

Improving the Accuracy of Estimation of Climate Extremes

Workshop on Metrics and Methodologies of Estimation of Extreme Climate Events; Paris, France, 27–29 September 2010

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Climate projections point toward more frequent and intense weather and climate extremes such as heat waves, droughts, and floods, in a warmer climate. These projections, together with recent extreme climate events, including flooding in Pakistan and the heat wave and wildfires in Russia, highlight the need for improved risk assessments to help decision makers and the public. But accurate analysis and prediction of risk of extreme climate events require new methodologies and information from diverse disciplines. A recent workshop sponsored by the World Climate Research Programme (WCRP) and hosted at United Nations Educational, Scientific and Cultural Organization (UNESCO) headquarters in France brought together, for the first time, a unique mix of climatologists, statisticians, meteorologists, oceanographers, social scientists, and risk managers (such as those from insurance companies) who sought ways to improve scientists' ability to characterize and predict climate extremes in a changing climate.

More than 130 people from 32 countries attended the workshop. Oral sessions were dedicated to hydroclimate extremes, heat waves, extreme extratropical and tropical cyclones including storm surges, methodologies for estimation of extremes, and risk assessment. More than 75 posters were on display. The workshop concept, program, and presentations are available at <http://www.extremeworkshop.org>. Breakout groups were held to develop recommendations concerning (1) data requirements and availability, (2) representation of extremes in models, and (3) methodologies for estimating extremes. The workshop identified critical problems for accurate estimation of climate extremes and effective management of their risks. In particular, these critical problems include limited availability of high-resolution data in both space and time, insufficient capability of climate models to simulate phenomena leading to extreme events, and still undeveloped statistical methodologies. To overcome these problems, workshop participants prioritized activities to improve estimation of climate extremes; the most important activities focused on the following:

- Improved high-temporal-resolution (subdaily) data sets that can be used to assess changes in extreme rainfall, drought, heat waves, floods, and storms
- Model evaluation with the focus on the model's ability to replicate extremes and to better compare model output with observations
- Determination of the main phenomena responsible for extremes and improved understanding of the relevant physical processes
- Development of robust statistical methods for assessing extremes and their uncertainties and making these tools available for widespread use
- Development of an activity on analysis of extremes utilizing data archived by the WCRP Coupled Model Intercomparison Project.

A white paper is being prepared to develop more detailed recommendations for action based on the workshop discussions. The outcomes of this workshop are expected to feed into a larger WCRP cross-cutting effort targeted at climate extremes that also includes, among other things, a focus on drought (see <http://drought.wcrp-climate.org/workshop/index.html>).

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