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The OWLeS Project - Preliminary Analyses Influences of Upwind Lakes on PBL Development over Lake Ontario

David Kristovich, Luke Bard, Leslie Stoecker

University of Illinois at Urbana-Champaign

Acknowledgements

- Luke Bard and Leslie Stoecker
- OWLeS PIs and student help (109 folks!)!!
- UWKA pilots and crew!!
- NWS Support
- Sam Haimov (UW)

- National Science Foundation, Physical & Dynamic Meteorology Program, AGS 12-59004

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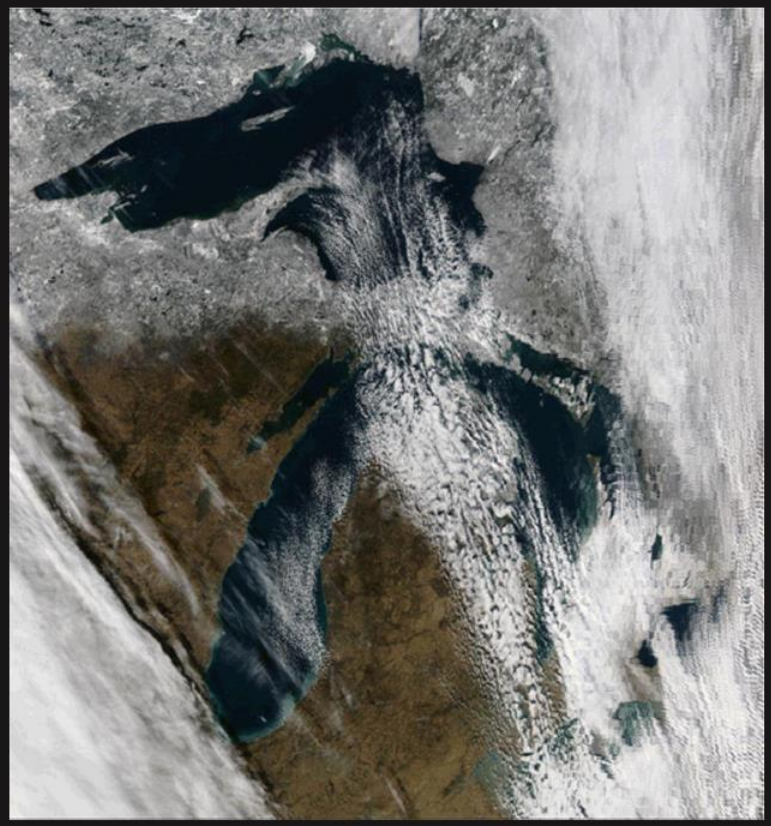
Lake-to-Lake Lake-effect Cloud Bands



