WEATHERLOGICS

NHP Workshop – October 30, 2023

HAIL MONITORING AT WEATHERLOGICS

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Overview

- Background
- Hail technology
  - Hail database
  - Radar processing
- Hail forecasting
- New Developments
- Questions

BACKGROUND

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Background - History

- Weatherlogics established in late 2016 by Scott Kehler and Matt Desorcy in Winnipeg
- Initially provided services for the agriculture and insurance industries
- Expanded to provide services to transportation companies and governments

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Background - Hail

- Matt Desorcy began collecting hail data in 2015 for some parts of the country
- Weatherlogics began collecting hail data nationally in 2017
  - Need for high-quality national data for real-time and historical purposes
- Weatherlogics established a system of data collection and quality-control based loosely on the European Severe Weather Database

HAIL TECHNOLOGY

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Hail Technology

- Weatherlogics hail database
  - Our catalogue of hail events in Canada
  - Partnerships

- Hail estimates from weather radar
  - Software for processing radar volumes

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Weatherlogics Hail Database

- About 10,000 hail reports collected since 2015
  - Location saved (within 2 km or less)
  - Diameter (within 5 mm or less)
  - Time (within 15 min or less)
  - City, province, notes, etc

- Additional 20,000 reports from Manitoba and Saskatchewan from our partners at Coop Hail Insurance

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Quality Standards

- We have created a system of quality control that has three levels (QC0, QC1, QC2)
  - Quality-control level 0 (QC0): Hail is known to have occurred, but there is not enough information to accurately catalogue it.
  - Quality-control level 1 (QC1):
    - Hail location is known to within 2000 m
    - Hail size is known to within 5 mm
    - Hail time is known to within 15 minutes
  - Quality-control level 2 (QC2)
    - Hail location is known to within 250 m
    - Hail size is known to within 2 mm
    - Hail time is known to within 5 minutes

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Quality Standards

- If the location and time of a report can be accurately identified, but the size cannot, we do enter the report as “size unknown”
- We sometimes enter null reports if hail was expected at a location, but none occurred
- Maintaining high quality reports is critical. Hail is very localized and inaccurate/imprecise reports make research difficult or impossible.

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Partners

- We have partnered with Coop Hail Insurance to share hail claims data
  - Very useful to identify where hail has occurred
  - Data indicates date, location, and relative intensity of hail damage
  - Resolution about to about 400 m
- Also partnered with other crop hail insurers, but data cannot be shared
- Hope is that the insurers will eventually work together to provide a complete climatology of Prairie hail based on observed damage

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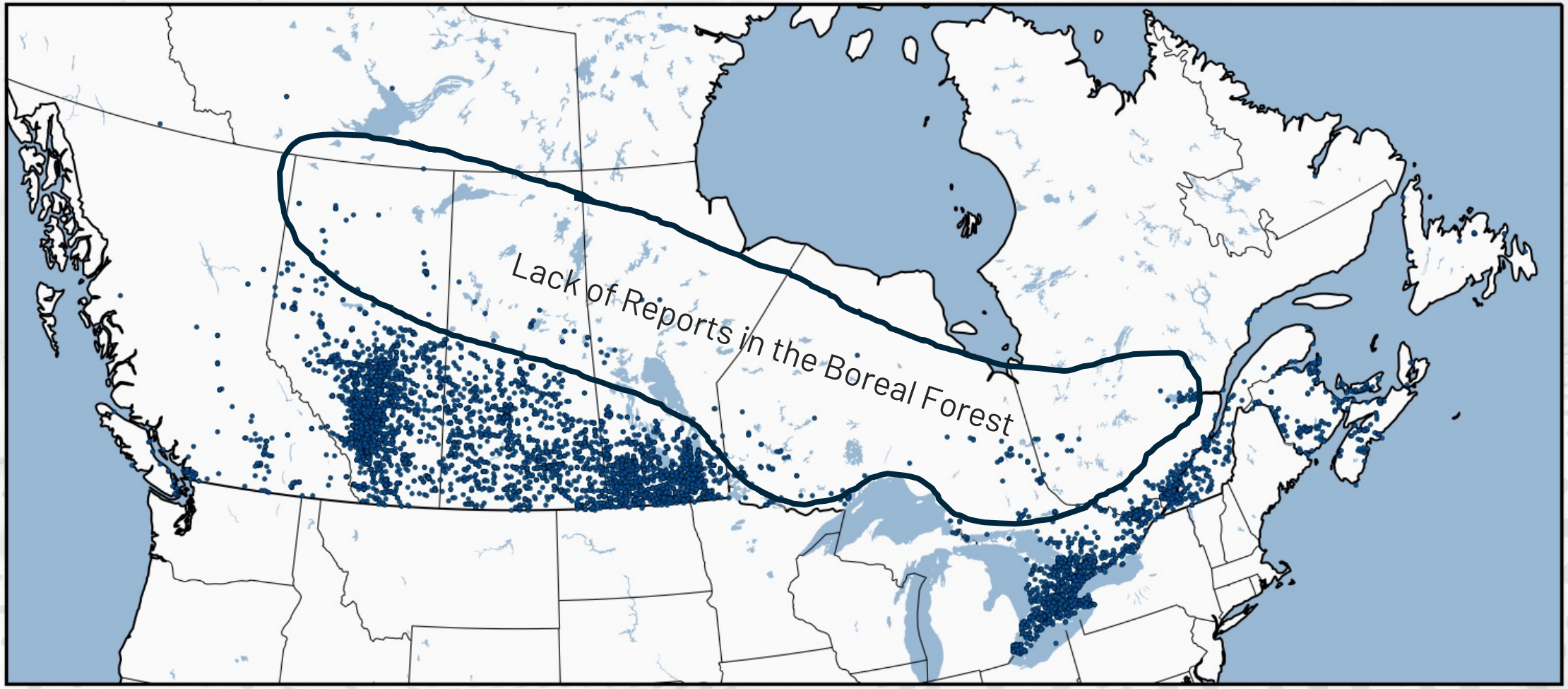
Weatherlogics Reports Since 2015



