Inland Extent of Lake-Effect Snow

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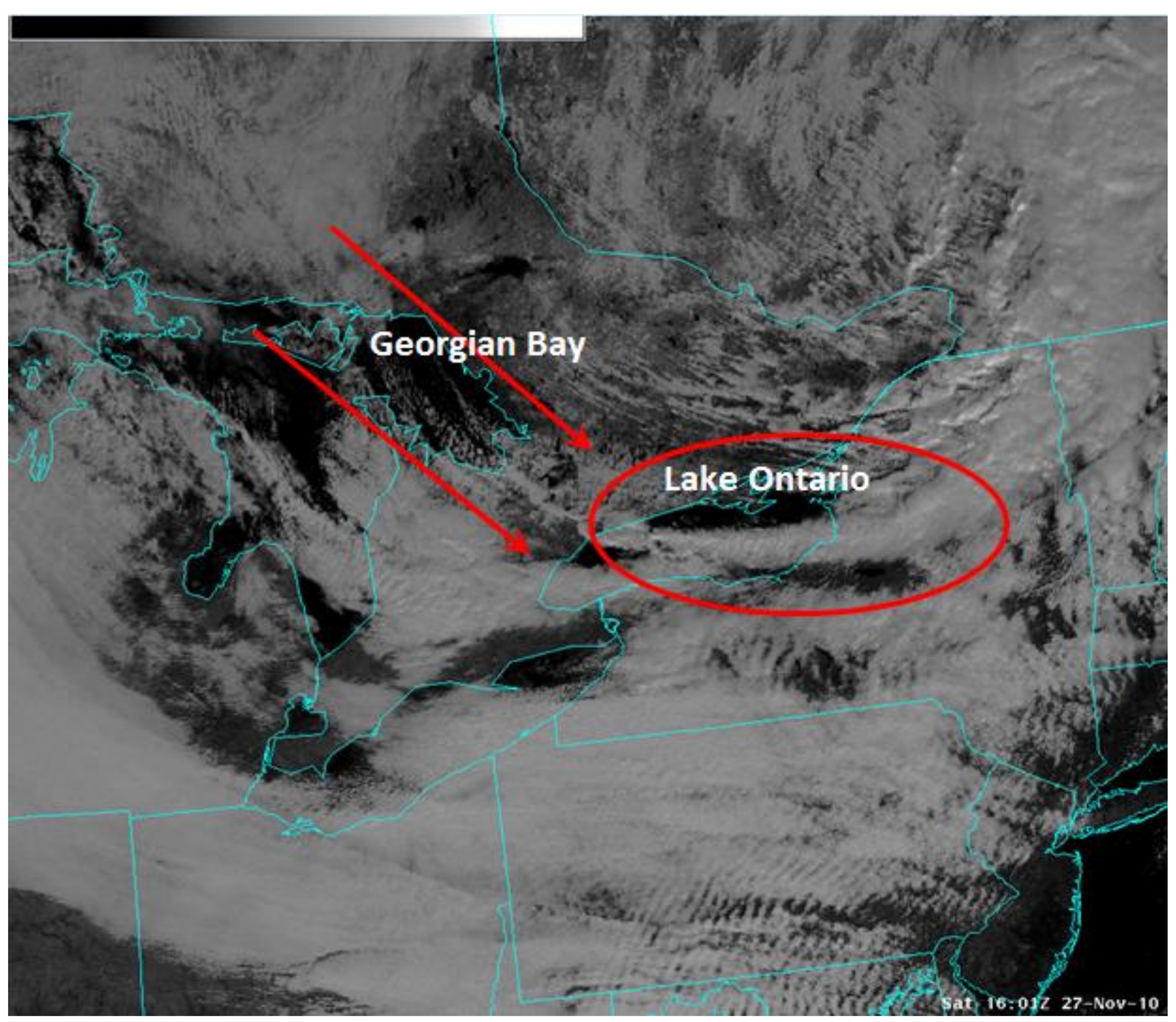
Motivation

