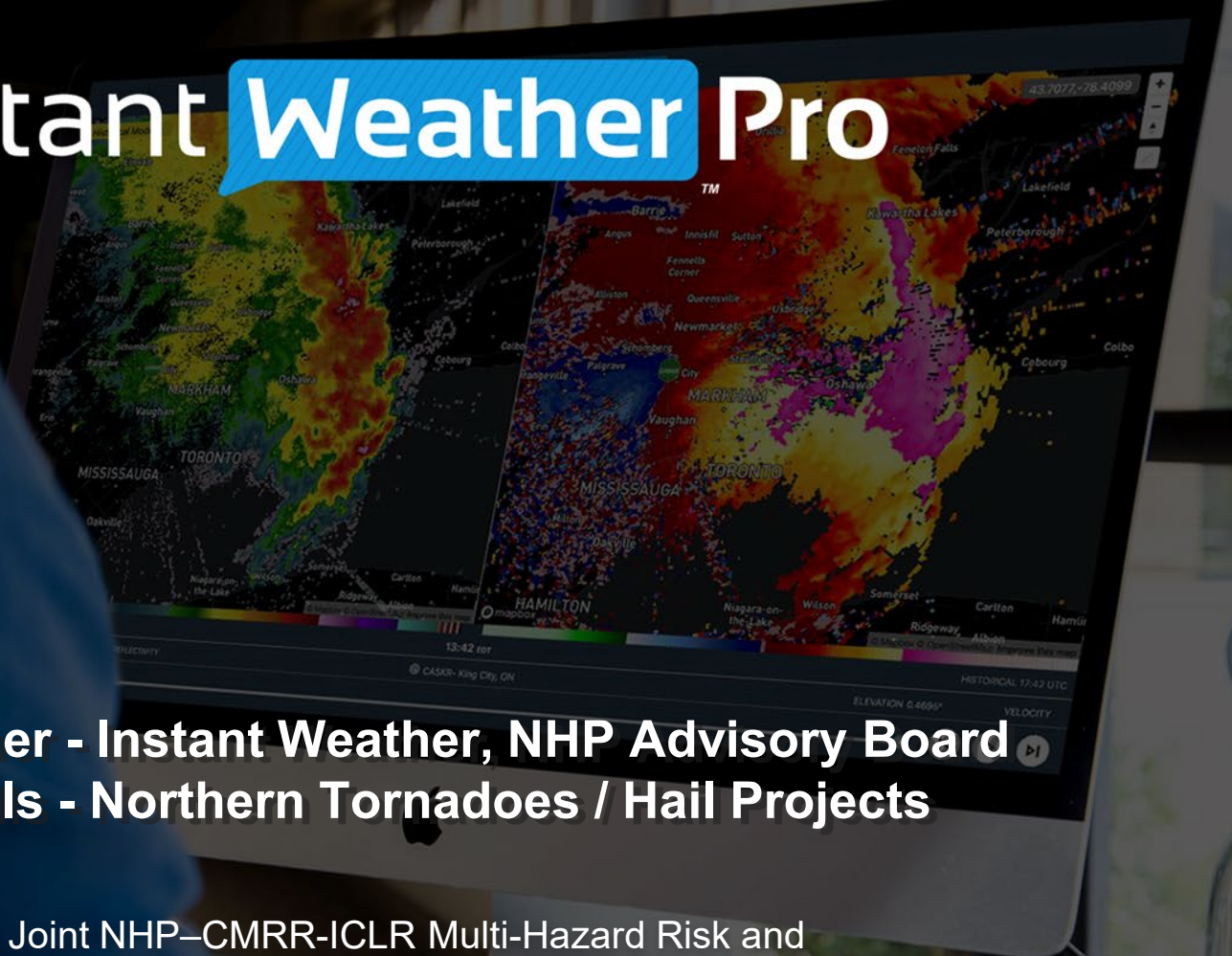


Instant Weather Pro



Adam Skinner - Instant Weather, NHP Advisory Board
David Sills - Northern Tornadoes / Hail Projects

2023 Joint NHP–CMRR–ICLR Multi-Hazard Risk and
Resilience Workshop – 30 October 2023

Instant Weather

Who is Instant Weather?

- Created with the goal to raise awareness about tornadoes and severe weather
- Has grown into the most engaged severe weather community in Canada with more than 1.2 million members across 120 social media pages
- Runs a successful, growing weather app that currently has 127,000 monthly active users
- IW's community is an important and growing source of tornado, hail and damage reports in Canada
- Official partner of the Northern Tornadoes Project and the Northern Hail Project

Our motivation for IW Pro

Why is this needed?