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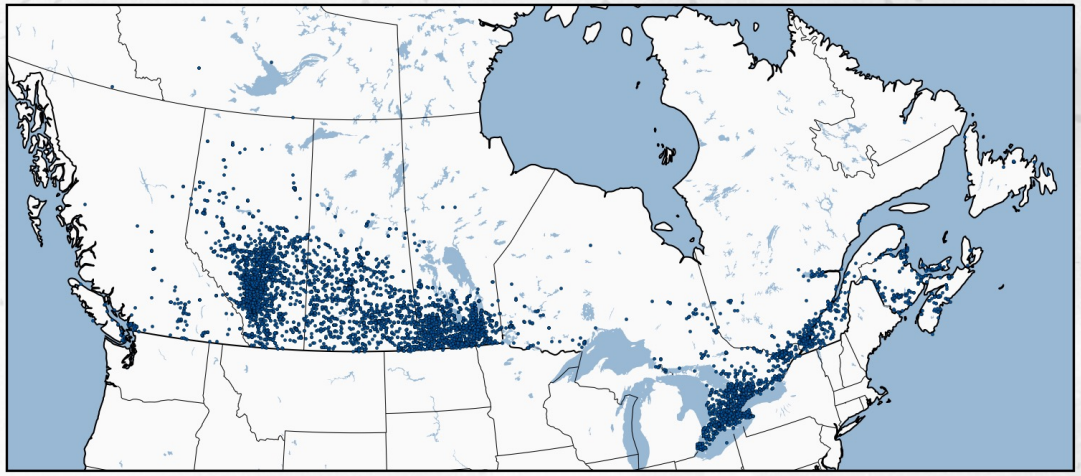
Reporting Biases



- There is a strong bias in reports towards large cities and agricultural areas
- We are certain that hail in the boreal forest is under-reported, we just don't know by how much
- Our team will make phone calls to identify hail in remote areas, but there is often nobody to contact within the path of the storm
- We have reviewed historical data that suggests there were very active hail periods in the 1980s and 90s
  - It is difficult to compare these periods to the present due to the significant recency bias caused by social media reports

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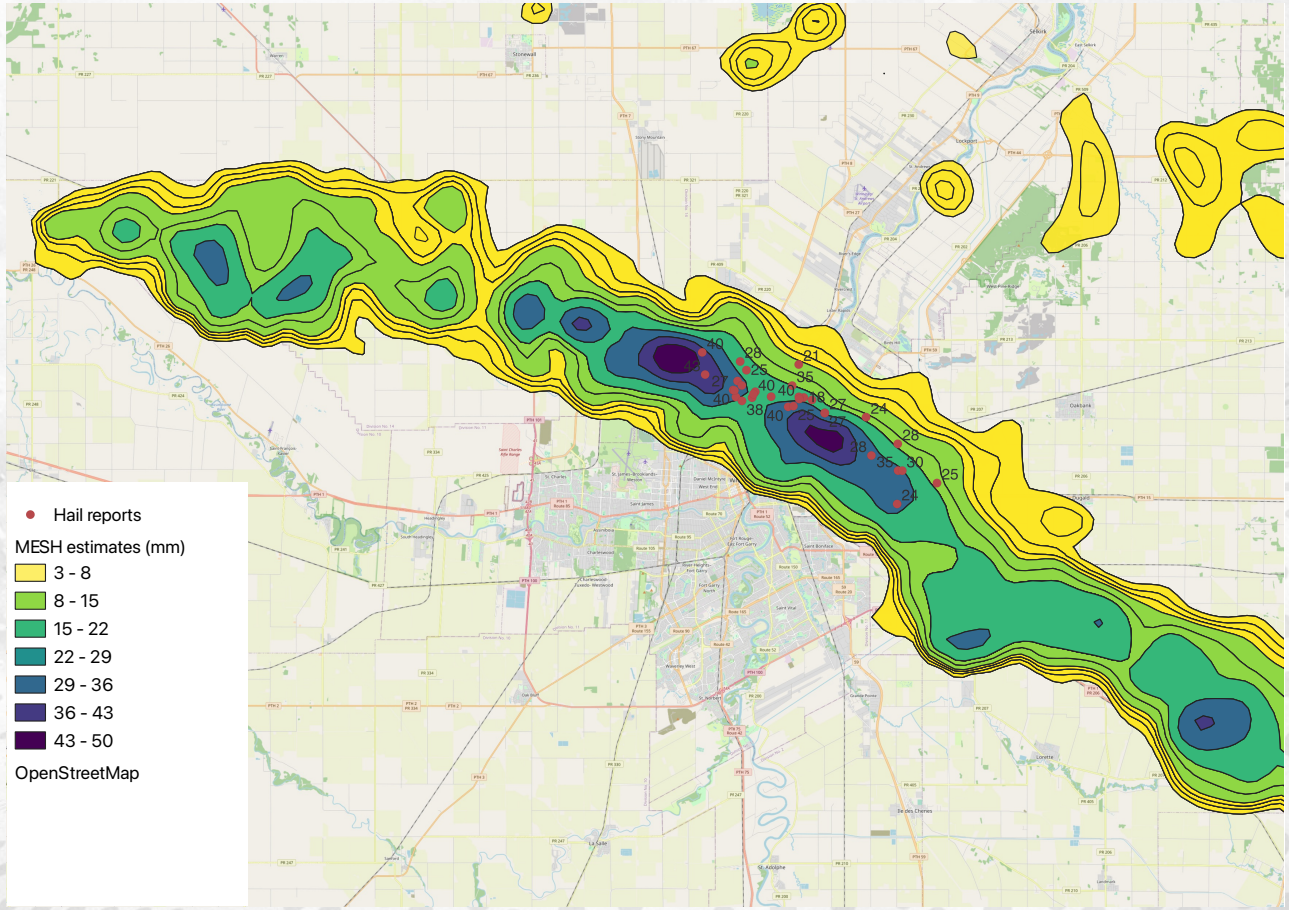
Weather Radar Processing

