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## $CO_2$ Crosses 400 ppm Threshold Throughout Northern Hemisphere

For the first time, observed concentrations of carbon dioxide ($CO_2$) in the atmosphere topped the symbolic 400 parts per million (ppm) monthly average threshold in March and April at all the Northern hemisphere monitoring stations belonging to the WMO Global Atmosphere Watch network. This seasonal maximum for $CO_2$ concentrations occurs early in the Northern hemisphere spring before vegetation growth absorbs $CO_2$, levels are lower for the rest of the year. At the current rate of increase, the global annual average $CO_2$ concentration is set to cross the 400 ppm threshold in 2015 or 2016.

"The 400 parts per million threshold is of great symbolic importance," said WMO Secretary-General Michel Jarraud. "It should serve as yet another wakeup call about the constantly rising levels of greenhouse gases which are driving climate change and acidifying our oceans. If we are to preserve our planet for future generations, we need urgent action to curb new emissions of these heat trapping gases," he said.

$CO_2$ remains in the atmosphere for thousands of years, trapping heat and causing Earth to warm further. Its lifespan in the oceans is even longer. It is the single most important greenhouse gas emitted by human activities. It is responsible for 85% of the increase in radiative forcing – the warming effect on our climate - over the past decade. Between 1990 and 2012 there was a 32% increase in radiative forcing because of greenhouse gases. Increasing radiative forcing is calculated relative to the pre-industrial level of key greenhouse gases.

The amount of $CO_2$ in the atmosphere has increased on average by 2 ppm per year for the past 10 years.

## Fisheries, Food Security and Climate Services

Fisheries, Food Security and Climate Services was the theme of the WMO Global Framework for Climate Services (GFCS) side-event co-organized with the Food and Agriculture Organization of the U.N. (FAO) at the fifteenth meeting of the U.N. Informal Consultative Process on Oceans and the Law of the Sea (ICP) in New York from 27 to 30 May. Oceans provide a significant contribution to global food security. Fish comprises about 20% of the animal protein in the diets of over 3 billion people. The contribution of fish to dietary animal protein can reach 50% in the world's poorest regions, and up to 90% in Small Island Developing States (SIDS).

Climate change can influence species distribution as well as movement of fish. Physical changes in the oceans, such as increases in sea level, sea surface temperature or sea acidification level, can impact its ecology, affecting growth and the redistribution of species. Studies have already revealed that the composition of species in fish catches is changing as a result of climate change.

"We are also seeing changes in the tropics where species diversity as well as abundance are decreasing," said Dr. Dalal Al-Abdulrazzak, Marine Policy Analyst, United Nations Development Programme (UNDP) Water and Ocean Governance Programme. She highlighted that "catches in the tropics are projected to decrease by about 40% while catches in the higher latitudes are projected to increase between 30-70%." She noted that the global impact would amount to billions of dollars.

The gathered experts discussed the importance of strong policies and initiatives to deal with such impacts. Proper environmental monitoring systems coupled with climate change adaptation tools are needed to prepare fish farmers well in advance. Alf Haakon Hoel, Research Director, Institute of Marine Research, Norway emphasized the need to establish long-term management plans that would take the evolution of ecosystems into account.

*A woman sells fish at a market in Apia, Samoa.*

Dr. Rohana P. Subasinghe, Senior aquaculture officer, FAO, focused on an FAO pilot-level monitoring and early warning systems to improve fishers and fish farmers preparedness and resilience to climatic variability and climate change. She explained how the monitoring information is linked to weather conditions and available meteorological data to send out early warning signals.

The first obstacle to overcome, however, is the lack of infrastructure and technical, human and institutional capacities to provide high quality climate services in many countries.