- A professional radar suite built for the Canadian context, something lacking with other publicly accessible radar apps
- Historical Canadian radar data goes back *at most* 30 days in other tools
- Canadian alerts (e.g. from ECCC) often glitchy in other apps
- No publicly available algorithms for storm tracking and MESO, TVS, and hail detection for Canadian radars (partial exception US MRMS...)

Development approach

- Design a performant web-app that can display and animate full raw radar polygon data (no mapping or vector tiles)
- Pro functionality including all available radar products, view formats, small file size / fast downloads, all tilts, lightning, alerts, etc.
- Easy to use with as little friction as possible for important features like changing products, tilts, animation length, animation speed, view formats
- Phase 1: 'Minimum viable product' development and proof of concept
- Phase 2: Add US radars, archive access, real-time lightning and alerts
- Phase 3: Develop / encourage open-source severe weather algorithms

Methods

How were design challenges overcome?

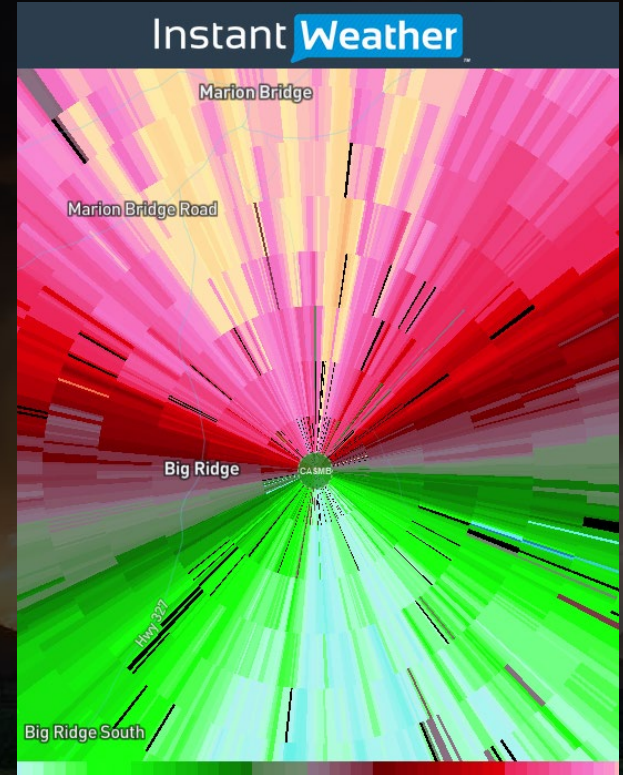
- Initial performance was extremely glitchy and blurry when animating 200,000 raw polygons, especially when displaying multiple products at once + 50 frames of animation
- Before giving up on a web-app and pursuing traditional .exe-app formats, we went back to the drawing board and brainstormed - the result is a groundbreaking animation and visualization technique
- After several iterations, the new experimental processing technique yielded 30x the performance with no glitches and more accurate mapping than other suites

Methods continued

Successfully achieved a performant way to display and animate raw full-resolution radar data inside of a web-app!

Important because:

- Hardware independent
- No app update required when there's a new version with new features added
- Can open as many simultaneous radar windows as desired - various products from one radar, the same product from multiple radars, or both



Results

What is the current status?

- IW development team achieved several technical breakthroughs in order to make the IW Pro web-app a reality
- Pro radar suite including processor and viewer for both Canadian and US radars is *complete*
- Completed the last two deliverables for Phase 2 (Lightning & Alerts)
- Launched beta test subscriptions on May 31st for early adopters

