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New working arrangement between the European Commission and WMO

A new working arrangement has been put in place between the European Commission and WMO to highlight priority areas of cooperation in operational and research fields related to the atmospheric environment, weather, climate, hydrology and water resources. Both organizations are committed to working together to address regional and worldwide environmental and societal emergencies such as climate change, sea-level changes, natural disasters, stratospheric ozone depletion, atmospheric and water pollution, marine environment pollution, water scarcity, freshwater availability, land degradation and desertification, and loss of biodiversity.

On 16 June, the Commission published the new working arrangement in the *Official Journal of the European Union*. A signing ceremony is planned for early September.

Impacts of COVID-19 on WMO scientific areas

The Chair of the Subsidiary Body for Scientific and Technological Advice (SBSTA) of the United Nations Framework Convention on Climate Change (UNFCCC) convened an information event as part of its June Momentum for Climate Change series to discuss how the COVID pandemic has affected the scientific community and how to leverage scientific support and knowledge-sharing for a sustainable recovery. At the event, experts from WMO and the scientific community provided extensive information on the impacts of the pandemic on climate research, observations and assessments, as well as on the levels of greenhouse gas concentrations and emissions. Scheduled scientific missions and conferences were postponed or cancelled, gaps in some in situ long-running climate records are likely, and research budgets may be negatively affected.

The Global Carbon Project presented evidence suggesting that the COVID-19 global lockdown may result in a 3-month average of 8% reduction in fossil fuel emissions and a peak drop of 17%. This may lead to a 4–7% drop in emissions over 2020 — depending on when lockdown restrictions are eased. However, WMO noted that the reduction in emissions does not mean that CO₂ in the atmosphere will go down: it will continue to accumulate at a slightly lower rate. Only when the net emission of CO₂ comes close to zero will the net uptake by ecosystems and ocean start to slightly reduce the CO₂ levels in the atmosphere. Even then, most of the CO₂ already added to the atmosphere will remain there for several centuries and take part in the warming of our climate.

WMO further reported on the impact of the lockdown on climate observations, pointing out that aircraft observations had been drastically reduced and that manual surface observations were badly

hit in areas with little resilience. The impact on automatic observations was less but the effects of lack of maintenance and calibration will accumulate and affect the climate record in many locations. This will lead to degradation of climate monitoring and of weather forecasts globally, with significant impact on local forecasts and emergency warning systems in the countries lacking observations.

India's new high-frequency data buoy system

A recently updated Indian moored buoy system in the northern Bay of Bengal (at 17.5° N/ 89.1° E) was implemented on 19 May during the passage of Cyclone Amphan. The newly installed Hrudaya data acquisition system transmits data every three hours under normal conditions and hourly during cyclones. The valuable data it provided helped forecasters in the Department of Meteorology to accurately predict the cyclone's trajectory, size and time of landfall, and to provide early warnings to people at risk.

The moored buoy system was put in place in 1997 by India's Ocean Observation Systems, which is part of the National Institute of Ocean Technology (NIOT) under the Ministry of Earth Sciences (MoESs). The unique Hrudaya algorithm installed on the existing MoES-NIOT data buoy system is capable of transmitting and disseminating real-time datasets in high-frequency mode during cyclones – at low pressure and high wind speeds. During Cyclone Amphan, the high-frequency transmission was triggered from 00:00 GMT to 16:00 GMT on 19 May, providing 11 additional real-time datasets. The system withstood the cyclone's passage, which generated 6-metre waves, and provided critical met-ocean datasets to stakeholders with higher frequency in real-time.

Maersk fleet to provide vital met-ocean data

Maersk, a Danish shipping company, has committed its fleet of 300 vessels to operating within the global Voluntary Observing Ship (VOS) scheme of the Global Ocean Observing System (GOOS). Approximately half of its vessels are already operating within the VOS scheme and the remaining half should be active by the end of 2020.

Weather and sea-state observations have been collected and disseminated systematically for over 150 years. They provide essential data on meteorological conditions at sea for weather forecasts and, over long timescales, help climate scientists understand climate change. Ship observations, alongside other ocean, land-based and satellite observations, are fed into global and regional climate analyses, as well as coupled atmosphere-ocean climate models, which depict the evolution of our environment. These observations also help to ensure safety of life and property at sea by allowing better forecasting of storms and other extreme ocean-related events.

Five Maersk vessels have already been equipped with automatic weather stations (AWSs) known as EUCAWS (European Common Automatic Weather Stations). These systems – provided and installed by Deutscher Wetterdienst (DWD) – automatically acquire data on atmospheric pressure, air temperature and relative humidity, and transmit them hourly. By the end of 2020, a total of 50 such stations are planned to be operational, providing the largest fleet of AWSs from one single company.

GOOS is a joint programme of WMO, the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP) and the International Science Council (ISC).

