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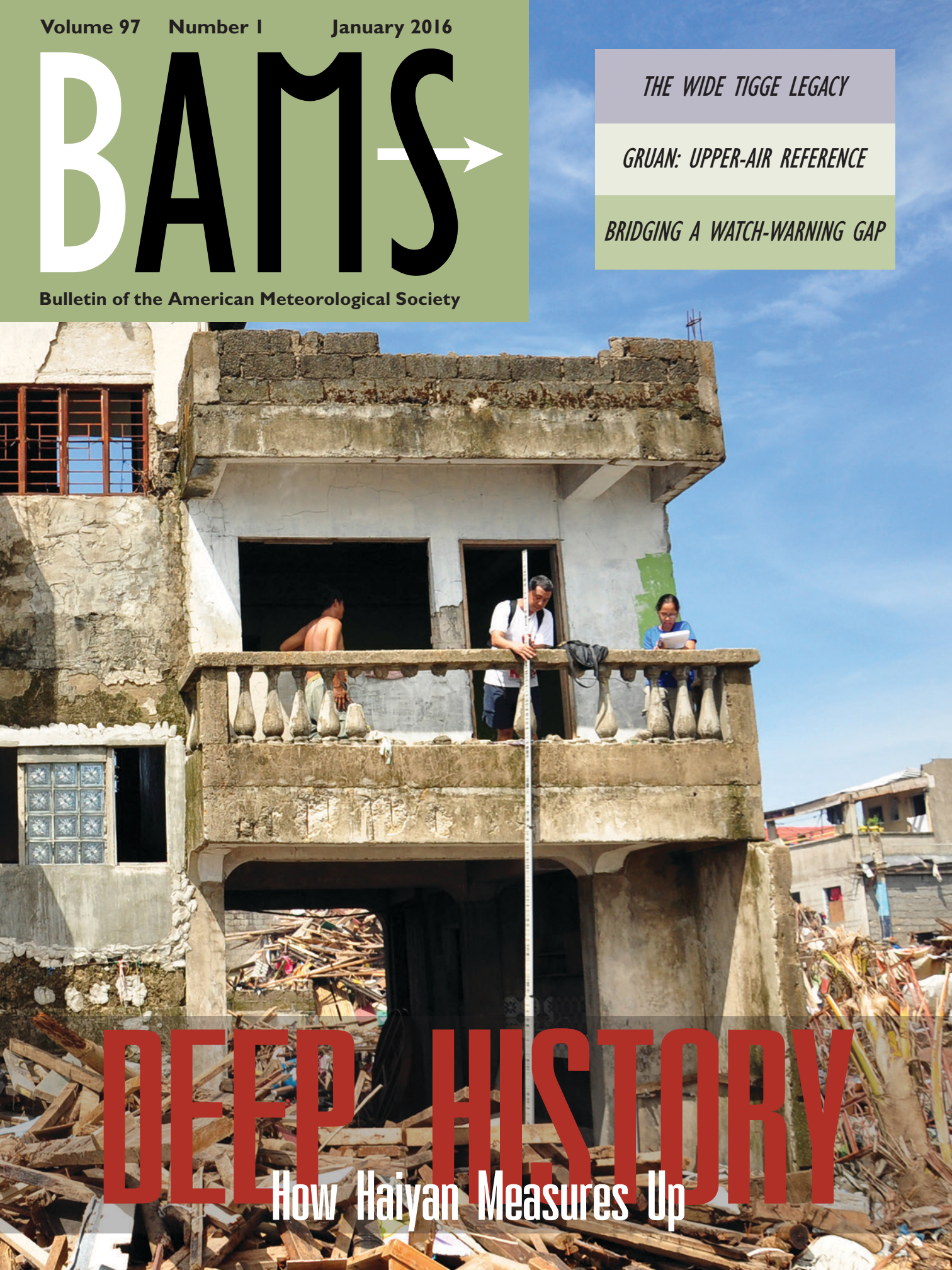
THE WIDE TIGGE LEGACY

GRUAN: UPPER-AIR REFERENCE

BRIDGING A WATCH-WARNING GAP



DEEP HISTORY

How Haiyan Measures Up

GIS-based Data Portal for Climate Change Impact Assessment

Recent modeling efforts suggest that the continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive, and irreversible impacts on humans and ecosystems. While mitigating climate change would require substantial and sustained reductions in greenhouse gas emissions through worldwide consensus and collaborations, adapting to climate change has become a major focus of local policymakers and development practitioners. Sound decisions rely on impact-based modeling, but the coarse-resolution outputs of global climate models (GCMs) are unsuitable for driving impact models, which usually require finer resolution projections at both spatial and temporal scales. Effective downscaling of GCM projections is thus required, but it is particularly difficult due to the lack of computational resources and/or long-term reference data. Such difficulty has become a major barrier preventing informed climate change adaptation planning at regional scales.

To address this challenge, we developed probabilistic high-resolution regional climate projections using an ensemble modeling approach. A web-based and user-friendly public data portal with integration of advanced geographic information system (GIS) technology, named Ontario CCDP (http://ontarioccdp.ca), has been established to allow intuitive and open access to high-resolution climate scenarios. It offers functions of visual representation through geospatial maps and data downloading for a variety of climate variables (e.g., temperature, precipitation, relative humidity, solar radiation, and wind) at multiple temporal resolutions (i.e., annual, seasonal, monthly, daily, and hourly). The vast amount of information this portal encompasses can provide a crucial basis for assessing impacts of climate change on local communities and ecosystems and generating relevant adaptation strategies.

Rainfall intensity-duration-frequency (IDF) curves are widely used to summarize extreme rainfall event characteristics, which are critical for designing flood protection and many other civil engineering structures (e.g., stormwater sewers, dams, and bridges). Therefore, in addition to the high-resolution projections for typical climate variables, we also develop projected IDF curves at grid point scales under future climatic conditions. The projected IDF curves are made available at Ontario CCDP, allowing development practitioners to convert climate projections into water flow and flood risks for supporting engineering design under a changing climate.

Since its initial launch in January 2014, Ontario CCDP has received more than 17,200 downloading requests from over 180 registered users, including academia, municipal and provincial agencies, nongovernment agencies, and private sectors. Our climate data have been widely used for different research purposes, such as agricultural impact and risk assessments, water quality and quantity forecasting, infrastructure design and operations, wind power applications, and many others. The increasing visits to the portal demonstrate that easy and open access to regional climate data is essential for promoting further impact studies. —Xiuquan Wang (University of Regina), G. Huang, J. Liu, Z. Li, and S. Zhao, "Ensemble projections of regional climatic changes over Ontario, Canada," in the 15 September issue of the *Journal of Climate*.

Fig. 2. A GIS-based data portal, named Ontario CCDP (http://ontarioccdp.ca), presents high-resolution climate projections over Ontario, Canada, using vector-based gridded maps. Through integration of many auxiliary tools (e.g., map layer selector, information panel switcher, basemap selector, transparency controller, and zooming features), this portal allows users to explore spatial variability in local climate and to locate relevant climate data and intensity-duration-frequency (IDF) curves for further impact assessment. The green color mask represents the spatial coverage of all climate data and IDF curves. By clicking on each grid cell, users can view the IDF curves and download the related climate data for the grid cell.