Quantifying the Potential Impacts of Climate Change on Trends in Extreme Weather for Great Lakes Agriculture

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Notable weather events in the United States over the last several years, such as severe droughts and floods in the Midwestern and Western regions of the country, have demonstrated the widespread impacts that natural disasters can have on agriculture. Data on extreme weather events suggest that the impacts of these events have been increasing over the past several decades (Wuebbles, 2016; Smith and Katz, 2013). Climate change could exacerbate these trends, leading to even greater future effects on U.S. agriculture and food security (Hatfield et al., 2014; Dai et al., 2016; Manale et al., 2016; Tripathi et al., 2016; Karl et al., 2012). While climate change has the potential to be positive or negative for agricultural production depending on the location, a better understanding of potential future trends in extreme weather events at local and regional scales is essential for effective adaptation planning (Hatfield et al., 2014; Manale et al., 2016).

The purpose of this research is to improve understanding of the impacts of climate change on extreme weather events in North America's Laurentian Great Lakes region, particularly within the context of agricultural production. Existing research suggests that climate change could have significant impacts on extreme weather events in the region (Mortsch et al., 2000; McBean and Motiee, 2008; Hayhoe et al., 2010; Mishra et al., 2010).

We are using Coupled Model Intercomparison Project Phase 5 (CMIP5) data and the Variable Infiltration Capacity (VIC) model to examine how climate change could impact trends in extreme weather, including temperatures, precipitation, and extreme weather events, as these variables have been shown to significantly impact agriculture (Hertel and Baldos, 2016; Lesk et al., 2016). The findings of this research could help inform the development of climate change adaptation strategies by agricultural producers in the Great Lakes region.

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