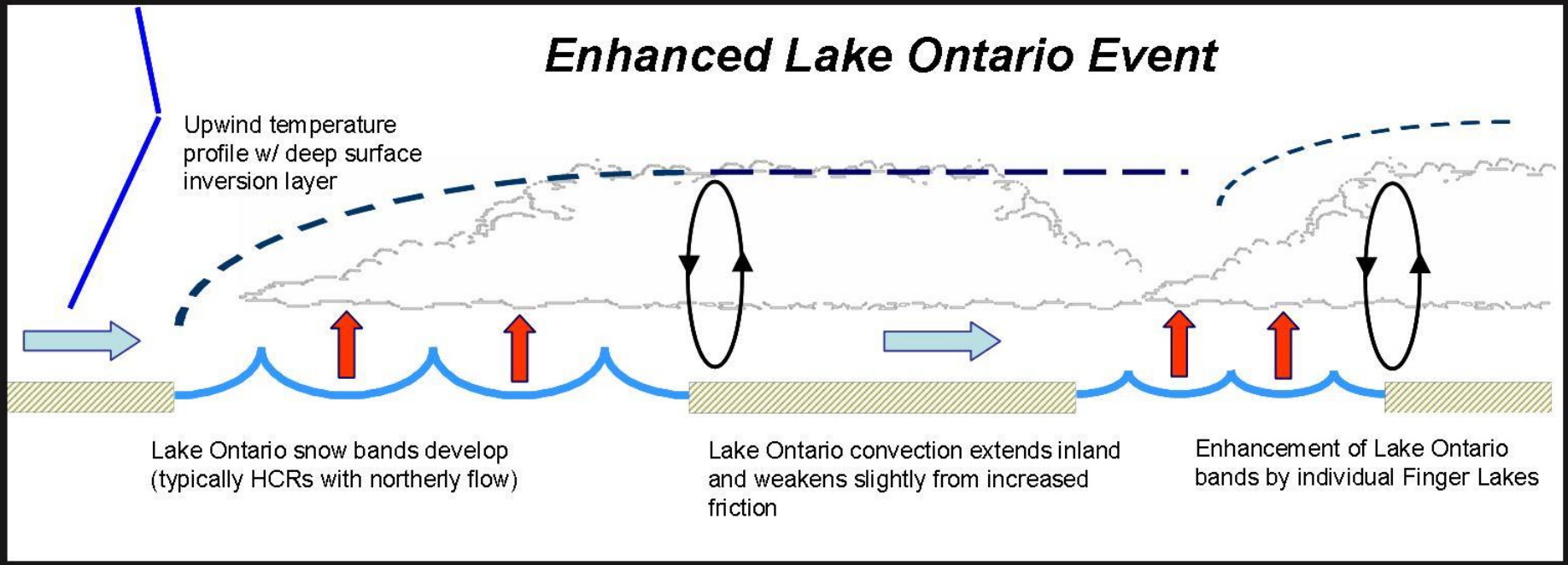
Potential Influences

- ***Reduce upwind stability***
- ***Retained circulations***
- ***Natural Cloud Seeding with snow***

Rodriguez, Kristovich, and Hjelmfelt (2007)

Lake-effect Snow System
Atmospheric Convective Boundary Layers

North South



Laird, N. F., 2008: Lake-effect Snows Associated with Small and Large Lakes. *Sigma Xi*, February.

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Two IOPs With Clear Upwind Influences

IOP #18 – 23 January 2014

- NNW winds
- Georgian Bay influence

IOP #23 – 28 January 2014

- SW winds
- Lake Erie influence

Moderate Wind Speeds
Stable Atmospheric Conditions
Fetch -Partially Ice-Covered Lakes
Periods of High Blood Pressure

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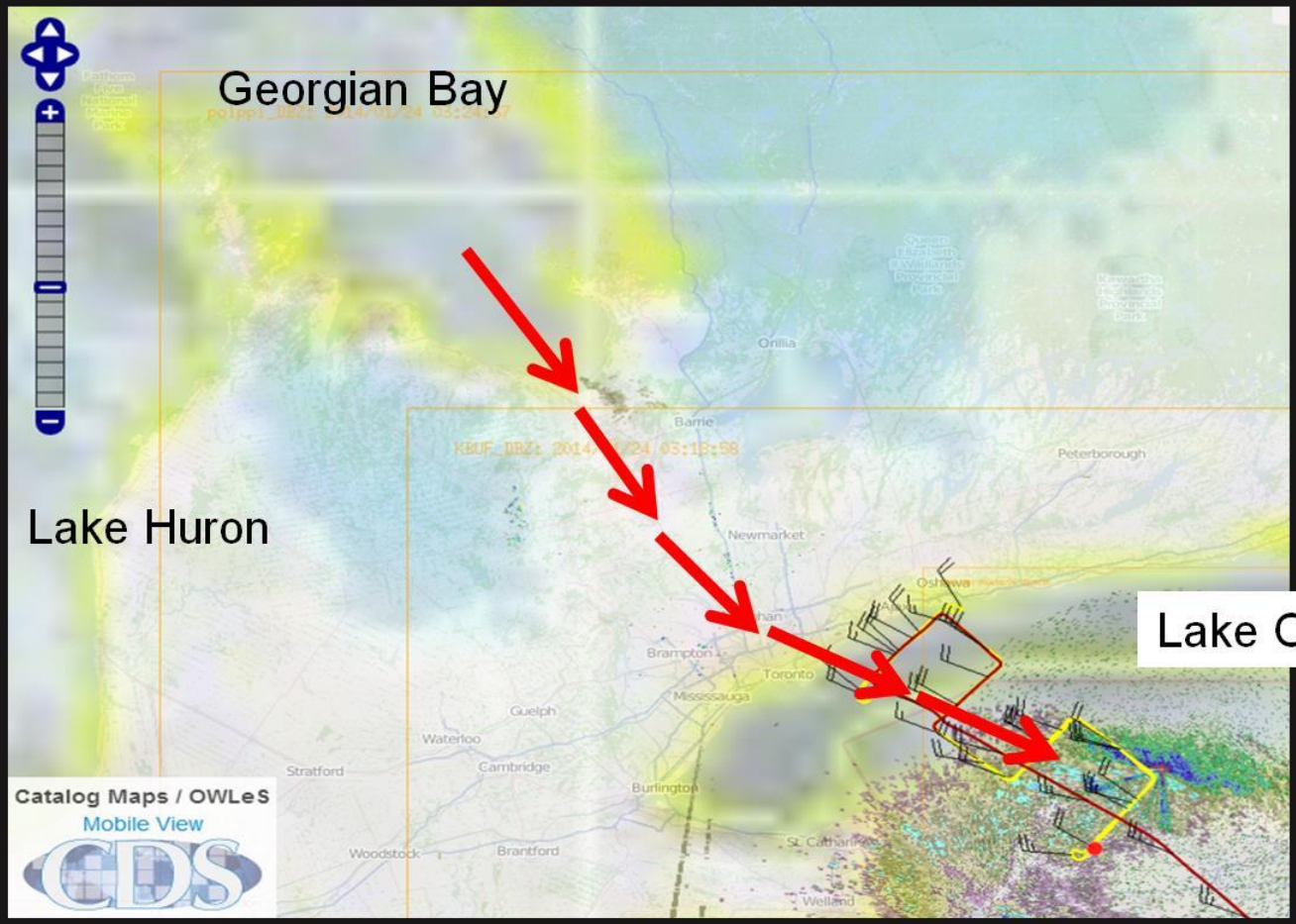
OWLeS Project IOP #18