## 16th session of Regional Association V

*RA V elected a new president, Dr. Andi Eka Sakya (Indonesia), and re-elected the vice president, Mr. 'Ofa Fa'anunu (Tonga).*

The 16th session of Regional Association V (RA V-16), held in Jakarta, Indonesia, from 2 to 7 May, identified the challenges and high priority areas for the Region for the next years, based on the outcomes from the survey and subgroup discussions during the Regional Conference prior to the Session. The four priorities for the Region for the period 2016–2019 are:

- Maintenance and improvement of observations and telecommunication networks at the regional and national level through completion of the implementation of the WMO Information System (WIS) and the WMO Integrated Observing System (WIGOS);
- Delivery of improved climate services through the establishment of the optimum network of Regional Climate Centres to sustainably implement the GFCS;
- Implement effective education and training programmes that build the capability of National Meteorological and Hydrological Services in resource management, advocacy and outreach, and the use of Numerical Weather Prediction (NWP); and
- Achievement by all Members of the standards required for quality management and staff competencies, with a focus on aviation and marine meteorology.

Other major RA V-16 outcomes include:

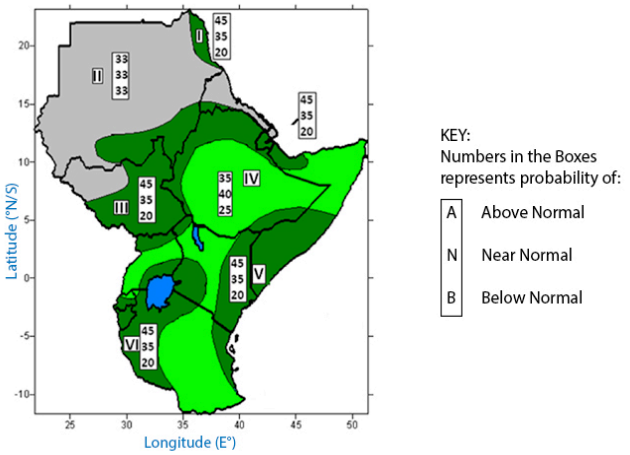
- Refinement and implementation of the RA V Strategic Operating Plan 2012–2015 and the development of the RA V Operating Plan 2016–2019;
- Adoption of a Regional WIGOS Implementation Plan (R-WIP-V) and a Regional WIS Implementation Plan (R-WIS-IP);
- Adoption of a new working mechanism for the RA V and establishment a Management Group, four Working Groups and a Tropical Cyclone Committee; and
- Engagement and contribution to the Third International Conference on Small Island Developing States (SIDS) to be held in Apia, Samoa from 1 to 4 September.

RA V Members also recognized the importance of strengthening existing, and setting up new, multi-hazard early warning systems in light of disasters related to tropical cyclones/typhoons, floods, drought, earthquakes and tsunamis such as Typhoon Haiyan (Yolanda) in the Philippines in November 2013, and Tropical Cyclone Ian in Tonga in January 2014.

## Building on the Climate Information and Prediction Services (CLIPS) Project

The WMO Technical Conference on Climate Services – Building on CLIPS Legacy was held from 30 June to 2 July in conjunction with the 16th session of the Commission for Climatology (CCl-16) and the 35th annual meeting of the Joint Scientific Committee of the World Climate Research Programme (WCRP). It reviewed the contributions and lessons from the CLIPS project, established by the World Meteorological Congress in 1995.

Figure 1: Greater Horn of Africa Consensus Climate Outlook for the September to December 2012 rainfall season




*CLIPS supported the provision of regional seasonal climate predictions and their interpretation for decision-making in climate sensitive sectors*

The mission of CLIPS was "to provide the best possible climate information, including expectations of future conditions, to improve economic and social decisions that will reduce risks and improve economic vitality as well as quality of life." Over the ensuing decades, CLIPS worked to increase climate knowledge, improve seasonal climate prediction capabilities and to develop the capacities of the National Meteorological and Hydrological Services for the delivery of climate information to meet the needs of stakeholders.

CLIPS was instrumental in the development of the concept of Regional Climate Centres and their formal establishment around the world. It also played a key role in the development of Regional Climate Outlook Fora as effective platforms for generating consensus-based seasonal climate outlooks at the regional scale. Such efforts by CCl, in coordination with National Meteorological and Hydrological Services, the WCRP Secretariat and other relevant bodies, have enabled systematic production of operational climate information at global and regional levels. These initiatives, together with the CLIPS training workshops,

have helped to build capacities for climate services. The achievements of CLIPS significantly contributed to the formulation of the GFCS.

