regional Climate Capacity in the Caribbean and Implementing the GFCS at Regional and National Scales, facilitate collaborations at the national level that will ultimately result in regional adaptation to climate events.

For example, the National Meteorological Service (NMS) of Belize recently established a project that supports one of its climate-sensitive

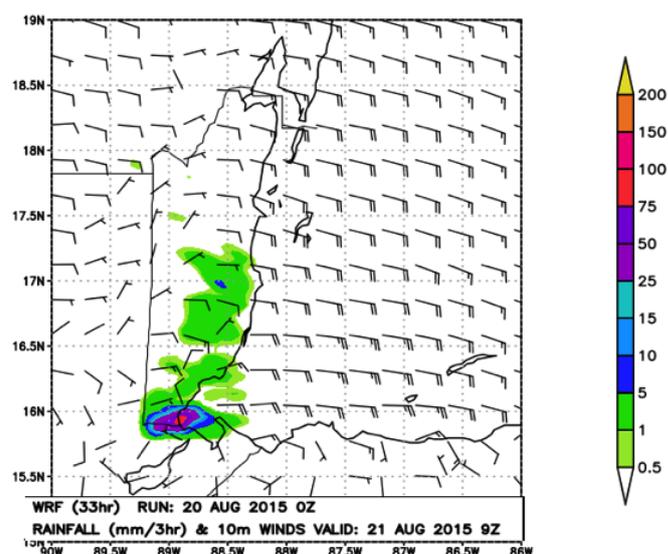
sectors by providing customized products and services with help from CIMH. The project, developed in partnership with Belize Electricity Limited (BEL), demonstrates how national energy sectors in Caribbean Small Island Developing States can adapt to increased climate variability and change.

In late 2013, CIMH co-convened a GFCS Stakeholder Consultation in Belize to discuss how to reduce and manage risks related to climate. The Consultation provided a platform for the identification of priority areas and key activities that would assist the NMS to improve its climate services. To help make effective decisions related to climate, the Belize Energy Resilience for Climate Adaptation Project (ERCAP) was to develop an urgently needed hydrologic model to forecast the input flows into reservoirs such as Macal River’s Chalillo Dam.



Chalillo Dam on Macal River.

The Belize ERCAP is a groundbreaking model that partners meteorological operations with the energy sector to develop and distribute key data for building climate resilience and adaptation. As a model for other regions, it demonstrates how the GFCS successfully guides the development of products and services that support decision-making at the national level.



Weather Research and Forecast Model output.

## Climate Forecast for Germany’s City Dwellers

Today, the majority of German citizens live in cities where climate information is available to support city management and urban planning

to reduce or minimize negative climate impacts on inhabitants. Detailed modelling of city climate is very complex and time-consuming, however, DWD has developed an online information portal for climate change adaptation in cities (INKAS). This is a decision-support tool that allows city managers to identify, assess and implement necessary climate change adaptation actions.

In Jena, DWD provided climate measurements and simulations for recent and future regional climate conditions, considering current and hypothetical future urban planning. The city used the information to develop its own local strategy for adapting to climate change. "Due to the increase of numerous trends, such as thermal heating in compact areas, dryness, especially in the summer months, or floods, JenKAS is an important milestone for the city and its citizens to better prepare to the impacts of climate change," said Matthias Lerm, Department Urban Development and Town Planning of Jena. "Therefore, cooperation with DWD has helped to identify and better understand both temperature conditions during summer months and nightly cold air conditions."

Simulations are frequently used to identify flows of fresh air into cities and to avoid blocking these by new building structures. Awareness of urban heat island problems, prompted the city of Hamburg to implement a green roof programme, which aims to reduce the effects by installing up to 100 hectares of green roofs by 2020.

Simulations for Frankfurt/Main show an increase in the number of warm days in the future. "For the first time the joint project between the municipal authorities and the DWD provided an estimate of the future urban thermal stress for the city," said Hans-Georg Dannert, Office for the Environment of Frankfurt am Main. He explained that the simulations are an important basis for the city's adaptation strategy and serve as a major guidance for environmental and city planning as well as for political policymakers.