- We have developed software to process Canadian radar volumes to produce hail swaths
  - Maximum estimate hail size (MESH)
  - Kinetic Energy
  - Exploring dual-pol products to improve estimates

Winnipeg hail storm – August 24, 2023



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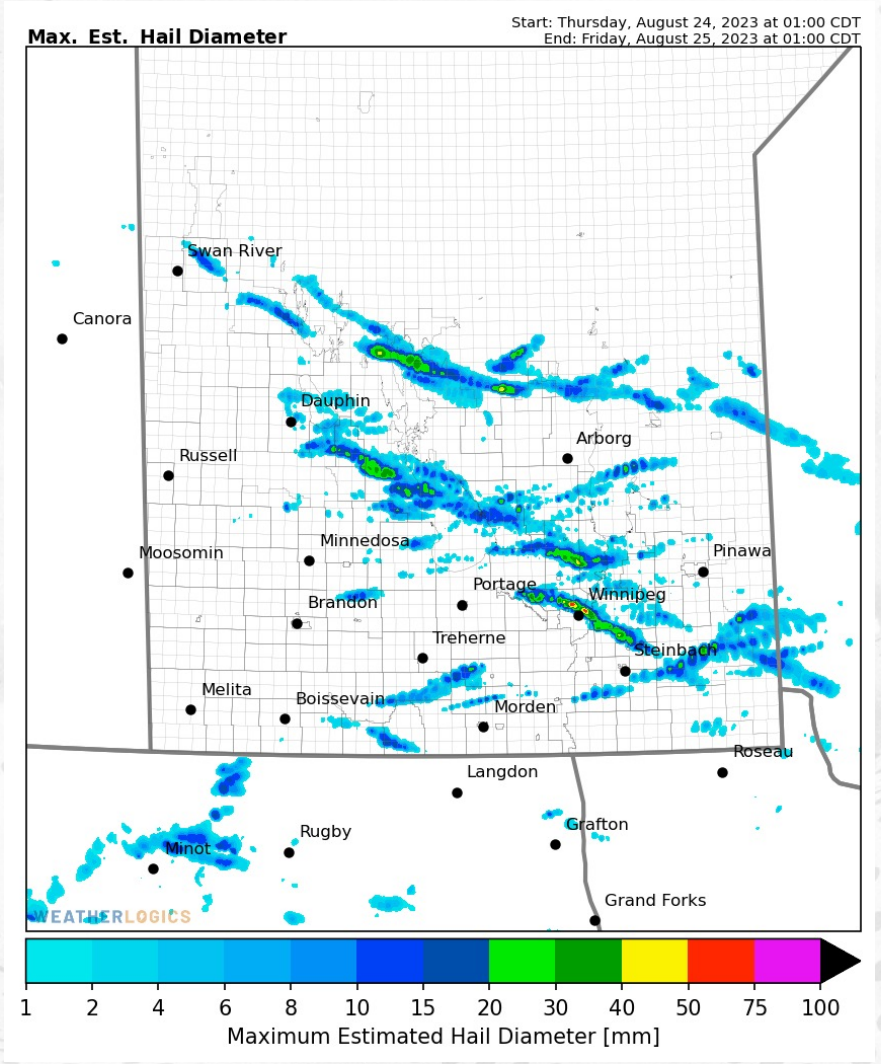
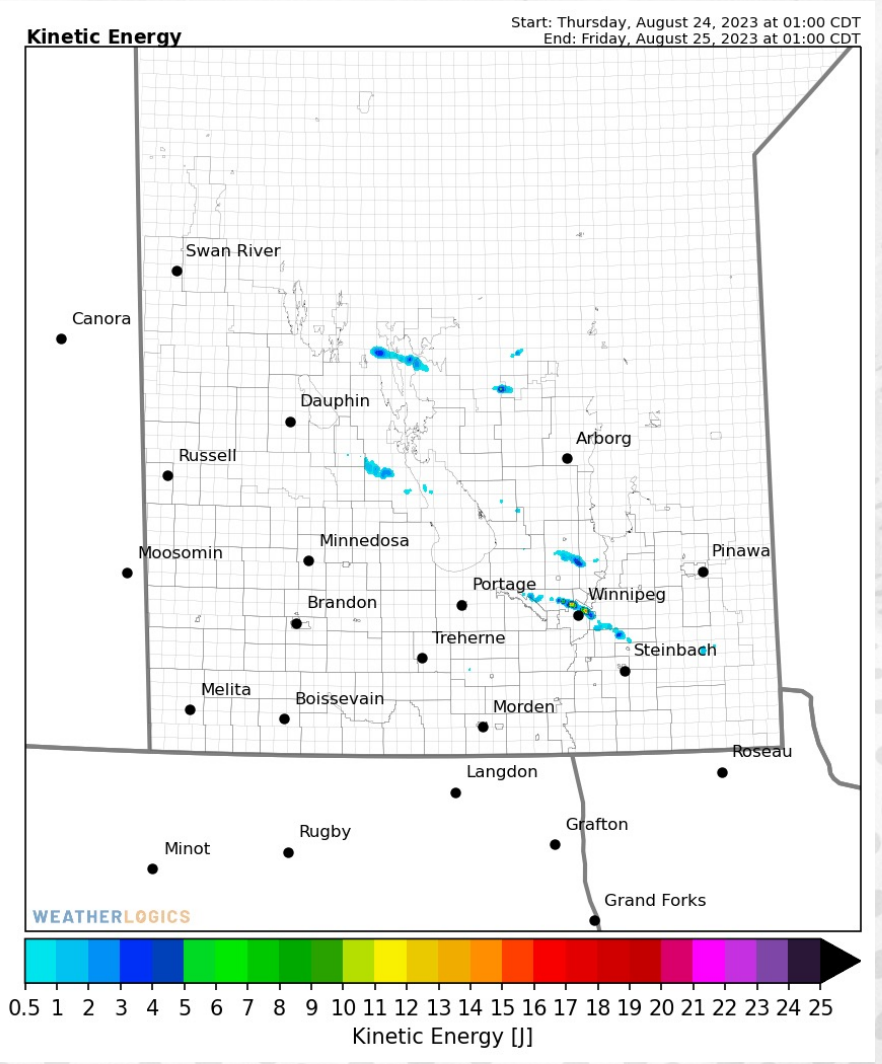
Hail Maps for Insurance