The technical conference reviewed the evolution and achievements of CLIPS; the importance of the systematic collection and archiving of climate data for reliable climate services; improvements needed to better monitor the climate and to provide outlook products for climate information services at global, regional and national levels; and research challenges for improving climate predictions at regional scale.

Next year CLIPS will transition into the GFCS. The 20-year legacy of CLIPS has provided a strong foundation for GFCS implementation.

## AMCOMET: Second Task Force and Bureau Meetings

*Vice President Joyce Mjuru of Zimbabwe with WMO Secretary-General Michel Jarraud and WMO Assistant Secretary-General Elena Manaenkova.*

The Second Task Force and Bureau Meetings of the African Ministerial Conference on Meteorology (AMCOMET) in Harare, Zimbabwe, from the 26 to 30 May fleshed out the draft Implementation and Resource Mobilization Plan of the Integrated African Strategy on Meteorology. The Task Force further discussed the progress in the establishment of a Regional Climate Centre in Central Africa, the AMCOMET Constitution and Rules of Procedures and the feasibility of developing an African Regional Space Programme.

The meeting prepared for the 3rd session of AMCOMET, which will take place in Cabo Verde from 15 to 18 October. There, African Ministers responsible for meteorology are expected to approve the draft Implementation and Resource Mobilization Plan of the Integrated African Strategy on Meteorology and to sign the AMCOMET Constitution.

The meeting reports are available on the AMCOMET website (www.wmo.int/amcomet/).

## GEO - Tokyo Statement on Water Issues

The 7th Global Earth Observation System of Systems (GEOSS) Asia-Pacific Symposium "Benefits for Society from GEOSS Evolution Toward Addressing Sustainable Development Goals" concluded with adoption of the Tokyo Statement. The Symposium, held in Tokyo from 26 to 28 May, considered how Asia-Pacific societies are currently benefiting, and could benefit further in the next decade, from the GEOSS. The Tokyo Statement welcomes, among other things, the initiative – led by the World Health Organization (WHO), United Nations Human Settlements Programme (UN-HABITAT) and United Nations Environment Programme (UNEP) with GEO participation – to integrate Earth observations with other data and information towards addressing the complexities of monitoring in the water sector. It also acknowledges the agreement to establish a "GEOSS Asia-Pacific ocean data networking system" to accelerate data sharing in order to mitigate weather and climate related disasters in the region.

The Symposium further discussed how GEOSS could contribute to monitoring the implementation of international agreements currently in discussion, such as the set of Sustainable Development Goals to be adopted for the post 2015 period, as well as trans-disciplinary research initiatives such as Future Earth. A special "Trans-Disciplinary Approach to Solving Environmental Issues" session focused on the application and integration of Earth observations, modelling and other information for informed decision-making in Cambodia, in areas such as water, climate and agriculture.

**Barbara J. Ryan re-appointed**

The GEO Executive Committee re-appointed, without competition, Barbara J. Ryan to a second term as its Secretariat Director in July.

## Developing, Linking and Applying Climate Knowledge

Some 220 scientists attended the WCRP Conference for Latin America and the Caribbean, held in Montevideo from 17 to 21 March in cooperation with the Universidad de la Republica de Uruguay. The main goal of the conference was to define a research agenda to support the provision of effective climate services in the region. The Conference focused in a specific economic sector and societal aspect – health, water, energy, agriculture, ecosystems, and urban and coastal environments – each day.

The scientists sought to expand the analysis of observations and model outputs in order to facilitate the creation of knowledge-based systems that are credible, relevant and salient for society. When climate affects risk management and human decisions, societal dimensions and their complexities need to be taken into account.

The Conference recognized that improving climate monitoring and prediction is critical for building knowledge-networks. Moreover, discussions highlighted the importance of combining forecasts with more general climate information, optimized by including available local expertise. As noted by several speakers, the region lacks adequate climate observation and monitoring systems with sufficient temporal and spatial resolutions to characterize and quantify climate related risks. Some of the countries have very poor information systems and the quality, number and distribution of meteorological stations, upper soundings and remote sensing capabilities are in general far from ideal.