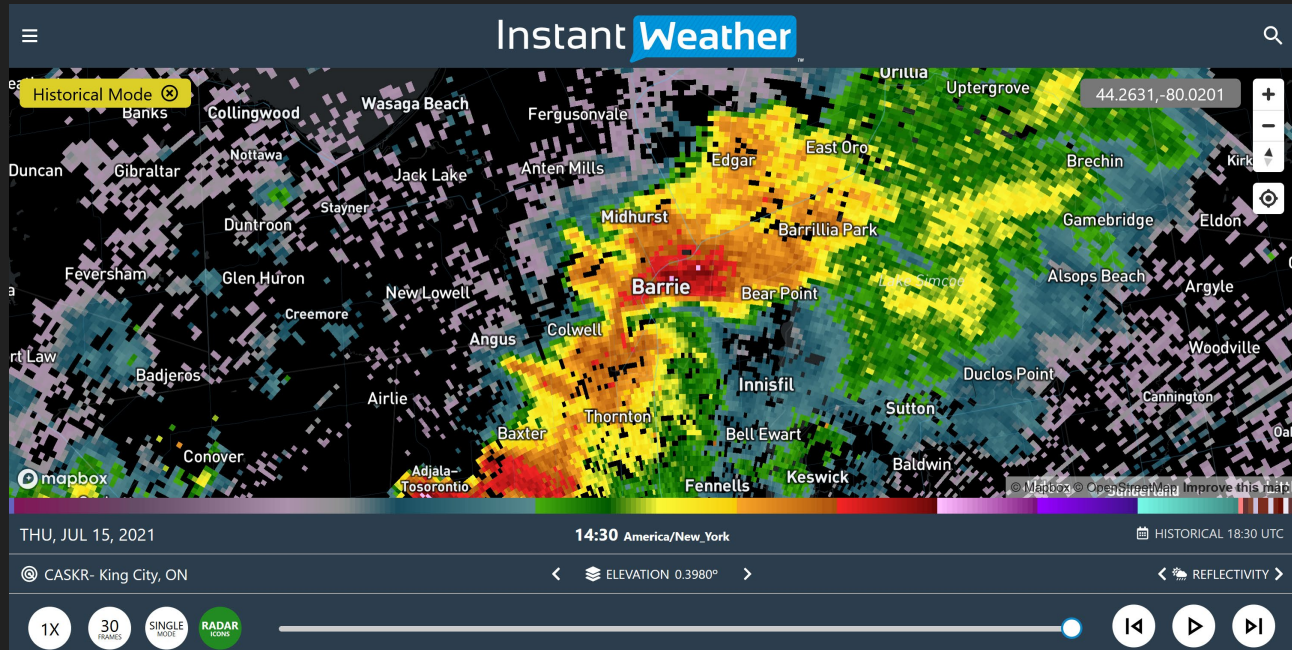
Functionality

DISPLAY MODES

SINGLE MODE: One product at a time for detailed analysis

DUAL MODE: Classic way to display two products at once

SPLIT MODE: Brand new method to swipe between two products at once



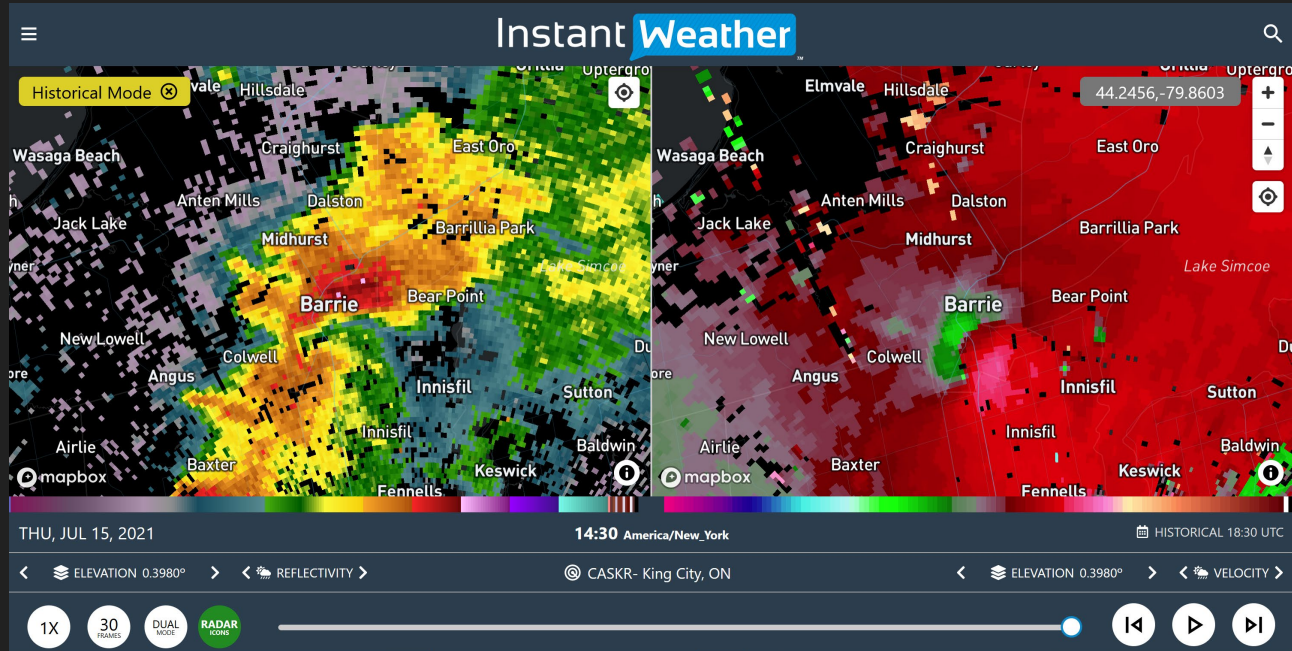
Functionality

DISPLAY MODES

SINGLE MODE: One product at a time for detailed analysis