- Produce daily maps for crop insurers
  - MESH often doesn't tell the whole story
  - Duration of hail is important – small hail that lasts for an extended period of time is often responsible for crop damage





HAIL FORECASTING

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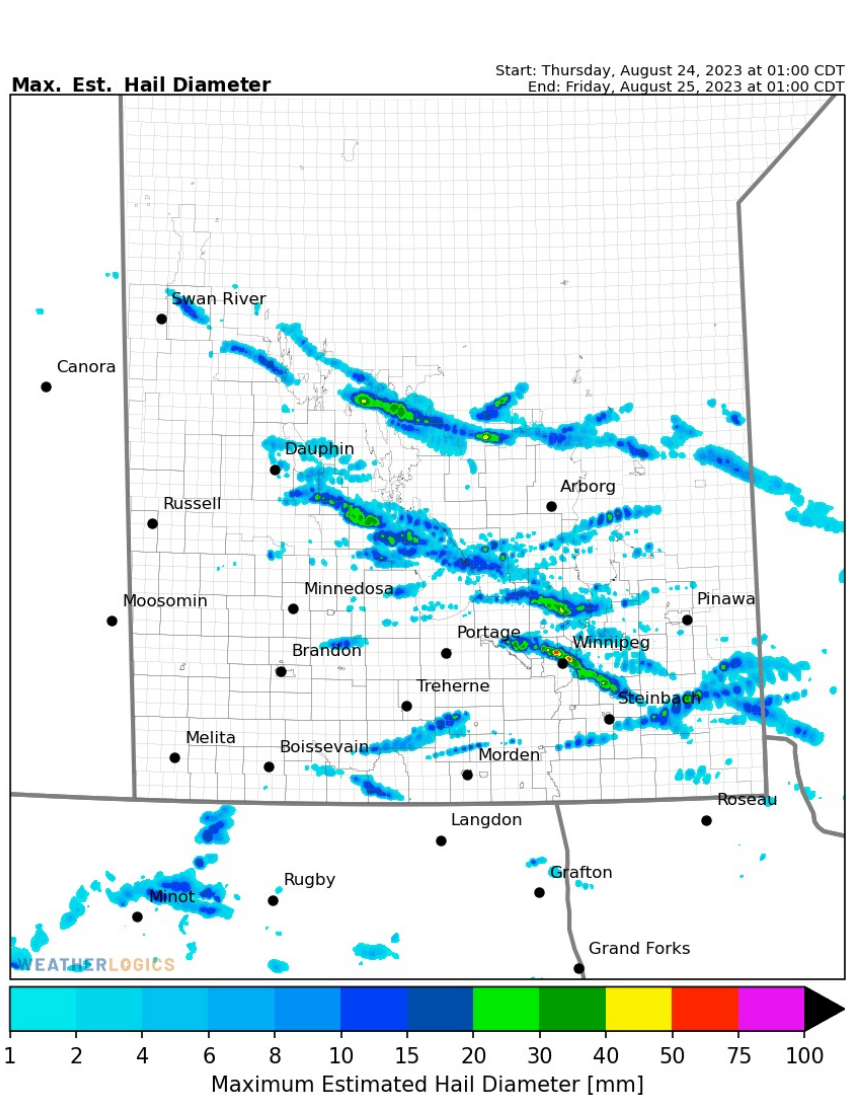
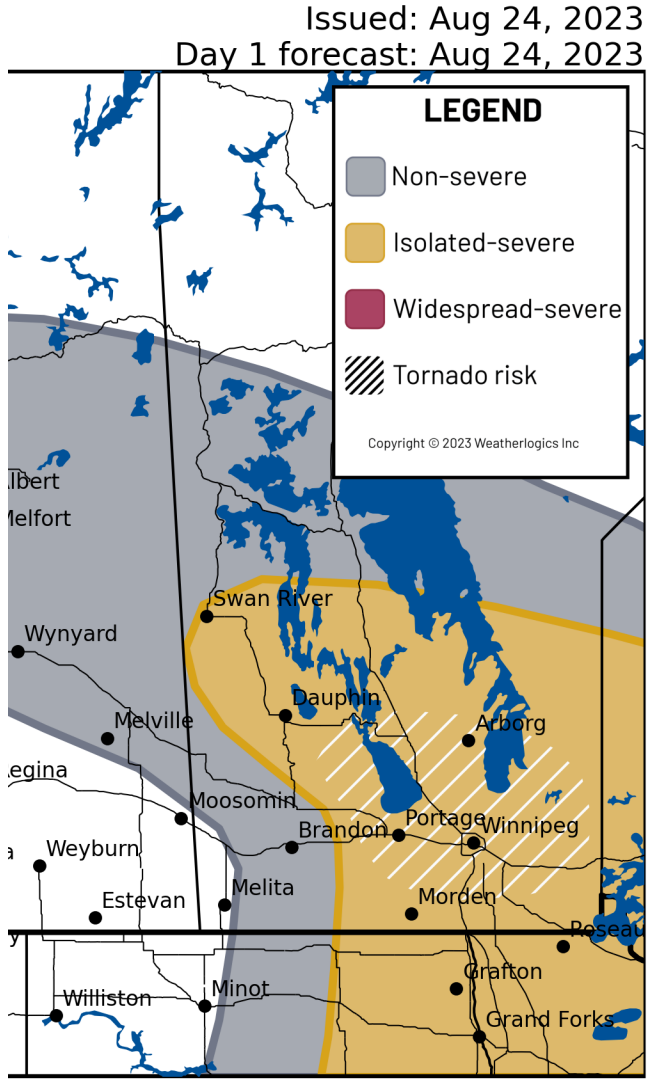
Hail Forecasts