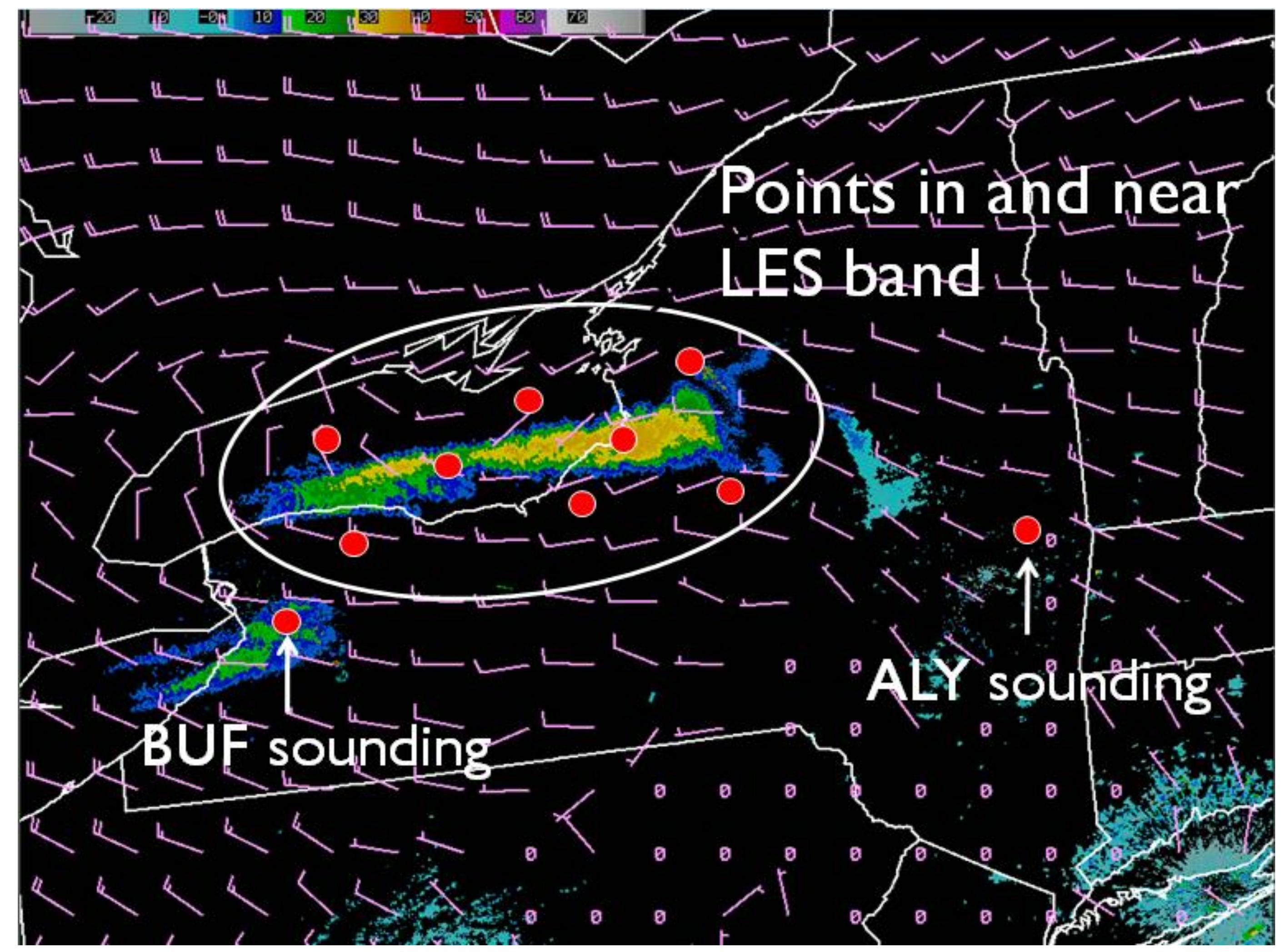
Although many components of lake-effect snow forecasting have been well studied over the years, one that has not has been the inland extent of lake-effect snow bands.

Accurate forecasts of the inland penetration of lake-effect snow bands can be a critical determination in NWS Watch/Warning/Advisory decisions.