Artist depiction of Hamburg with green roofs. (© BUE, visualization: TH Treibhaus Landschaftsarchitektur, aerial picture: Matthias Friedel)

## Health Impacts of Airborne Dust

The first Africa/Middle East expert meeting and workshop on the health impact of airborne dust was held in Amman, Jordan, from 2 to 5 November. The Workshop assessed the state of knowledge and encouraged actions with regard to impacts of airborne dust on public health in the region. It also promoted active communication among dust-related forecast service providers – African/Middle Eastern National Meteorological and Hydrological Services – and relevant national and international environment, air-quality and public health agencies.

As recognized by World Health Organization (WHO), particulate matter affects more people than any other pollutant. It consists of a complex mixture of solid and liquid particles suspended in air. Mineral dust is one of its major components and constitutes the dominant fraction of particles over most of the Middle East and Northern Africa region. In recent years, much of the region has suffered from an increased intensity and frequency of duststorms, which bring daily economic activities to a stand-still and cause major public health issues.

Meeting participants encouraged the continued joint efforts of WMO and the United Nations Environmental Programme (UNEP) to establish a West Asia Node for the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS).

The need for action on sandstorms and duststorms was underlined when a major duststorm swept through Jordan as the meeting took place, severely obscuring skies and affecting air travel. Most models contributing to the WMO SDS-WAS Centre managed to predict this event. The operational forecast of the Barcelona Dust Forecast Centre showed the formation of a dust cloud in northern Saudi Arabia, moving westward over Jordan and Israel, which then actually happened.

## Connecting Farmers to Meteorological Services

From 2012 to 2015, representatives from 17 West African Meteorological Services interacted with over 10 600 farmers in a four-year project that organized 260 seminars. Over 4 500 raingauges were distributed to farmers who were taught basic weather principles and how to develop a supplemental observation network.

In addition, several of the Meteorological Services reported that successful partnerships and collaborations were launched with local non-governmental organizations (NGOs), other government ministries and local farmer organizations. These partnerships led to increased requests for climate services, which has increased the visibility of the Meteorological Services with partners and within the country.

Evaluation reports on the impacts of providing weather and climate information to farmers from four of the countries showed that there is more work to be done to encourage women farmers to participate in the seminars. On average across the 17 countries, only 13% of the participants were women farmers. However, Burkina Faso and Cabo Verde reported that they had participation rates of 28% and 35%, respectively. The pilot study recommended that the participation of women farmers be increased through the engagement of nongovernmental organizations focused on women's issues within the countries and by organizing seminars specifically for women farmers.

The Metagri Operational Project Final Technical Workshop held from 23 to 25 November in Abidjan, Côte d'Ivoire, provided a detailed review of activities performed under the project. Topics included the successes, challenges and lessons learned by conducting roving seminars in each country, offering technical training at Meteorological Services, improving information broadcasts through workshops with the media in 13 countries, monitoring and evaluating the impact of seminars, and increasing the number of women farmers participating in seminars.

## Air Pollution Harms Agriculture

Air pollution has an impact on agriculture and, in turn, agriculture contributes to air pollution and greenhouse gas emissions. Experts in atmospheric chemistry and agricultural meteorology discussed how to

better measure these emissions and impacts during an International Workshop held in Pune, India, from 2 to 4 November. The workshop examined the impacts of atmospheric chemistry, which included air pollution effects on agricultural production and the impacts of agriculture on atmospheric composition, including the effects of greenhouse gases, biomass burning, reactive gases and aerosols.

In the final session, future steps and recommendations were approved:

- The two scientific communities expressed a strong interest for extended collaboration. Specifically, they agreed to publish a WMO brochure on agriculture, air pollution and climate to promote these issues to a wider audience.
- It was also agreed to explore opportunities to develop pilot studies that would use existing observation and forecasting systems to develop applications for agriculture.
- A clear need was identified to enhance the observation system, especially for trace gases and aerosols in agricultural areas.