The Conference identified six priorities for the development of climate services in the region and proposed a research agenda to be considered as part of the WCRP Grand Challenge on Regional Climate Information (www.wcrp-climate.org/index.php/grand-challenges/gc-regionalclimate).

The Conference received support from the Inter-American Development Bank, the Inter-American Institute for Global Change Research, the GFCS and a number of regional and local organizations.

## Haiti Weather and Climate Programme

The Haiti Weather Systems Programme – Climate Services to Reduce Vulnerability in Haiti aims to rehabilitate and modernize the weather, climate and hydrology forecasting infrastructure that was destroyed by the 2010 earthquake.

Haiti is a mostly agrarian society – two thirds of Haitians depend on agriculture. It is strongly reliant on rainfall as there are few irrigated land areas. Haiti is particularly exposed to natural hazards, experiences two rainy seasons a year, from April to June and from October to November, as well as a hurricane season from early June until the end of November. Along with other Caribbean nations, Haiti is also especially vulnerable to climate change. Sea-level rise associated with global warming is expected to increase risks of inundation, storm surges, erosion and coastal hazards, compounding the challenges of population growth and environmental degradation.

The magnitude 7.0 earthquake that struck the country on 12 January 2010 left it devastated – over 230 000 lives were lost and a further 300 000 people were injured. Economic losses are estimated around US$7.9 billion – over 120% of its 2009 Gross Domestic Product (GDP). Most major infrastructure, including that for weather, climate and water monitoring and the prediction and forecasting of extreme events in order to issue for early warnings, was destroyed. The hydrometeorological facilities were deemed too dangerous to reoccupy.

**Re-establishing weather and climate services**

After the earthquake, WMO provided two containers to Haiti to serve as interim hydrometeorological facilities. They were installed close to the National Civil Aviation Building. Computers and office support systems, sent by Canada and United States of America, completed the temporary set up. But the buildings became leaky, causing equipment malfunctions.

The WMO-led The Haiti Weather Systems Programme – Climate Services to Reduce Vulnerability in Haiti will build capacity by training both scientific and technical personnel, and develop a business plan for the National Meteorological and Hydrological Services. It aims to strengthen the climatological and hydrological observing networks and implement an integrated data management system. It will also develop a wide-reaching dissemination system to inform decision-makers, stakeholders and the general public of climate related risks. In the long-term, WMO will also construct new permanent headquarters for the service in an earthquake and hurricane proof building.

The development of climate services in Haiti, the poorest nation in the Western world, will be an important test case for the GFCS.


*Of the two containers initially provided, WMO repaired one and replaced the other early this year, allowing staff to operate more effectively as the North Atlantic Hurricane season approached.*

## Aircraft-based Meteorological Observations Benefits to Aviation

The idea of making meteorological and other scientific atmospheric measurements from aircrafts is nearly as old as aviation itself, but it is only in the late 1980s that the Aircraft Meteorological Data Relay (AMDAR) observing system commenced as an operational programme sanctioned by WMO. This programme, using predominantly existing on-board sensors and systems, now produces nearly half a million observations per day of temperature, winds and, increasingly, humidity in support of the WMO Global Observing System (GOS).

There are three elements of the AMDAR observing system that make it especially valuable:

- AMDAR wind and temperature data have been shown to be similar in quality (i.e. accuracy or uncertainty of measurement) to that of radiosondes;
- The measurement sensors and systems on the aircraft are able to produce these data at a very high rate or frequency of measurement, thus providing very fine detail within the vertical profiles; and
- Owing to the frequency with which aircraft are landing and taking off from airports, these vertical profiles can be produced on at least a 3-hourly basis at many airport locations.