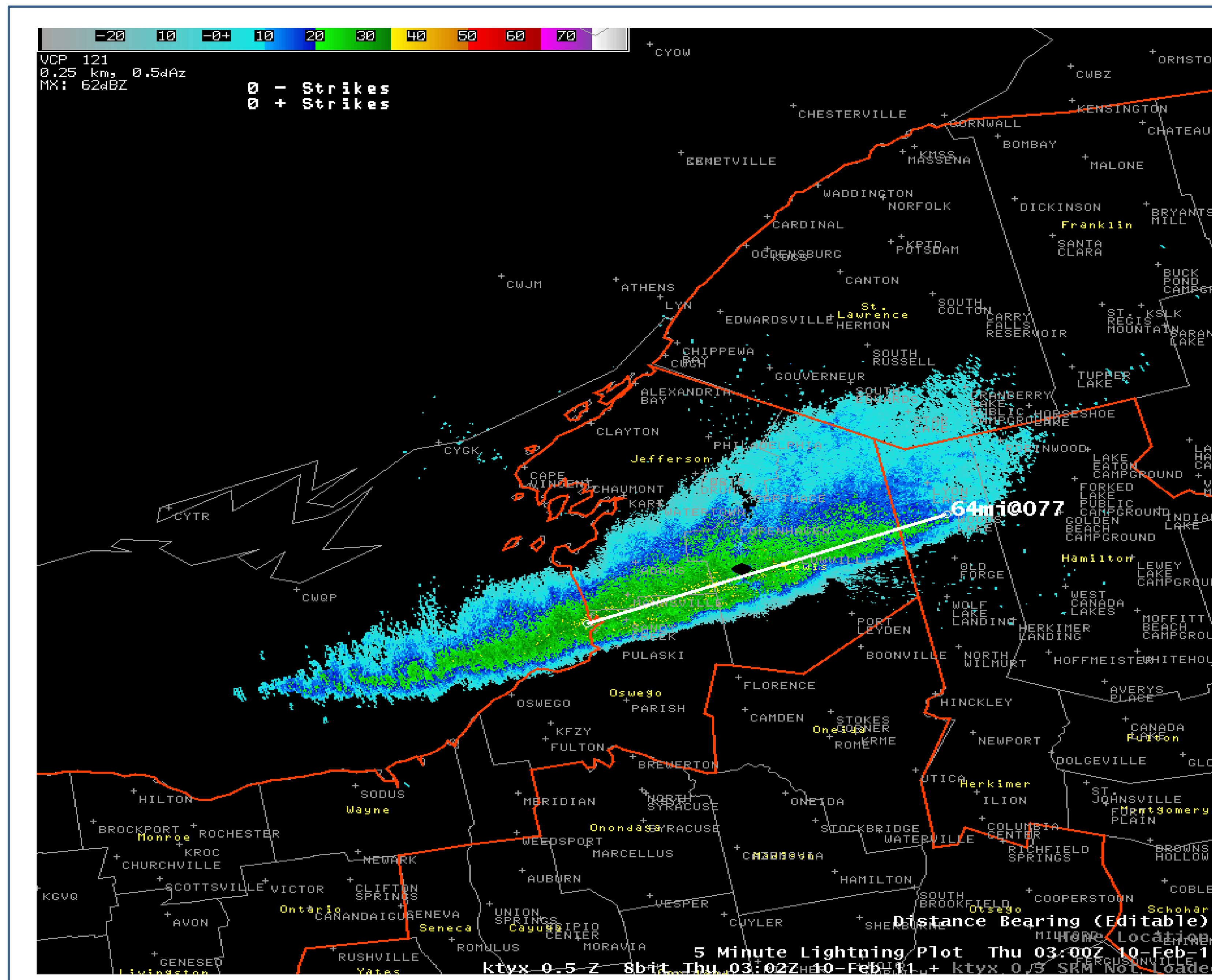
This visible satellite image (1601 UTC, 27 Nov 2010) depicts an example of a significant Lake Ontario single band, with upwind moisture connections to Georgian Bay. It is just these types of events where determining the inland extent of significant lake-effect snow is very important for NWS Watch/Warning/Advisory operations.

Methodology



A number of lake-effect snow events were studied across Central and Eastern NY, during the winters from 2006-2010. The goal was to identify the most strongly correlated atmospheric parameters to significant inland extent. As the above graphic portrays, our method (for each event at 6 hourly intervals) was to pick a number of data points (utilizing initialized model fields from the 12-km North American Mesoscale Model (NAM), as well as actual sounding data), both within and just on the periphery of well defined Lake Ontario single bands.

As seen below, a distance measuring tool (outlined by the white polyline) was used to determine the exact inland extent (in nmi), at these same 6 hourly intervals.