- Produce daily severe weather outlooks
  - Audience for maps is the public via our social media
  - Also produced for our own awareness as it affects insurance/agriculture
- Example – day of the Winnipeg hailstorm





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Real-time Monitoring

- Monitor hail as it occurs to alert certain clients

- Weather radar is a key tool, with dual pol making a big difference
  - Dual-pol can more easily show where hail is present in a storm and gives some idea of size
  - ”Holes in differential reflectivity” combined with low CC are usually large hail

NEW DEVELOPMENTS

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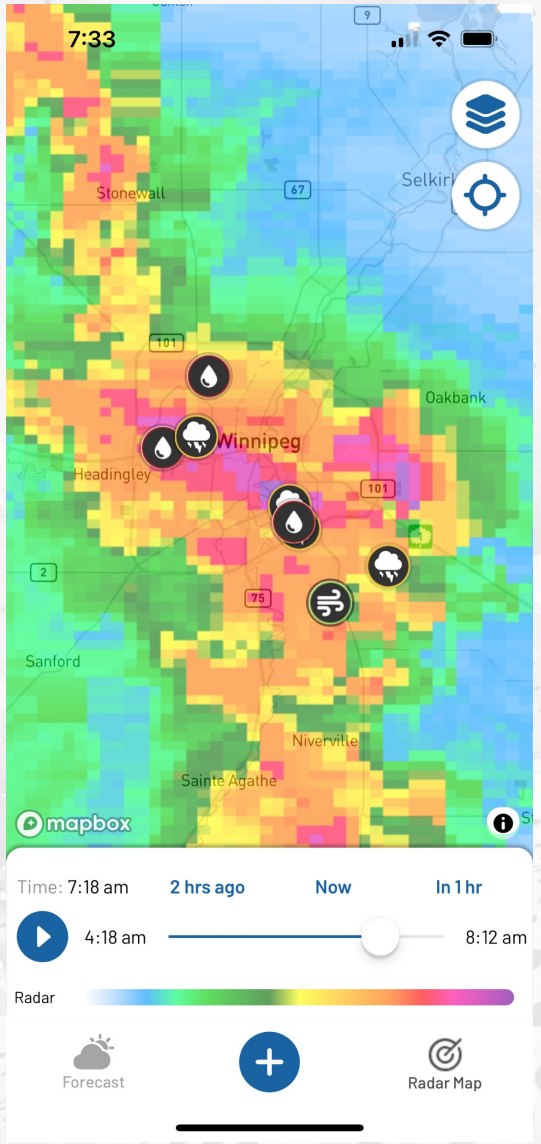
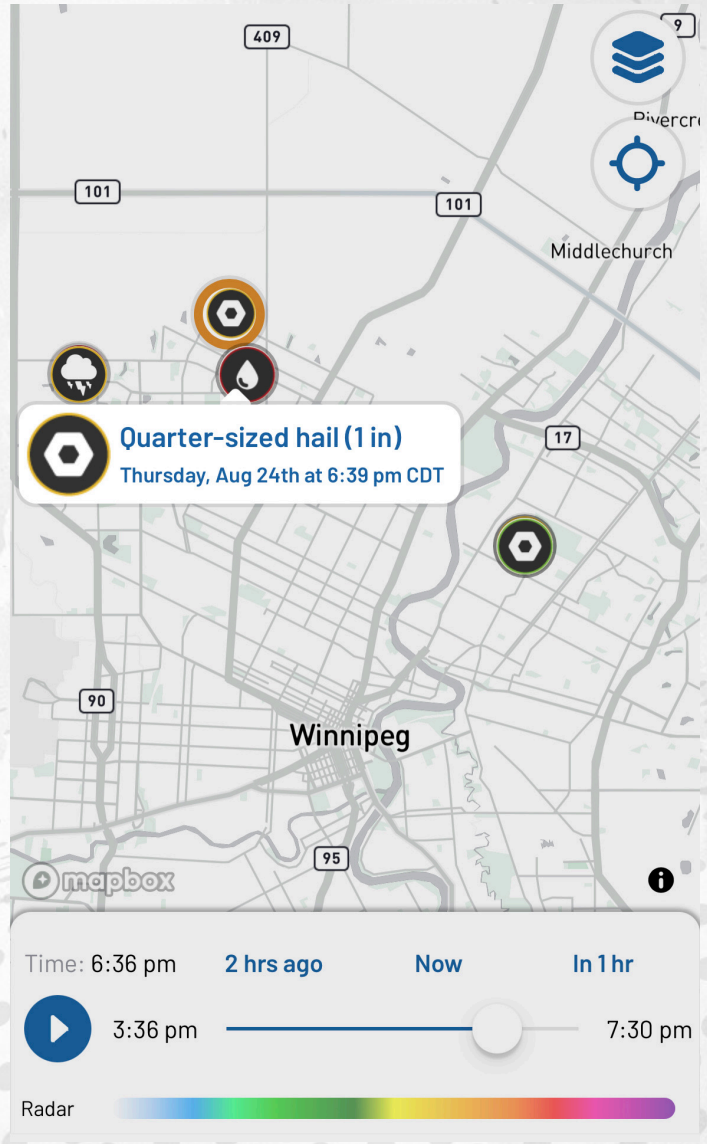
Weatherlogics App