Forecast meteorologists find AMDAR data valuable and useful, providing significant improvement to applications for monitoring and prediction of weather systems and phenomena such as:

- Surface and upper air forecasts of wind and temperature;
- Thunderstorm genesis, location and severity;
- Wind shear location and intensity;
- Low cloud formation, location and duration;
- Fog formation, location and duration;

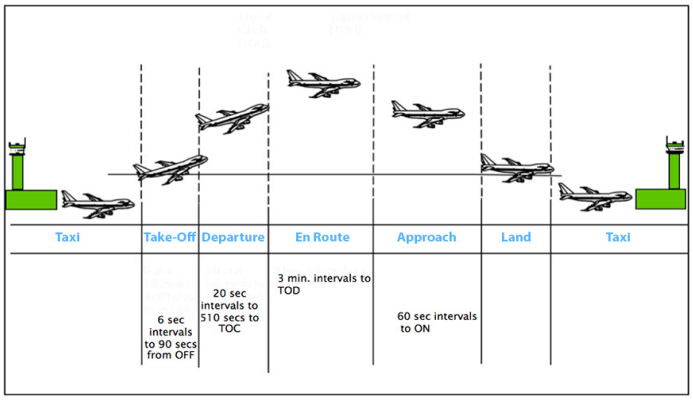
- Turbulence location and intensity;
- Jet stream location and intensity;
- Precipitation amounts and rates; and
- Conditions leading to aircraft icing.

Meteorologists are able to use modern numerical weather prediction (NWP) systems to precisely quantify the benefits of aircraft-based observations and have determined that these observations are second only to high-volume satellite data in impact on NWP systems. Quantitatively, AMDAR and other aircraft-based observations provide an improvement in forecasting ability through a reduction in NWP forecast error of up to 15-20%.

Pilots and airline flight and dispatch managers know the impacts atmospheric phenomena have on airline operations, efficiency and safety – each of which are critical to the financial bottom line of the airline. "Weather accounts for 70% of all air traffic delays within the U.S. National Airspace System," concluded the 2007 Report of the Weather-ATM Integration Working Group of the United States Research, Engineering and Development Advisory Committee. It further noted, "that as much as two-thirds of the weather related delay are potentially avoidable." The US Congressional Joint Economic Committee report Your Flight Has Been Delayed Again (May 2008) further found that:

- The total cost of domestic air traffic delays to the economy was as much as US$ 41 billion for 2007;
- Air-traffic delays raised airlines' operating costs by US$ 19 billion;
- Delays cost passengers time worth up to US$ 12 billion; and
- Indirect costs of delay to other industries added roughly US$ 10 billion to the total burden.

The financial interests of airlines are, therefore, well served by their contributing to any efforts to improve weather forecasting ability. Such improvements reduce their costs and those to the community. Airlines participating in the AMDAR programme also contribute to the efficiency and safety of the aviation industry and their own operations.




For more information on the AMDAR programme and requirements for participation in it, see the WMO AMDAR website: www.wmo.int/amdar

## Implementing Climate Services in Peru - The project CLIMANDES

Reliable climate information is vital for the design of appropriate climate change adaptation strategies. In developing and emerging countries, climate data are often of poor quality and do not meet the prerequisites for the provision of climate services for political decision-makers. The main objective of the GFCS is to build and develop the capacities of National Meteorological and Hydrological Services in generating climate products and services, and to link climate service providers and users in a way that allows the better use of climate information.


In Peru and the Andean region, the importance of user-tailored climate services is recognized, but this requires better quality climate observations and more expert meteorologists and climatologists. To address this need, the GFCS pilot project CLIMANDES (Servicios climáticos con énfasis en los Andes en apoyo a las decisiones) was established between Peru and Switzerland in 2012. The project seeks to increase the number of professionals and students trained in meteorology and climatology in support of the recently established WMO Regional Training Centre (RTC), which is hosted at the National Agricultural University La Molina in Lima (Module 1). Furthermore, CLIMANDES aims to develop climate services for the pilot regions Cusco and Junin (Module 2).

As part of Module 1, the science curriculum of the RTC was restructured to align with current and future needs in the Andean region. New e-learning tools are now also being developed for both undergraduate and graduate students of meteorology and climatology. Furthermore, the student exchange within the Andean region – as well as with University of Bern (Switzerland) – is facilitated to enable knowledge exchange and to strengthen the role of the RTC. To improve operational forecasting skills at the Peruvian National Service for Meteorology and Hydrology (SENAMHI), applied training courses are regularly held in the field of practical meteorology. In the long run, all of these efforts will contribute to developing more skilled professionals.