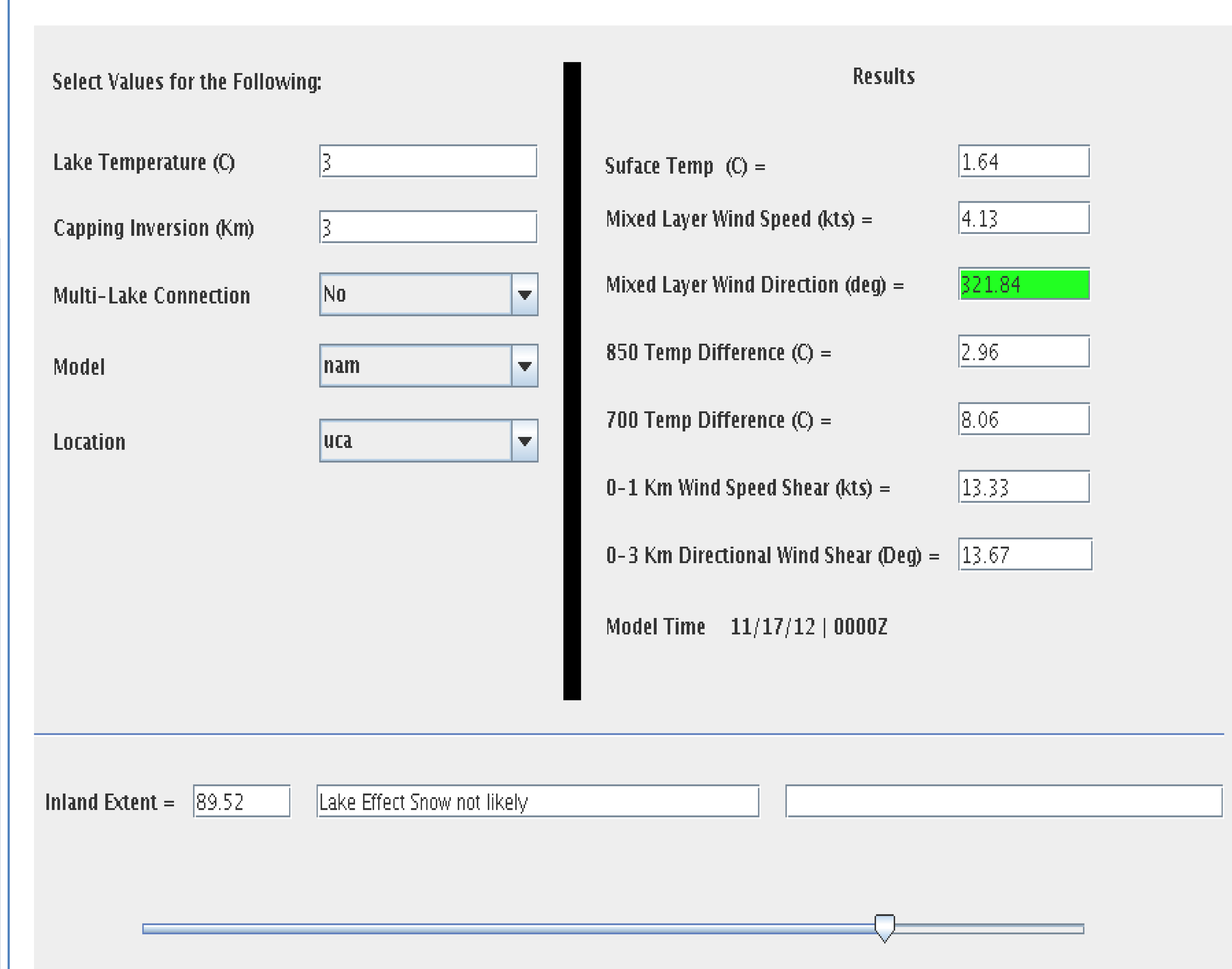


Results

Top 3 Most Strongly Correlated Parameters to Inland Extent:

- **The existence of a Multi-Lake Connection (MLC – Strong Positive Correlation)**
- **Lake / Air Temperature Differentials in the 850-700 mb Layer (Strong Negative Correlation)**
- **Speed Shear in the 0-1 km Layer (Strong Positive Correlation)**

Forecast Application Tool



Based on the above cited correlations, a forecast tool was developed to give NWS personnel an estimate (in nmi from the shoreline) of inland extent, utilizing both real-time model and forecaster input.