DUAL MODE: Classic way to display two products at once

SPLIT MODE: Brand new method to swipe between two products at once



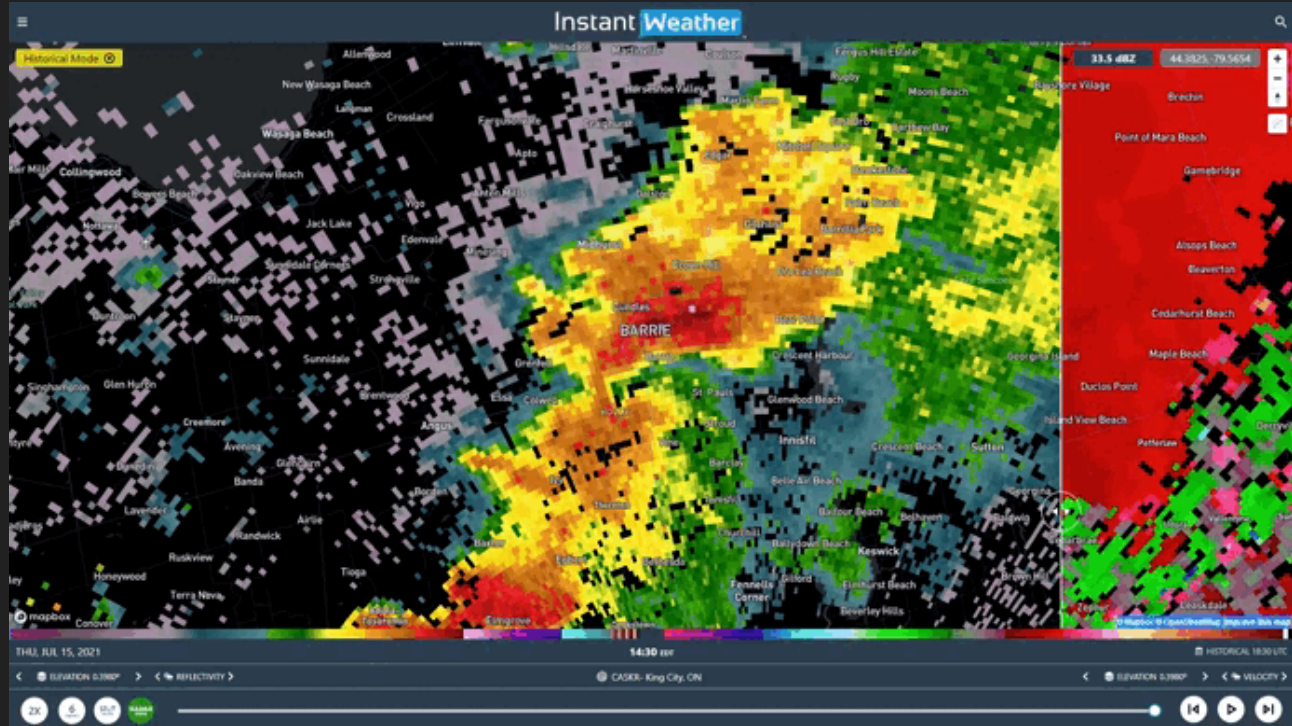
Functionality

DISPLAY MODES

SINGLE MODE: One product at a time for detailed analysis

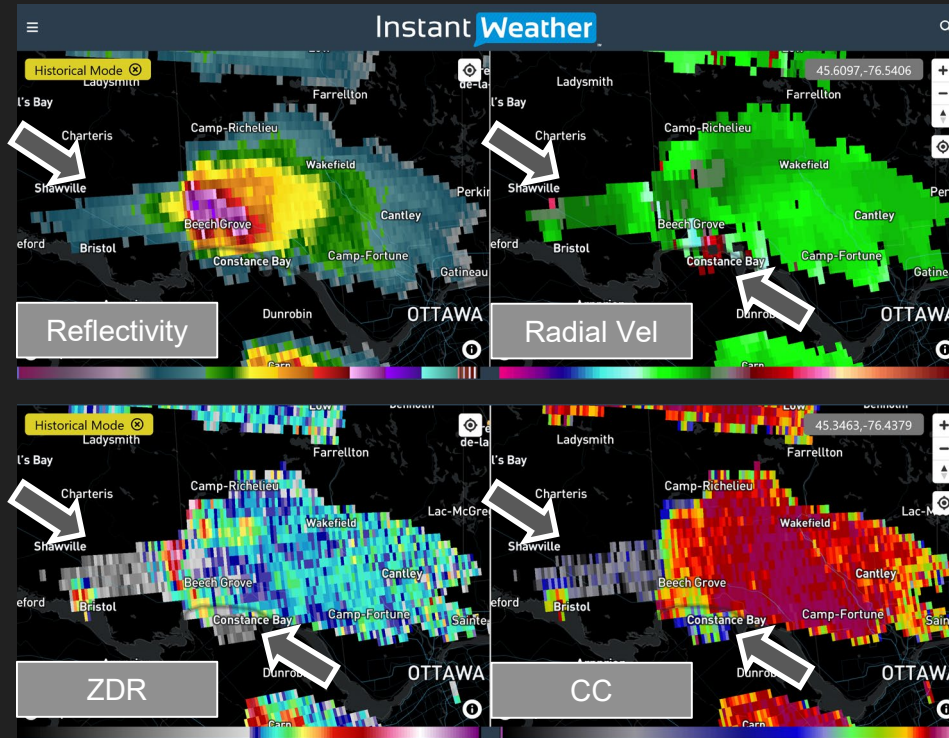
DUAL MODE: Classic way to display two products at once

