



Possible Impacts of Climate Change on Wind Gust under Downscaled Future Climate Conditions over Ontario, Canada

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The overarching purpose of this study was to project changes in the occurrence frequency and magnitude of future wind gust events under downscaled future climate conditions over Ontario, Canada. Wind gust factors were employed to simulate hourly/daily wind gust based on hourly/daily wind speed. Regression-based downscaling methods were used to downscale future hourly/daily wind speed to each of the 14 selected cities in Ontario for eight GCM models with IPCC SRES A2 and B1 scenarios. The wind gust simulation models were then applied using downscaled future GCM wind speed data to project changes in occurrence frequency and intensity of the future hourly/daily wind gust events. Downscaling transfer functions and wind gust simulation models were validated using a cross-validation scheme and comparing data distributions and extreme-event frequencies derived from downscaled GCM control runs and observations over a comparative time period 1961–2000. The results showed that the models for all variables used in the study performed well. By comparing the current-past averaged conditions, the occurrence frequency and intensity of future wind gust events in the study area are projected to increase. The modeled results from this study found that the frequency and intensity of future wind gust events are projected to significantly increase under a changing climate in this century.

This talk will introduce the research project and outline the modeling exercise and verification process. The major findings on future wind gust projections from the study will be summarized in the presentation as well. One of the major conclusions from the study is that the procedures used in the study are useful for climate change impact analysis on future wind gusts. The implication of the significant increases in future wind gust risks would be useful to be considered when revising engineering infrastructure design standards and developing adaptation strategies and policies.