### Data Rescue in West Africa

A joint WMO and Government of Greece project to Enhance Climate Services launched in March in collaboration with the Meteorological Services of Burkina Faso, Mali and Niger, and the African Centre of Meteorological Applications for Development is already yielding encouraging results. The objectives of the project included:

- Modernization and re-arrangement of paper archives;
- Consolidation of national climate databases by centralizing storage; and
- Identification of imaging priorities for digitization of paper archive and establishment of procedures for a sustainable imaging process.

Necessary equipment and software were provided to the three countries, and national support teams were hired.



Imaging climatological paper archives in Niger.

By the end of September 2015, in all three countries, a data management system, CLIDATA, was being used for keying data into the main national climatological database, to help develop products and services for agriculture, water, health, disaster risk reduction and others.

The project is also proving to be successful in raising awareness of the importance of data rescue and providing an approach for

accelerating this activity based on local efforts and experience. The three Meteorological Services have expressed their commitment to sustaining data rescue. WMO will use of this approach to expand data rescue to other countries in the region.



New data archive system in Burkina Faso.

### Seasonal Forecasts and Water Management

In October, the Italian Regional Training Centre in Florence organized an International Training Course on "Seasonal Forecasts and Water Management in the Mediterranean Basin: Integrated Approach." The course addressed the need to build capacities and develop mechanisms for delivery of climate services for water managers and users and for enabling risk mitigation strategies. It also identified the research and knowledge transfer demands of end users as well as contributed to the strengthening of existing regional networks for application of seasonal forecasts.

Some participants proposed to continue working together and with trainers following the course to create an open community of users/practitioners sharing and developing codes and methodologies for improving regional forecasting competences. The aim is to involve the National Hydrological and Meteorological Services, research/academic institutions and technical services/agencies in jointly developing an open source tool for seasonal forecasting.

Women were equally represented in the group of European and African agro-meteorologists, climatologists and agronomists in the course.

### Italian Festival of Meteorology

The University of Trento organized the first "Italian Festival of Meteorology" on 16 and 17 October in Rovereto, Italy. The event offered a unique and unprecedented opportunity for public and private weather services, research institutions, universities, companies, associations, students and people interested in meteorology to meet.

It included activities such as conferences, exhibition stands, movie projections and simple experiments for children. In particular, at the conferences, experts from various institutions presented different aspects of the state and perspectives of meteorology in Italy.



Movie projections at the Italian Festival of Meteorology.

## SOOS Metadata Portal

The Southern Ocean Observing System (SOOS) metadata portal is now live. This resource contains almost 5 000 records, describing research datasets from physical, chemical and biological sciences throughout the Southern Ocean, collected by researchers from many countries.

The portal is run through NASA's Global Change Master Directory (GCMD), and presents a subset of all records in the GCMD that relate to the candidate Essential Ocean Variables (EOVs) that have been identified as the focus of SOOS data efforts.

## International Swiss Climate Summer School

Swiss Climate Research, a network of leading Swiss institutions in climate research and education, invites young scientists to join high-profile climate researchers in a scenic Swiss Alpine setting for keynote lectures, workshops and poster sessions for the 15th International Swiss Climate Summer School 2016, which is focusing on the theme "Climate Risks – Coping with Uncertainty".

Detailed information and application forms are available at: <http://goo.gl/foiB62>

## Explaining Extreme Events

Human activities, such as greenhouse gas emission production and land use, influenced specific extreme weather and climate events in 2014, including tropical cyclones in the central Pacific, heavy rainfall in Europe, drought in East Africa and stifling heatwaves in Australia, Asia and South America, according to a recent report. "Explaining Extreme Events of 2014 from a Climate Perspective" addresses the natural and human causes of individual extreme events from around the world in 2014, including Antarctica.