SPLIT (SWIPE) MODE: Brand new method to swipe between two products at once



Functionality

DUAL-POL MOMENTS and ALL TILTS

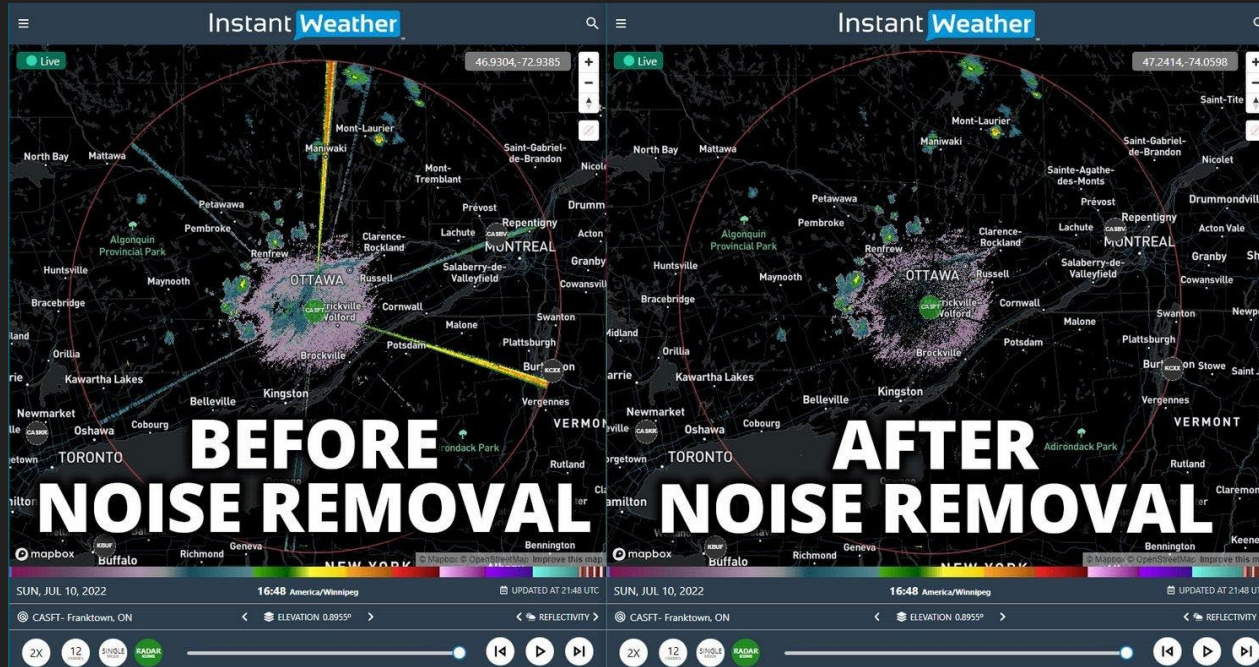


- Easy access to dual-pol products like 'differential reflectivity' (ZDR) and 'correlation coefficient' (CC)
- Aiming to provide access to all tilts making up the radar volume, including any long-range scans