Candidates for Centennial Station recognition

In December 2019, WMO issued a third call for nominations for recognition as Centennial Observing Stations and has since received the candidature of 119 stations from 30 Members. The list includes some notable candidates and the Advisory Board for Recognition of Long-term Observing Stations will give them further consideration even though they do not fully meet all recognition criteria.

The candidate stations from Beijing, China, and Downtown Charleston, United States of America, are both exceptional in that they have more than 250 years of observations. Beijing station, in fact, has the longest observing history of all nominees so far – reaching back to 1724. Four other exceptional nominees – Scott Base, in New Zealand, and Bjornoya, Jan Mayen and Svalbard, in Norway – operate in polar regions. Base Orcadas, Argentina, is the only polar region station recognized as a Centennial Station.

Climate, measurement and observation network experts on the Advisory Board have already assessed all the candidates against the criteria for recognition and its recommendations will be discussed at the WMO Executive Council in October 2020. However, the Advisory Board will look at how to highlight the role of this year's exceptional candidates.

To date, 140 centennial stations in 47 Member States and Territories have been recognized by WMO. Every Centennial Observing Station receives a WMO certificate signed by the Secretary-General and a brass plate to display at the station for public viewing. Centennial observing stations are also specifically flagged in OSCAR and listed in the WMO centennial stations website.

A fourth call for centennial station nominations is tentatively planned for the end of 2020, pending approval of updated recognition criteria by the Executive Council to strengthen the data and metadata criteria for these observing stations.

Tanzania issuing weather forecasts for Lake Victoria

The Tanzania Meteorological Authority (TMA) is now providing 24-hour marine weather forecasts for fishermen and other small craft operators in the Tanzanian region of Lake Victoria through the High Impact Weather Lake System (HIGHWAY) project. The format, content, weather icons and warning colours follow those already used by the Uganda National Meteorological Authority (UNMA) and the Kenya Meteorological Department (KMD) in their marine

weather forecasts for their corresponding regions of Lake Victoria. This harmonization is bringing the countries around the lake one step closer to developing a fully integrated early warning system. The forecasts are also shared through a WhatsApp group that includes the forecasting offices of UNMA and KMD.

In November 2019, TMA hosted an Impact-based Early Warning Service (EWS) workshop for its stakeholders in order to raise awareness of the project. The workshop promoted the main media channels for disseminating forecasts to the general public, and more specifically the fisheries sector: television, radio, newspapers, SMS, websites and social media. Currently, warnings are only being disseminated through a WhatsApp group open to all subscribers and through the Beach Management Unit; the others will soon follow.

Cities committed to a healthy urban life

The WMO Global Atmosphere Watch (GAW) and the World Wildlife Fund (WWF) Cities held a series of user-oriented webinars in May, during the corona virus lockdown, for cities committed to a healthy urban life. The World Wildlife Fund Cities hosts the One Planet City Challenge, a friendly competition to mobilize cities to deliver on the Paris Agreement. Each webinar showcased success stories in using atmospheric observations in support of decisions and policies to improve urban air quality and multi-hazard early warnings and to reduce greenhouse gas (GHG) emissions. Topics were addressed from the perspective of technical experts and users, highlighting the results of collaboration and the use of scientific information for decision-making processes.

The first webinar took participants on a journey towards cleaner air in Mexico City. Beatriz Cárdenas, Air Quality Manager, World Resources Institute (WRI), and Michel Grutter de la Mora, Researcher, Center for Atmospheric Sciences, National Autonomous University of Mexico (UNAM), presented tools to measure and forecast acute pollution episodes and explained how Mexico City has used atmospheric pollutant observations to improve its air quality.

In the second webinar, Tsz-cheung Lee, Senior Scientific Officer, Hong Kong Observatory, and Ir Maxwell SW Mak, Land Drainage Engineer, Drainage Services Department, Hong Kong, China, explained how technology can help cities anticipate climate hazards such as flash floods and be ready when these events occur.

The third webinar explored the path towards carbon neutrality in Paris, France. Yann Françoise, Head of Climate, Energy and Circular Economy Strategies, Urban Ecology Agency, City of Paris, and Thomas Lauvaux, Research Scientist, Laboratory of Climate and Environmental Sciences (LSCE), elaborated on how atmospheric observations can support climate change mitigation actions. High-resolution monitoring of the atmosphere combined with modelling provides timely and reliable information enabling local governments to size GHG emissions more accurately and take informed decisions in line with the goals of the Paris Agreement.

The WMO Integrated Global Greenhouse Gas Information System (IG³IS) supports efforts to use atmospheric observations and analyses for effective GHG emission reduction in cities. It also coordinated a workshop in June on urban GHG monitoring and assessment, which is expected to lay the foundations for the development of an international standard that will help local authorities to efficiently use atmospheric information for carbon neutrality.

