

Preface

Subsequent to publication of the fourth assessment report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) and awarding of the 2007 Nobel Peace Prize to the IPCC, there has been wide recognition that anthropogenic greenhouse gas emissions are causing changes in climate, and there has been much discussion about the nature and magnitude of changes in climate extremes while the global climate warms throughout this century. Such discussion notably influences adaptation to and disaster risk management for climate change. Multi-model datasets used for the IPCC AR4 as a part of the Coupled Modeling Intercomparison Project phase 3 (CMIP3) have provided good information about future climate changes on a large horizontal scale and monthly time-scale. The low horizontal resolution of the CMIP3 models, however, has been an obstacle to obtaining physically sound information on future changes in extreme weather events; as an unfortunate result, research on both climate projections and impact assessments has been done without the information needed for a fully informed analysis.

We have been working to conduct extreme event projections and assess their impacts as one of the three teams under the auspices of the Innovative Program of Climate Change Projection for the 21st Century (KAKUSHIN), in collaboration with the Meteorological Research Institute (MRI); Disaster Prevention Research Institute, Kyoto University (DPRI); the International Centre for Water Hazard and Risk Management (ICHARM); the National Institute for Land and Infrastructure Management (NILIM); and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). This program has been funded by the Ministry of Education, Culture, Sports, Science and Technology-Japan (MEXT) and has enabled us to use a supercomputer, Earth Simulator. MRI used super-high-resolution atmospheric models to project extreme weather events such as tropical cyclones and severe rainfall and quantified and reduced the uncertainty in climate change projections. Physically sound information on future changes in extreme weather events as well as climatological mean conditions has allowed (1) DPRI to assess climate change impacts on watersheds during environmental disasters in Japan, (2) ICHARM to integrate assessments of the impact of climate change on the risks of disastrous floods and measures to reduce those risks globally and in specific vulnerable areas, and (3) NILIM to study climate-change impacts on plans for river management in Japan.

Under the auspices of our KAKUSHIN Team-3 and DPRI, and in cooperation with the Japan Society of Hydrology and Water Resources (JSHWR), the KAKUSHIN Team-3 held two open symposia: the first, in November 2009, on Extreme Weather and Impact Assessments for better predictions and assessments, and the second, in September 2011, for contribution to the IPCC AR5. Participants gave cutting-edge presentations that covered research ranging seamlessly from climate projections to impact assessments based on most of the projected results. Out of more than 100 presentations, 22 articles have been published in Hydrological Research Letters. Many of the 22 articles are cited in the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), which was published in March 2012. Because these articles include the latest advanced achievements in climate projections and impact assessment, their publication as a special collection of Hydrological Research Letters was deemed worthwhile. We hope that this special collection contributes to the IPCC

AR5 and provides many scientists, engineers, and policy makers with access to the latest projections of future climate and impact assessments.

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KAKUSHIN Team-3