ZDR: the difference between the horizontal and vertical returned power - shape
CC: a measure of the consistency of the shapes and sizes of targets - similarity

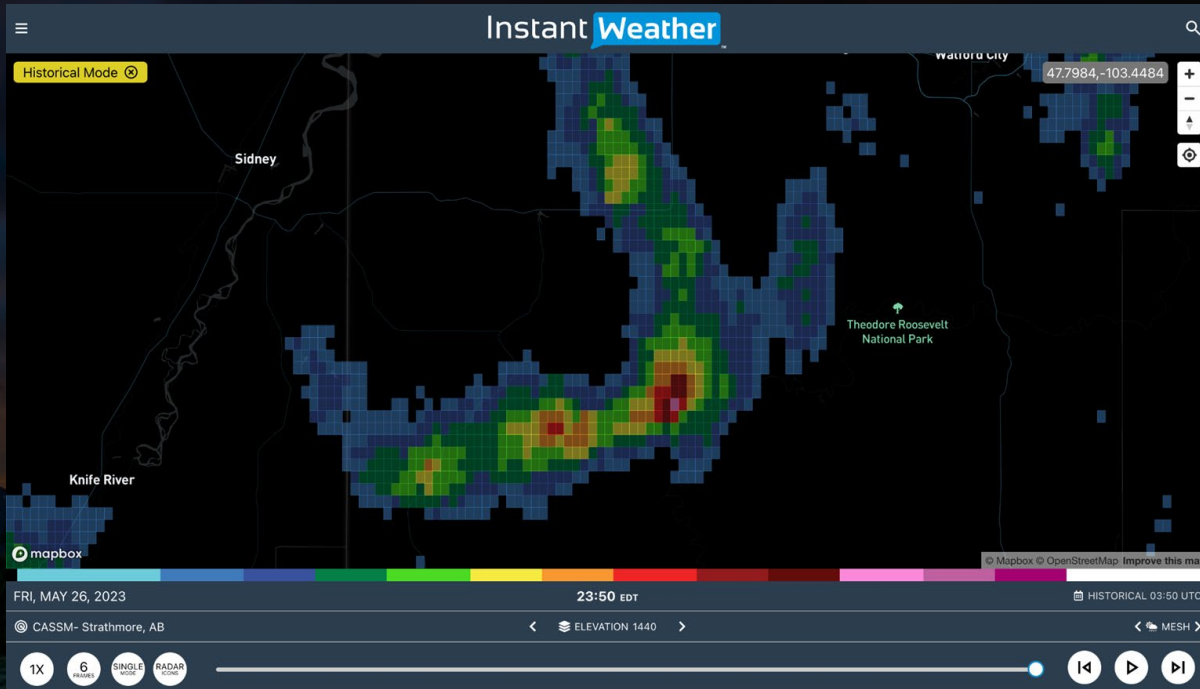
Functionality

ENHANCED DATA FILTERING



- RF interference filtering for Canadian S-Band radars
- Interference is removed by making use of dual-pol data, leaving only legitimate radar returns.
- RF interference removal for velocity data coming in Phase 3.

Functionality (research support)



MESH INTEGRATION

Maximum Estimated Size of Hail has been integrated into the products tab to help assist the NHP track and verify hail across Canada.

This product will also be available to organizations that subscribed to the enterprise tier.

What is next?

- IW Pro will be integrated as a subscription option inside of the existing Instant Weather mobile app (internal test has begun)
- Subscribers will have access to both the mobile app and website version
- The creation of three unique subscription tiers, including 'enterprise'
- Canadian storm reports from the IW mobile app will be visualized in IW Pro
- US alerts almost complete + animation of alerts under development
- Addition of storm tracking and severe weather algorithms, plus storm cell probability of severe weather (tornado, wind, hail) in next 30 min (*nowcasting*)

Summary

- First ever publicly accessible pro radar suite built by Canadians for Canadians
- Lots of improvements and new features on the way!
- Open to community development of aspects of the suite such as severe weather detection and nowcasting algorithms

Learn more at InstantWeatherPro.com

or

Email Adam.Skinner@InstantWeather.ca