The webinars attracted a broad international audience at a time when many are thinking about how we could improve things after COVID-19. They are available online for those who could not attend the live session.

Are forests a solution to climate change?

In response to the COVID-19 lockdown, which did not permit gatherings, the European Geosciences Union (EGU) General Assembly launched [Sharing Geoscience Online](#). Over 26 000 geoscientists came together in 721 live text chats where over 200 000 messages were posted during the event. Among the many contributions by WMO, the Global Atmosphere Watch (GAW) organized one of the live sessions: a Great Debate where panellists were asked “Are forests a solution to climate change?”

The panellists – Prof. Gensuo Jia, Institute of Atmospheric Physics, Chinese Academy of Sciences, China, Dr Bronson W. Griscom, Moore Center for Science, Conservation International, United States of America, Dr Luciana Vanni Gatti, National Institute for Space Research, Earth System Science Center, Brazil, and Dr Catherine Scott, NERC Independent Research Fellow, School of Earth and Environment, University of Leeds, United Kingdom – engaged more than 600 listeners. They discussed the potential of forests, including their afforestation and reforestation, as part of nature-based solutions, and asked if their capacity to take up CO₂ could be increased through changes in management. However, forests are living ecosystems and there are many factors that humans cannot control which can have an impact on a forest’s capacity to take up CO₂, such as changing climatic conditions. The increase in greening that has been observed from satellites demonstrates the fertilization effect of CO₂ on forests, but forests do not only take up CO₂, they are also sources of methane and reactive constituents that impact climate in the short term.

In the [Declaration of the Significance of Geoscience Expertise to Meet Global Societal Challenges](#), issued at the beginning of the online conference, EGU and its partners recognize their shared responsibility “to utilize scientific research results to increase societal resilience to single, multiple and potentially interrelated threats” whose cascading effects can only be understood by carrying out complex analyses in which geoscientists have particular expertise. The science for services approach being implemented by the WMO research programmes follows similar principles, manifested in WMO strategic goal 3: “Advance targeted research: Leveraging leadership in science to improve understanding of the Earth system for enhanced services.”

Multi-hazard Early Warning Systems – the way forward in Southeast Asia

Cambodia, Lao People’s Democratic Republic, the Philippines, Thailand and Viet Nam, having recently completed assessments of their early warning systems, agreed in February, together with other countries and regional organizations, to move forward with the establishment of a Southeast Asia-wide framework for meteorological and hydrological disaster risk reduction and capacity development.

The assessments, carried out using the [Multi-hazard Early Warning Systems Checklist](#) with the assistance of the Regional Integrated Multi-hazard Early Warning System (RIMES) for Africa and Asia, were core components of an ongoing project aimed at strengthening weather, climate and water-related impact-based forecasting and warning services. They provided an overview of current capacities,

gaps and needs for producing, delivering and acting on early warnings of multiple hazards, informing contents and approaches of future capacity-development initiatives. They looked at each country’s legal and institutional frameworks, the actors involved and recent and on-going projects, focussing on the role of National Meteorological and Hydrological Services (NMHSs), and performed a desk review of existing assessments and documents. This was followed by validation workshops and interviews in each beneficiary country in 2019 and 2020.

This work was discussed at a subregional workshop held in Thailand in February 2020 at which participants reached a consensus on the development of a coordinated Southeast Asia-wide framework for strengthening the hydrometeorological disaster risk management and capacity development of NMHSs. WMO will work with the Association of Southeast Asian Nations (ASEAN), the United Nations Office for Disaster Risk Reduction, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the Food and Agriculture Organization (FAO) of the United Nations, RIMES, the World Bank and other key players to develop the framework.

The workshop also made recommendations for developing and pilot testing an operational methodology for multi-sectoral impact forecasting of tropical cyclones, for organizing training workshops on impact-based forecasting and warning services in Thailand and Viet Nam, and for a Climate Risk and Early Warning Systems (CREWS) Initiative follow-up project foreseen in Cambodia and the Lao People’s Democratic Republic. The workshop also built a common understanding of Forecast-based Financing (FbF)/Early Warning Early Action (EWEA). These approaches enable access to humanitarian funding for early action based on in-depth forecast information and risk analysis. This will mean strengthening the capacity of NMHSs for impact-based forecasting and warning services, and heightening collaboration with the humanitarian agencies working in the countries concerned. In addition, the workshop introduced the topic of shock-responsive social protection which, in support of FbF/EWEA, has the potential to build resilience among the poor and most vulnerable and to improve the effectiveness of emergency response.

