

## Preface to the Special Issue on “Climate Changes and Their Impacts in Taiwan”

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Climate change and global warming may no longer be a matter of faith. A huge number of researches on climate change and global warming have been reported since the late 20<sup>th</sup> century. The Fifth Annual Report (AR5) from the Intergovernmental Panel on Climate Change (IPCC) released in 2013 and 2014 reports an observed increase of 0.85°C in the global average temperature during 1880 - 2012 with an accelerating increase rate in recent years. Many events and evidences around the world also reveal that extreme climates, such as heat waves, droughts, and torrential rainfalls are changing in terms of their frequency of occurrences and severity.

For a small region like Taiwan, developing high-resolution climate projections for various impact assessments remains a challenging task. In coping with this challenge, the Ministry of Science and Technology, R.O.C. has been supporting a national climate change project “The Taiwan Climate Change Projection and Information Platform Project (TCCIP)” since 2009. The TCCIP has compiled a large dataset of historical weather and climate records and outputs from many climate models. Through data digitization, assimilation, spatial interpolation, and statistical/dynamic downscaling, gridded meteorological datasets with high spatial and temporal resolutions were produced. Data generated by the TCCIP have been applied for various climate change impact assessments, including flood inundation, drought, landslide, and coastal disasters.

The TCCIP is coordinated by the National Science and Technology Center for Disaster Reduction (NCDR). In addition

to NCDR, many researchers at universities, government departments, and research institutes also undertook certain tasks in support of TCCIP. One major aim of the TCCIP is to bridge the gaps between the data producers and end users and convey useful and correct information regarding the climate projection data to the end users of various disciplines. To achieve this goal, TCCIP forms four research teams with specific research objectives and missions. Research Team 1 focuses on compiling observed datasets, constructing calibrated and gridded datasets and conducting model output analyses. Research Team 2 aims to produce downscaled data through statistical and dynamic downscaling. Research Team 3 develops modeling and simulation techniques for climate change impact assessments and their uncertainties in various applications. A newly established Research Team 4 focuses on data services, communication and promotion of TCCIP data usages.

This special issue presents major scientific evidences and insightful findings of the TCCIP and other research works using TCCIP data from various fields. Major themes and sub-topics of this special issue are summarized as follows.

### I. Climate Change and Extremes in Taiwan

- (1) Climate variability reflected by the winter temperature (Lu et al. 2016).
- (2) Climate variation of the East Asian Winter Monsoon (Kao et al. 2016).
- (3) Extreme rainfall evaluation using a standardized index (Tung et al. 2016).
- (4) Summer convective afternoon rainfall projection (Huang et al. 2016a, b).

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## II. Climate Projection and Downscaling Techniques

- (1) Bias correction of MRI-WRF dynamic downscaled hourly typhoon rainfall and daily solar radiation (Su et al. 2016).
- (2) Constructing a multi-scalar drought index 1-km gridded dataset in Taiwan (Weng 2016).
- (3) Typhoon activities over the Western North Pacific Region (Tsou et al. 2016).

## III. Assessing the Impact and Risk of Climate Change in Taiwan

- (1) Landslide impact (Wu et al. 2016).
- (2) Changes in river beds (Chao et al. 2016).
- (3) Flood losses under projected extreme weather events (Wei et al. 2016).
- (4) Changes in stream flow at catchment scale (Chen et al. 2016).

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