

An Enhanced Lake Effect Nowcasting Tool Using Synergistic GOES-R, NEXRAD, and Ground-Based Snowfall Microphysics Observations

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Abstract

The primary goal of the proposed work is to develop an enhanced lake-effect snow (LES) nowcasting tool from next generation GOES-R observations. This GOES-R product will utilize concurrent GOES-R, NEXRAD, and ground-based snow microphysical observations in the product development phase to create a near real-time satellite-based snowfall rate product for the Great Lakes region. This product will improve situational awareness for this unique severe winter weather type and will mitigate limited ground-based radar coverage for shallow LES bands that hinders LES nowcasting capabilities in the Great Lakes region.

Specific goals of this project include:

- Improve NEXRAD-derived snowfall rate estimates using ground-based snow microphysics observations to develop improved radar reflectivity to snowfall rate conversions for various LES modes.
- Co-locate GOES-R products and NEXRAD-derived snowfall rates to calibrate GOES-R products for Great Lakes LES events. A near real-time satellite-based snowfall rate product will be developed by empirically linking NEXRAD snowfall rates to GOES-R derived cloud properties.
- Co-locate GOES-R GLM data with NEXRAD-derived snowfall rates to investigate lightning production and snowfall rate relationships.

This project builds upon a strong pre-existing working relationship between CIMSS researchers and Marquette, MI (MQT) National Weather Service (NWS) Weather Forecast Office (WFO) staff for both the data collection and product testing/training phases. The proposed work also leverages special instrumentation deployed at MQT for LES snowfall research and previous related developmental work from NOAA GIMPAP funding.