These initiatives will contribute to the new (2021–2025) ASEAN Agreement on Disaster Management and Emergency Response (AADMER) Work Programme and ultimately to implementing national priorities and globally the Sendai Framework for Disaster Risk Reduction 2015–2030. ESCAP, FAO and WMO will promote these approaches among their Members and partners, for example, through the upcoming ASEAN Declaration on Drought and the 2021–2025 ASEAN-United Nations Joint Strategic Plan of Action on Disaster Management. Thus, these initiatives will benefit from regional United Nations collaboration mechanisms with which WMO is increasingly engaging. This work was carried out through a CREWS Initiative project being implemented from 2017 until 2021 with support from Environment and Climate Change Canada.

Innovations in education and training

A new online WMO Course on Education and Training Innovations was launched on 25 May and is scheduled to run until 30 July 2020. It comes at an opportune time during the global COVID-19 quarantine. This course offers a new way of learning and is based on an upcoming publication, *WMO Global Campus Innovations*. This four-volume publication addresses the following areas: new pedagogical approaches; curriculum advancements; collaboration in education and training; and technology-enhanced learning.

The course encourages adoption of innovations in the education and training institutions of WMO Members by exploring potential benefits and analysing examples from other Members. In the course, an innovative process model is used to put together an Innovation Implementation Plan within each participant's institution or national agency.

The course is being offered in a Certificate Path and an Open Path. Certificate Path participants are required to write four structured reflection papers on the four chapters of *WMO Global Campus Innovations* as well as to complete an Innovation Implementation Plan. Open Path participants are asked to contribute to the discussions on the readings and in the general forums, and can earn digital open badges for their participation. The majority of participants (55%) are seeking the Certificate Path.

Ocean State Report highlights major climate change impacts

The summary of the fourth edition of the Copernicus Marine Service Ocean State Report (OSR4), highlighting key findings and major impacts of climate change, is now available online.

According to the report, rising seas continue to threaten coastal and low-lying areas. Since 1993, global mean sea level has risen at a rate of 3.3 ± 0.4 mm per year. New calculations in the OSR4 reveal that sea-level rise is accelerating, with the rate increasing by 0.12 ± 0.073 mm/year.

The ocean is a major sink of excess anthropogenic CO₂. This absorption of carbon mitigates the effects of global warming but is a major threat to marine life as it results in ocean acidification. Between 20% and 30% of excess CO₂ in the atmosphere has been absorbed by the ocean in the last 10 to 15 years. In fact, the ocean has become about 30% more acidic since pre-industrial times.

Ocean surface temperatures have also been warming steadily since 1970, absorbing more than 90% of the excess anthropogenic heat in the climate system. Global sea surface temperature has increased at a rate of 0.014 ± 0.001 °C per year with warming occurring over most of the globe. There continues to be unprecedented warming of the upper ocean, and the past four years are the four warmest since records began.

Another key finding concerns the continued retreat of sea ice. The 2018 Arctic maximum winter sea-ice extent, which occurred in March, is the second lowest on record after winter 2017. The last quarters of 2016, 2017 and 2018 in the Antarctic experienced unusual losses of ice, while 2017 recorded the lowest and 2018 second lowest sea-ice extent since 1993.

Billions of people live alongside the ocean, and over three billion people depend on marine biodiversity for their livelihood. Consequently, these changes are forcing people across the globe to fundamentally alter how they coexist with the ocean.

Italian association of weather professionals

Italy and Greece are the only states in Europe in which the National Hydrometeorological Services are not civilian, but military. The Meteorological Service of the Italian Air Force (Servizio Meteorologico dell'Aeronautica Militare Italiana) is responsible for all meteorological

and climate activities, including forecasts and warnings on television, radio and in the press. The word "meteorologist" in Italy is synonymous with Colonel in the Italian air force. Civilian meteorologists, whether they worked in the public or in the private sector, were recognized neither by other organizations nor by the people. That changed in 2019 with the establishment of the first Italian association of weather professionals (Associazione Meteo Professionisti (AMPRO)).

The association's entry requirements had to be very stringent in order to exclude unqualified individuals and a multitude of weather enthusiasts who proclaimed themselves meteorologists. Thus, AMPRO followed the [Guide to the Implementation of Education and Training Standards in Meteorology and Hydrology](#) (WMO-No. 1083), Volume I – Meteorology, for its entry requirements. The qualifications defined in this publication ensure that AMPRO membership is restricted to professional, highly competent meteorologists and meteorological technicians. Only those who obtain a specific private certification (DEKRA) (the certification scheme was officially presented at Bologna University in March 2016), or those who follow a pre-established (2018) academic path can become members of AMPRO. The Permanent Representative of Italy with WMO defined the training and experience which is that required by WMO.

Thanks to the WMO Guide mentioned above, it is possible to build a path for the recognition of meteorologist as a profession and to create a professional association in compliance with Italy's stringent consumer protection laws (Law 4/2013). The work of the association has just started, and the aim is to promote this initiative further.

New WMO 70th Anniversary Publication: [The Establishment of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology: A Personal History](#).

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

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