WORLD METEOROLOGICAL ORGANIZATION

WCRP World Climate Research Programme

International Science Council

WMO Public Science Lecture

The Climate of Tomorrow: Building the Knowledge for Earth Stewardship

Thomas Stocker

Professor of Climate and Environmental Physics, University of Bern
Co-chair of IPCC Working Group I, 2008-2015

8 May 2019, 16:00
WMO Headquarters, Geneva
www.wcrp-climate.org/wmo-public-science-lecture

The World Meteorological Organization (WMO) is launching a series of public science lectures under the leadership of WMO Chief Scientist Pavel Kabat. The event series will invite world-leading experts in the fields of weather, climate, water, the environment, and related areas to engage with the WMO community, partner organizations and the interested public. The inaugural lecture is co-organized with the World Climate Research Programme (WCRP) and will be given by Professor Thomas Stocker, Professor of Climate and Environmental Physics at the University of Bern and former Co-chair of Working Group I of the Intergovernmental Panel on Climate Change (IPCC). The event will include an address by Luis Alfonso de Alba, the UN Secretary-General's Special Envoy for the 2019 Climate Summit, and will be followed by a high-level panel discussion.

There is no charge to attend the event. However, prior registration is mandatory and you will need a valid identity document (such as a passport) to enter the building. Please register here by 7 May 2019, 9:00 CEST:

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Lecture Overview - Thomas Stocker

Half a century ago, a decade of great environmental and global awareness began. "The Limits to Growth", a report by the Club of Rome, ushered in global-scale environmental assessment and relevant scientific studies started to emerge. In 1975 Broecker pointed to the risk of pronounced global warming, and in 1978 my colleagues Siegenthaler and Oeschger of the University of Bern predicted the atmospheric concentration of carbon dioxide (CO_2) for the year 2000 at 363 parts per million (ppm), almost spot-on the 369 ppm measured at the turn of the millennium. In 1979, a handful of visionary scientists produced the first scientific assessment on carbon dioxide and climate. The famous "Charney report" gave the first consensus estimate of climate sensitivity, the mean global warming resulting from a doubling of atmospheric CO_2 concentration, of 3°C with an uncertainty range of ±1.5°C. This knowledge of the late 1970s, a decade of prescient awareness of emerging environmental and global resource problems, was a robust scientific foundation for what could have been early and responsible action on anthropogenic climate change.

Until today, a community of thousands of climate scientists has produced five comprehensive assessment reports from the Intergovernmental Panel on Climate Change (IPCC), founded by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988. Decades of Earth system research and observations have enabled the hitherto most explicit language in the IPCC's 2013 report, encapsulated in three short and concise statements approved by all countries in consensus: (i) Warming of the climate system is unequivocal, (ii) Human influence on the climate system is clear, and (iii) Limiting climate change will require substantial and sustained reductions in greenhouse gas emissions. Without this firm scientific basis, the Paris Agreement of the United Nations Framework Convention on Climate Change would likely not have been born.

Much credit for this unique contribution of the global scientific community is owed to WMO, which in 1980 created, together with the International Science Council (and later joined by the Intergovernmental Oceanographic Commission of UNESCO), the World Climate Research Programme (WCRP). In the post-Paris Agreement world, new challenges arise to which a global programme such as WCRP, or even more broadly WMO as a leading UN organization, must respond to. The climate crisis may develop into a global resource crisis: warming and associated climate extremes threaten our health, water cycle changes create drought and flooding, sea level rise swallows our land, and collective and cumulative impacts challenge the basis of human wellbeing, biodiversity, and ecosystem functioning.

Confronting anthropogenic climate change defines four specific challenges for WMO and its programmes, challenges for which only the best science will provide the necessary information for wise decisions to ensure Earth stewardship. First, continued warming will change the statistics of extreme events. **Real-time simulations of extreme events** are essential for disaster prevention, and much-improved climate models must be developed to achieve this. Second, regional climate phenomena such as El Niño–Southern Oscillation (ENSO) and monsoon systems around the world may shift and change resource availability, and therefore, **seamless climate prediction** is necessary for forward-looking resource management in exposed and vulnerable countries. Third, **tipping points in the Earth system** represent potentially irreversible changes affecting all life on Earth. In particular, instabilities in ice sheet extent caused by ocean warming and tipping processes in marine ecosystems through the combined impact of acidification and warming are still little understood. Fourth, emerging alternative proposals to confront climate change, such as geoengineering, require more **comprehensive climate-chemistry models** to assess the full impact of such strategies and their governance, inter-generational, and ethical consequences. Such methods may constitute themselves dangerous anthropogenic interference with the climate system.

Essential to progress in delivering this knowledge are quality-tested, standardized, comprehensive, and global observations, coordinated model development, and operational Earth system simulations, as well as an improved understanding of the fundamental climate system processes. WMO is in the best position to serve the scientific community, policy makers and society by focusing on the four areas outlined above.

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