In this year's report, 32 groups of scientists from around the world investigated 28 individual extreme events in 2014 and looked at various factors that led to the extreme events, including the degree to which natural variability and human-induced climate change played a role. When human influence for an event cannot be conclusively identified with the scientific tools available today, it means that if there is a human contribution, it cannot be distinguished from normal climate variability.

## IPCC Elects Bureau for Sixth Assessment Cycle

The forty-second session of the Intergovernmental Panel on Climate Change (IPCC) elected Hoesung Lee of the Republic of Korea as its new Chairperson. It also elected a new 34-member Bureau to lead the Panel as it works on the forthcoming Sixth Assessment Report (AR6) as well as a new Bureau for the Task Force on National Greenhouse Inventories.

The forty-second session of the IPCC was held in Dubrovnik, Croatia, from 5 to 8 October. The primary focus of the next session, which will take place in Nairobi, Kenya, from 11 to 13 April 2016, will be the Special Reports to be published during the sixth assessment cycle and the scoping process for all of the AR6 reports.

## Weather presenters at COP-21

With financial support from the Government of Denmark and the UN Foundation, WMO invited an international group of weather presenters to report from COP-21 during the first week. Further support was provided by the French Meteorological Society (SMF) and Climate Central. The presenters came from Abu Dhabi, Australia, Belize, Brazil, Denmark, Dominica, Fiji, Kenya, Nigeria, Senegal, Uganda, United States of America and Vietnam.



Weather presenters with WMO Secretary-General at COP-21

The group shared a fixed camera position in the Media Centre and two camera operators with television cameras. Their interviews and stand-ups were delivered back to their home offices every few hours via Dropbox. The presenters interviewed many members of the new bureau of the Intergovernmental Panel on Climate Change (IPCC), senior WMO officials, delegates, and others. As accredited journalists, participants also had access to the regular press briefings, the press working area and official side events.

During the run-up to the COP, WMO also launched 23 new videos from weather presenters. These videos included "weather reports from 2050" as well as reports on climate change impacts on well-known UNESCO World Heritage Sites. The videos are posted at [www.wmo.int/climatebroadcasts](http://www.wmo.int/climatebroadcasts).

## Michel Jarraud, Secretary-General, 2001-2015

MeteoWorld would like to use this opportunity to recognize Secretary-General Michel Jarraud, as he leaves Office in December 2015, for launching this newsletter in 2004.

“Information on weather and climate, and its variability and change, is so embedded in our everyday life — from daily weather forecasts to seasonal climate predictions — that at times it is easy to forget the amount of observations, research, computing and analysis that lies behind weather and climate information products. Scientific progress in meteorology and climatology in the last fifty years is indeed among the most significant in all scientific disciplines.”

“I have always been fascinated by the weather and what it represents for each human being. When I was nine, my parents gave me a very special gift: a personal weather station. For three years, from 1961 to 1963, every day, I took measurements and observations that I annotated in my little logbook.”

“At that time, the World Meteorological Organization had been in existence for only ten years, and I did not know about it. But, more importantly, I did not know that one day I would have the responsibility to direct it and those who watch the weather, the climate and water resources of the world.”

- Michel Jarraud



## World Meteorological Day 2016



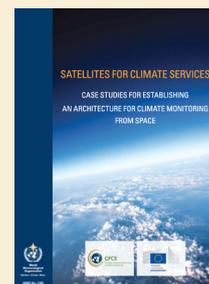
### Newly Issued

**World Hydrological Cycle Observing System Guidelines, WMO No. 1155, ISBN 978-92-63-11155-6.** Available in English.

**Guide to Participation in Radio-frequency Coordination, WMO No. 1159, ISBN 978-92-63-11159-3.** Available in English, French, Spanish, Russian, Arabic and Chinese.

**WMO Strategic Plan 2016-2019, WMO No. 1161, ISBN 978-92-63-11161-6.** Available in English, Arabic, Chinese, French, Russian and Spanish.

**Satellites for Climate Services: case studies for establishing an architecture for climate monitoring from space, WMO No. 1162, ISBN 978-92-63-11162-3.** Available in English.



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