- Weatherlogics has developed a public app
  - Provides weather forecasts, radar, and road conditions
  - Users can submit weather reports
  - Tested over the summer with good success

- There is still lots of hail across the country that goes unreported





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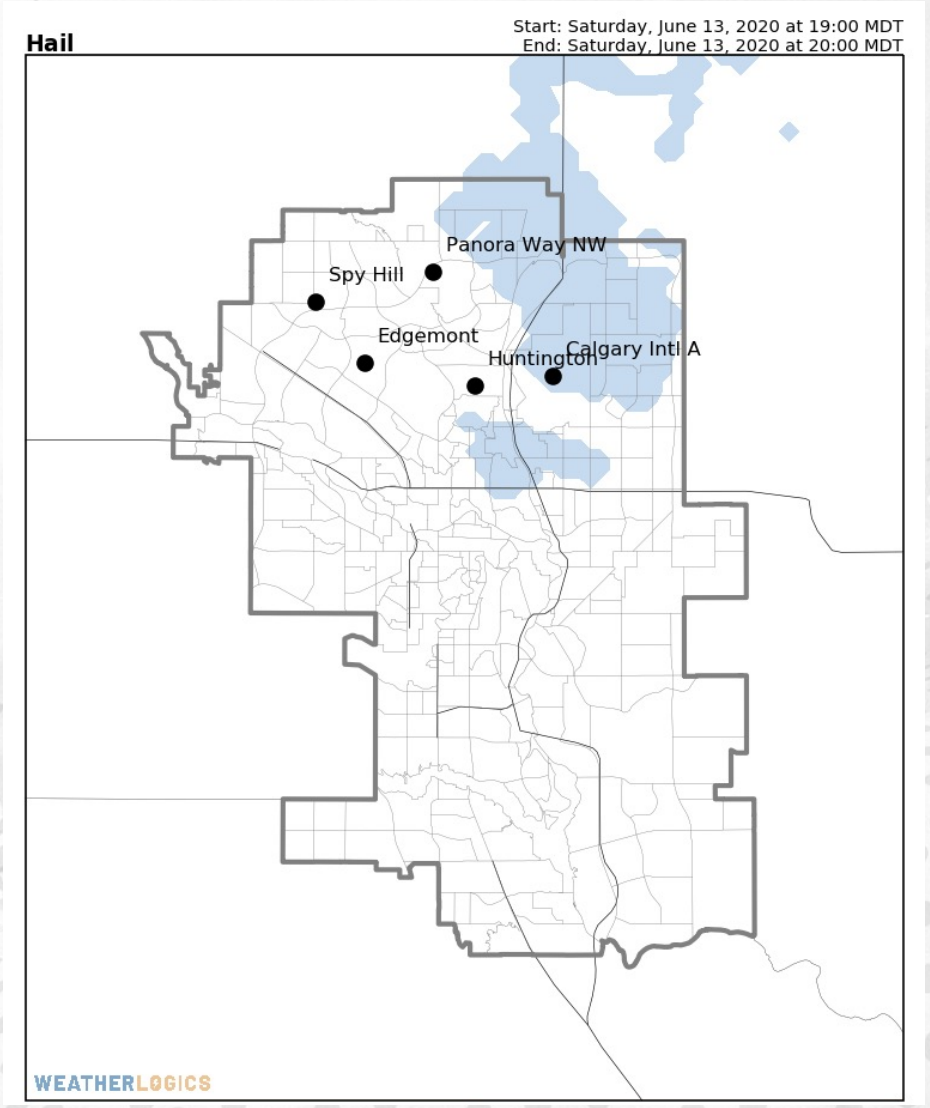
Dual-pol research