In Module 2, state-of-the-art data quality control and homogenization procedures are currently being implemented at SENAMHI. Climate change indices will be calculated based on these data for the Cusco and Junin pilot regions. To translate the climate information into comprehensive sector-relevant products and services, effective communication channels have been identified. Political decision-makers will be enabled to take appropriate adaptation measures. In this way, the initiative will result in socio-economic benefits for numerous sectors – agriculture, health and water – and, hence, for society at large.

The project is coordinated by WMO and implemented by SENAMHI and the Federal Office of Meteorology and Climatology MeteoSwiss in collaboration with the National Agricultural University La Molina (UNALM), the University of Bern, and Meteodat GmbH. It is financed by the Swiss Agency for Development and Cooperation (SDC). The project will run from August 2012 to July 2015.

## WMO Regional Training Centres

WMO currently has some 38 institutions acting as 26 Regional Training Centres (RTC), offering short and long-term training to staff of WMO Member National Hydrological and Meteorological Services. The first RTC will be celebrating its 50th year in 2015 and the next issue of the WMO Bulletin will look at the history and achievements of RTCs in more detail. In the meantime, we highlight below some recent courses offered in four RTCs.

### Climate change and agriculture – Israel Meteorological Service

*The 17 NMHSs staff taking part in the course came from Bosnia and Herzegovina, China, Czech Republic, Georgia, Ghana, Guinea-Bissau, Kenya, Kosovo[1], Nigeria, Philippines, Sierra Leone, Tajikistan, Uganda and Uzbekistan.*

The RTC of the Israeli Meteorological Service (IMS), in cooperation with the Israeli Agency for International Development Cooperation and the Israeli Centre for International Agricultural Development Cooperation, held a course from 9 to 19 June addressing the meteorological aspects of agriculture as one of the four priority areas of the GFCS.

The course investigated the state-of-the-art techniques and methodologies in agrometeorology and agronomy developed in Israel in recent years, which could mitigate the impacts of climate change. It also focused on the ways NMHSs could improve their contact with their users – stakeholders, farmers as well as general public. The course was structured to cover:

- Effects of climate change on agricultural production: precipitation distribution and changes; extreme events – floods, droughts, frost and heatwaves; phenological effects; agriculture and ecology;
- Agrometeorological techniques: advanced irrigation methods; usage of marginal water; climate control in horticulture and livestock buildings; and
- Forecast and risk management for improving agricultural production: short and medium range weather forecasts and their impact on agriculture and the usage of economical tools for mitigating the impact of climate change.

[1] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence

### Climate change impacts on the agriculture systems in Africa

The RTC in Florence, Italy, ran a one-week international training course on Climate Change Impacts on Agricultural Systems in Africa from 9 to 13 June. The purpose of the course was to build capacities for analysis of climate change impacts on crop production, with a special focus on Northern and Western African agricultural systems. Experts from IBIMET-CNR (Institute of Biometeorology of the National Research Council of Italy) and other institutions presented the following themes:

- Existing climate data sets: availability, differences and limitations for climate analysis on crop productivity;
- Sensitivity of specific crop phases to climate variability and extremes;
- Methodologies and tools for climate analysis in relation to specific crops' phases;
- Integrative observed climate trends and climate projections for short-term evaluation of climate change impacts on crop systems; and
- Adaptive responses to climate change and uncertainty in agriculture.

The Course brought agro-meteorologists, climatologists and agronomists together. It facilitated the sharing and development of a common view and language by the 16 participants from Egypt, Guinea-Bissau, Jordan, Niger, Senegal and Tunisia.

The RTC is coordinating with WMO for the organization of further courses for WMO Members in Africa and around the Mediterranean. The next course, "Seasonal Forecasts for Agriculture in the Mediterranean", will be held 22 to 26 September.

