Leadership in Sustainable Infrastructure

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Case Study

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CCDP: GIS-BASED DATA PORTAL FOR CLIMATE CHANGE IMPACT ASSESSMENT

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1 Background

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 policy makers 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 GCMs projections is thus required, but it is practically 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, a GIS- and web-based data portal will be established to allow intuitive and open access to high-resolution climate scenarios, thus to support decision making of effective climate policies at both regional and local scales.

2 Framework of CCDP

The developed data portal is named Climate Change Data Portal (CCDP) and is available to the public at http://ccdp.network. CCDP now contains three entries to allow free access to high-resolution climate data for Canada (i.e., Canada CCDP, available at http://canadaccdp.ca), China (i.e., China CCDP, available at http://chinaccdp.org), and the Province of Ontario (i.e., Ontario CCDP, available at http://ontarioccdp.ca), respectively. CCDP 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. As rainfall intensity-duration-frequency (IDF) curves are widely used to summarize the characteristics of extreme rainfall events characteristics, which are critical for designing flood protection structures 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, CCDP also includes projected IDF curves at grid point scales under future climatic conditions. The projected IDF curves allows development practitioners to convert climate projections into water flow and flood risks for supporting engineering design under a changing climate.

3 Summary

Since its initial launch in January 2014, CCDP has received more than 22,000 downloading requests from over 310 registered users, including academia, municipal and provincial agencies, non-government agencies, and private sectors. The climate data provided by CCDP has 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 CCDP demonstrate that easy and open access to high-resolution regional climate data is essential for promoting further impact studies.

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References

Wang, X., G. Huang, J. Liu, Z. Li, and S. Zhao 2016. GIS-based Data Portal for Climate Change Impact Assessment. *Bulletin of the American Meteorological Society*, 97: 17-18.

Wang, X., G. Huang, J. Liu, Z, Li, and S. Zhao 2015. Ensemble Projections of Regional Climatic Changes over Ontario, Canada. *Journal of Climate*, 28: 7327-7346.