- Dual polarization radar provides more information about particles within a thunderstorm
- Promising to differentiate hail from heavy rain
- Still not ready to make operational

Weatherlogics Dual-Pol Algorithm
Calgary Hailstorm June 13, 2020



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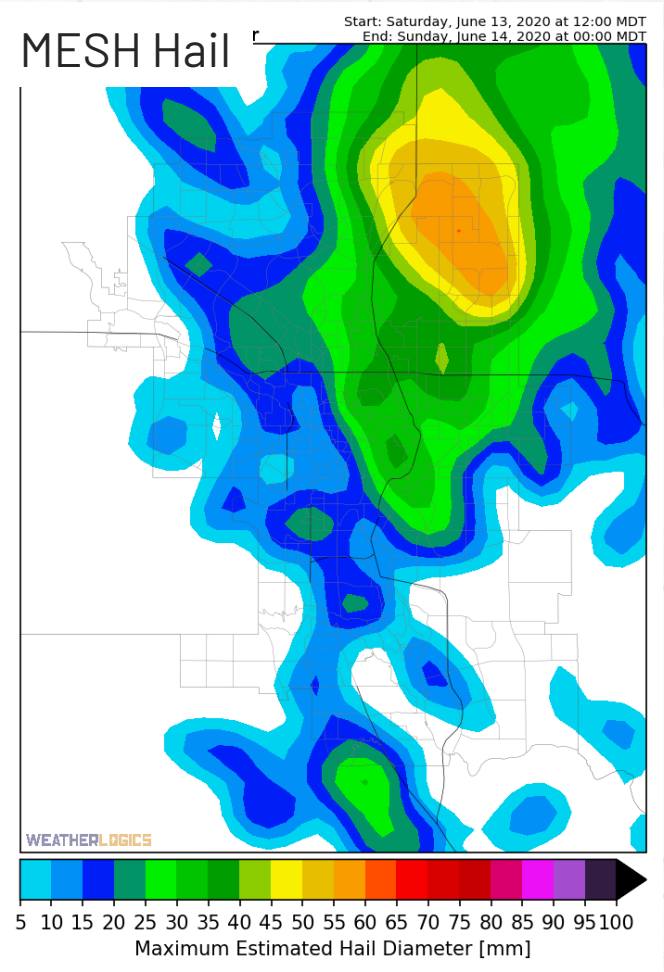
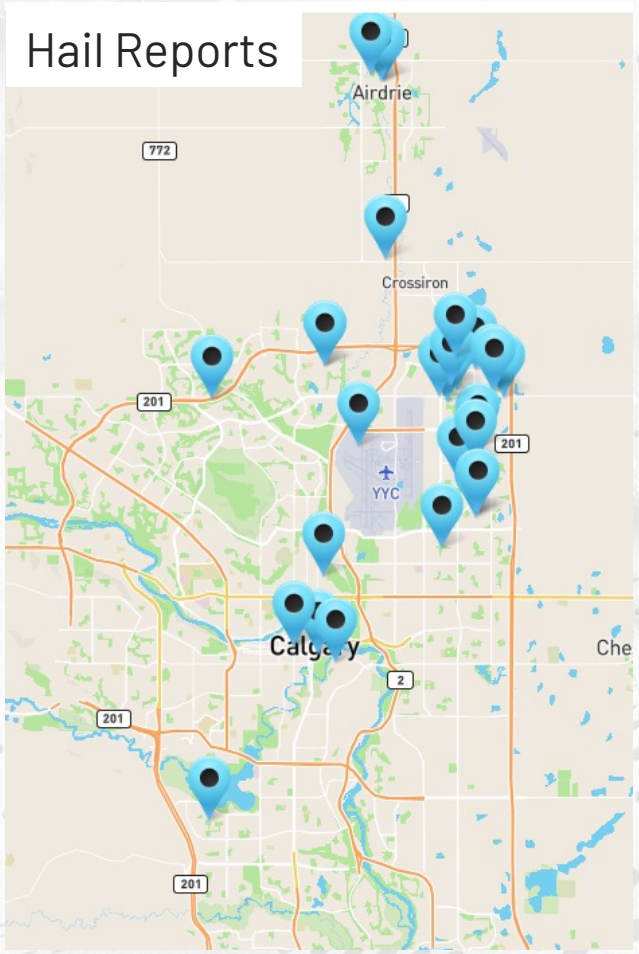
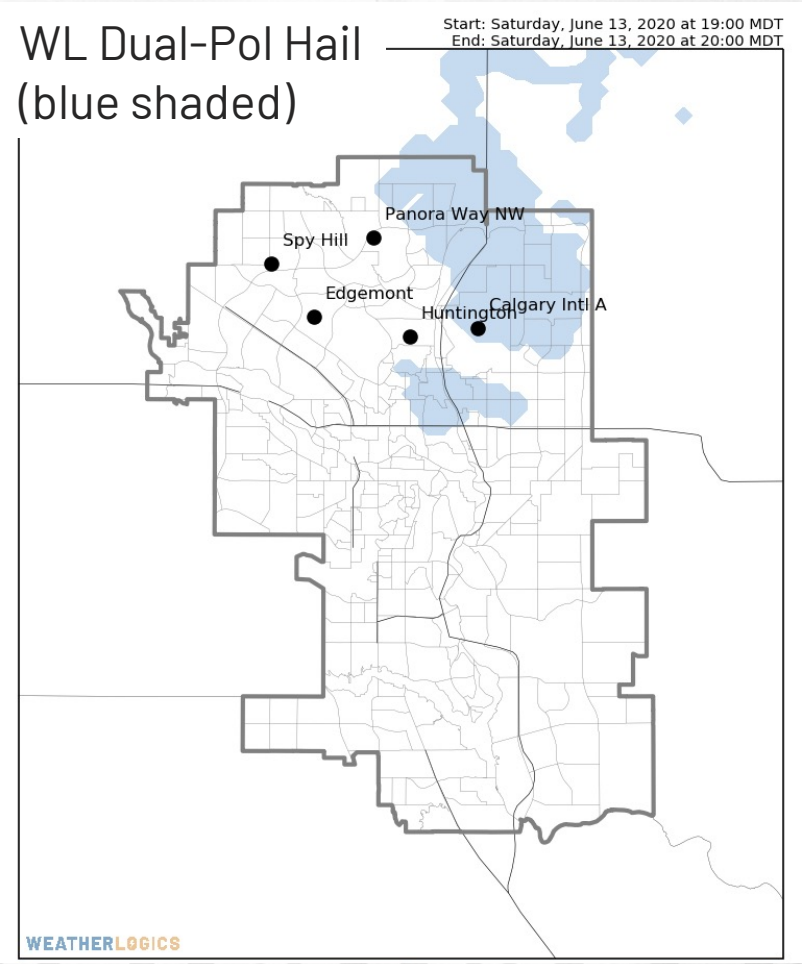
June 2020 Calgary Hailstorm