### Russian State Hydrometeorological University Class of 2014

The 2014 graduation ceremony for international students at the Russian State Hydrometeorological University (RSHU), an RTC in St. Petersburg in the Russian Federation, took place on 3 July. Bachelor and Master of Science diplomas were awarded in Meteorology, Hydrology, Ecology, Oceanography, Environmental Management and Economics, Applied Informatics and Public Relations.

The 85 graduates represented 24 countries: Benin, Bolivia, Colombia, Congo, Estonia, Equatorial Guinea, Georgia, Iraq, Jamaica, Kyrgyzstan, Latvia, Lithuania, Mali, Mongolia, Mozambique, Pakistan, Russian Federation, Syria, Tajikistan, Tanzania, Turkmenistan, Uzbekistan,

Vietnam and Zambia. Both the Government of the Russian Federation and the WMO Education and Training Programme offer fellowships to international students to study at RSHU.

Eight WMO fellows from least developed countries graduated from RSHU in July. They have since returned home and started working as meteorologists or hydrologists in their National Meteorological and Hydrological Services. The theoretical knowledge and practical skills acquired by them at RSHU will be a valuable asset for their careers and the national services, where they will share their experiences and knowledge. Some of them expressed the desire to return to RSHU to further their studies in order to obtain doctorates or masters degrees.

RSHU has provided high-level meteorological and hydrological education and training since 1930. Today it counts some 5 000 students from over 40 countries.

*Dr. Maria Mamaeva, Head of International Relations, RSHU, with some of the WMO Fellows who graduated from RSHU.*

## Learning about Climate Change the Pacific way

A new picture-based education resource, "Learning about Climate Change the Pacific Way," is now available for students, teachers and facilitators. The resource consists of 16 illustrated posters that depict:

- The water cycle;
- Climate in the Pacific islands and around the globe;
- Causes of climate change;
- Interrelationships between different factors;
- How the climate is changing in five Pacific Island countries; and
- Mitigation and adaptation measures that can be implemented through gardening, forestry and fishing activities and in a town centre.

In addition, country-specific teachers' guides illustrate and explain the key concepts. Copies are available online at www.spc.int/cc-project/.

The Fiji Ministry of Education launched the new resource in June in Suva with climate change focal points from the Governments of Fiji, Kiribati, Samoa, Tonga and Vanuatu. Around 500 individuals contributed to its development – from students, teachers and teacher trainers to national and regional climate change and education experts, editors, graphic designers, secretaries and accountants. An initial supply of 6000 copies of the resource will be printed and distributed through ministries of education to primary and secondary schools in Fiji, Kiribati, Samoa, Tonga and Vanuatu.

## Ask an Expert

Ask an Expert is a new PreventionWeb initiative through which partners in the disaster risk reduction community and the public at large can get expert opinions. Each week, thematic experts and thought leaders invite people from all over the world to ask questions, share concerns and comments for their take on issues.

Some of the experts for upcoming sessions include:

- Giacomo Teruggi (WMO) on integrated flood management;
- Julio Serje (U.N. Office for Disaster for Disaster Risk Reduction) on risk modelling and the use of past disaster data;
- Gerardo Huertas (World Animal Protection) on disaster risk reduction applied to farming and animal stock;
- Sam Johnson (Youth beyond Disasters) on engaging youth for disaster risk reduction;
- Sushil Gupta (Risk Modelling and Insurance) on regional risk models;
- Pedro Ferradas (Practical Action's Disaster Risk Reduction and Climate Change Adaptation programme) on urban disaster risk management; and
- Rohit Jigyasu (Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University, Kyoto) on disaster risk management of cultural heritage.

Your comments and questions are welcome at www.preventionweb.net.