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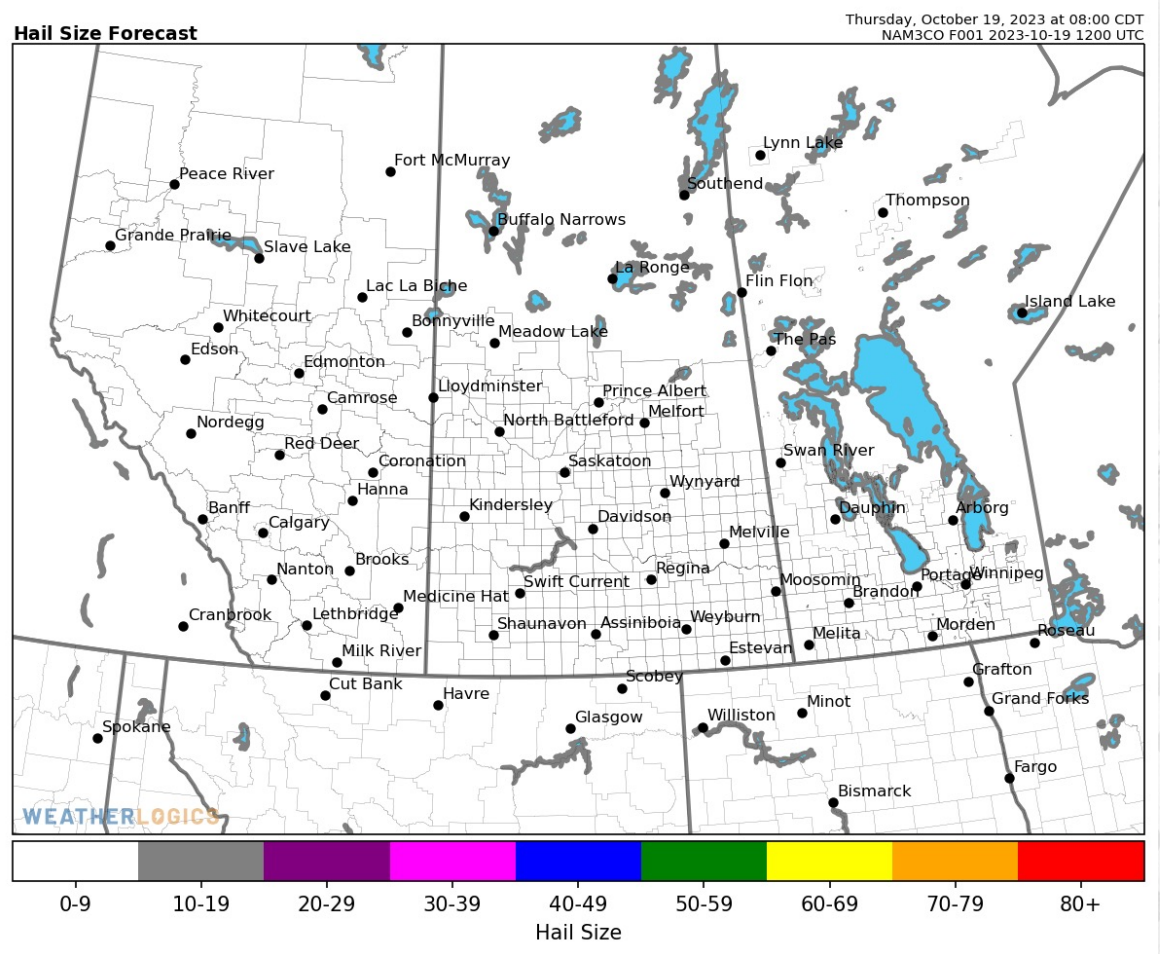
Experimental Forecast Products

- Available on the Weatherlogics Viewer Website
- “If a thunderstorm is present, how large might be hail be?”
- Developed by our UBC summer student in 2023 – will be tested more thoroughly in 2024



QUESTIONS?

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www.weatherlogics.com

“Weatherlogics” in the iOS App Store