## Forthcoming WMO Meetings

- **Extraordinary session of the Commission for Basic Systems (CBS-Ext.(2014)),** Asunción, Paraguay, 8–12 September 2014
- **16th session of the Regional Association III (RA III-16),** Asunción, Paraguay, 15–20 September 2014
- **16th session of the Regional Association I (RA I-16),** Praia, Cabo Verde, 8–14 October 2014
- **2nd session of the Intergovernmental Board on Climate Service (IBCS),** Geneva, 10–14 November 2014

## WMO Co-sponsored and Related Events

- **WWOSC The World Weather Open Science Conference (WWOSC)**, Montreal, Canada, 16–21 August
- **WMO side events at the Third International Conference on SIDS**, Apia, Samoa, 1–4 September
- **The Climate Symposium 2014**, Darmstadt, Germany, 13–17 October
- **3rd session of African Ministerial Conference on Meteorology (AMCOMET)**, Cabo Verde, 15–18 October
- **Conference on the Gender Dimensions of Weather and Climate Services**, Geneva, 5–7 November
- **3rd International Conference on El Niño "Bridging the gaps between the Global ENSO Science and the regional processes, extremes and impacts",** Guayaquil, Ecuador (GFCS), 12–14 November

## Newly issued

**Commission for Agricultural Meteorology - Sixteenth session: Abridged final report with resolutions and recommendations**, WMO No. 1134, ISBN 978-92-631-1134-0. Available in Arabic, English, French, Russian, Spanish. Chinese in preparation

**Forecast Verification for the African Severe Weather Forecasting**, WMO No. 1132, ISBN 978-92-631-1132-6. Available in English. French in preparation

**Climate Data Management System Specifications**, WMO No. 1131, ISBN 978-92-631-1131-9. Available in English

**Commission for Atmospheric Sciences - Sixteenth session: Abridged final report with resolutions and recommendations**, WMO No. 1128, ISBN 978-92-631-1128-9. Available in Arabic, Chinese, English, French, Russian, Spanish. 17 CHF

**Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2012)**, WMO No. 1123, ISBN 978-92-631-1123-4. Available in English. Arabic, Chinese, French, Russian and Spanish in preparation. 18 CHF

**The Global Climate 2001-2010: a decade of climate extremes - Summary Report**, WMO No. 1119, ISBN 978-92-631-1119-7. Available in Arabic, Chinese, English, French, Russian, Spanish. 15 CHF

**Guidelines for Continuous Measurements of Ozone in the Troposphere**, WMO No. 1110, GAW Report 209, ISBN 978-92-631-1110-4. Available in English. 30 CHF

**Watching the Weather to Protect Life and Property: Celebrating 50 Years of World Weather Watch,** WMO No. 1107, ISBN 978-92-631-1107-4. Available in Arabic, Chinese, English, French, Russian, Spanish. 15 CHF

**Manual on the WMO Information System: Annex VII to the WMO Technical Regulations** (2012 edition updated in 2013), WMO No. 1060, ISBN 978-92-631-1060-2. Available in Arabic, Chinese, English, French, Russian, Spanish

WMO Publications are free-of-charge online

## Related Publications

**Atmospheric Environment, Special Issue. Vol. 93, August 2014**. ISSN 1352-2310. Elsevier. Softcover 20.95 euros / Hardcover:36.95 euros

**Climate Change 2013: The Physical Science basis**, by Intergovernmental Panel on Climate Change (IPCC). ISBN 978-1-107-66182-0. Cambridge University Press. £55.00 (US$99)

**Sea-Level Science: Understanding Tides, Surges, Tsunamis and mean Sea-Level Changes**, by David Pugh, Philip Woodworth. ISBN 978-1-107-02819-7. Cambridge University Press. £55.00 (US$99)

**Transport in the Atmosphere-Vegetation-Soil Continuum**, by Arnold F. Moene and Jos C. van Dam, ISBN 978-0-521-19568-3. Cambridge University Press. £45.00 (US$70)

**Electromagnetic Scattering by Particles and Particle Groups**, by Michael I. Mishchenko, ISBN 978-0-521-51992-2. Cambridge University Press. £45.00 (US$70)

## Global Crop Production Review, 2013

The annual review of regional crop production, comparing 2013 with the previous year, prepared by United States Department of Agriculture's Joint Agricultural Weather Facility, is now available in the online version of MeteoWorld (www.wmo.int/meteoworld). For both the northern and southern hemisphere, these summaries reflect growing season weather for major commodities that were harvested in the calendar year of 2013, unless otherwise noted. Most statistics quoted are based on crop estimates released by the United States Department of Agriculture in March 2014.




**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

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