King City Ontario Radar
KBUF NEXRAD Radar
DOW 7 Radar

GOES 13 Thermal IR
UWKA Flight Track
UWKA 4000' Winds

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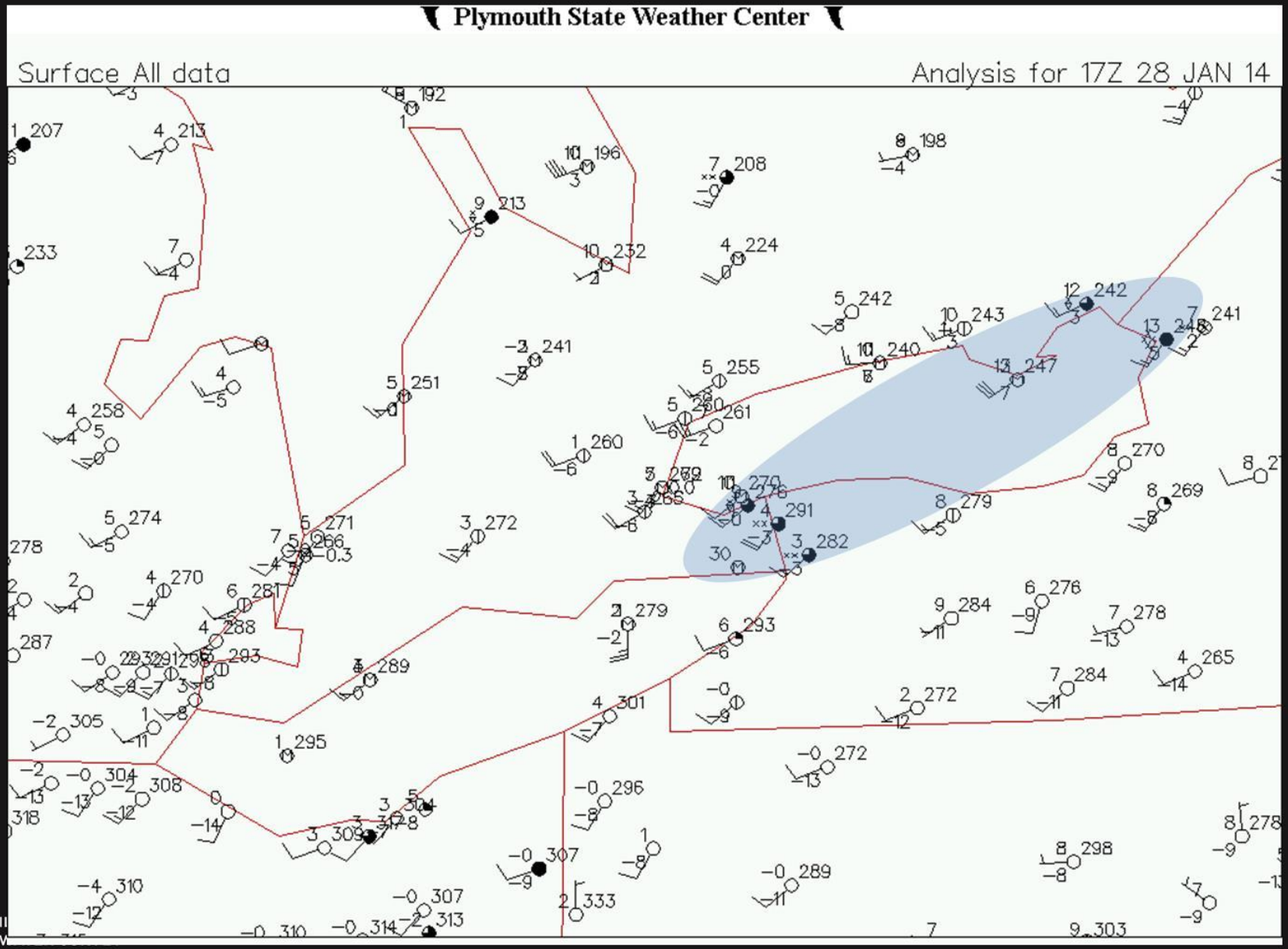
OWLeS Project IOP #23



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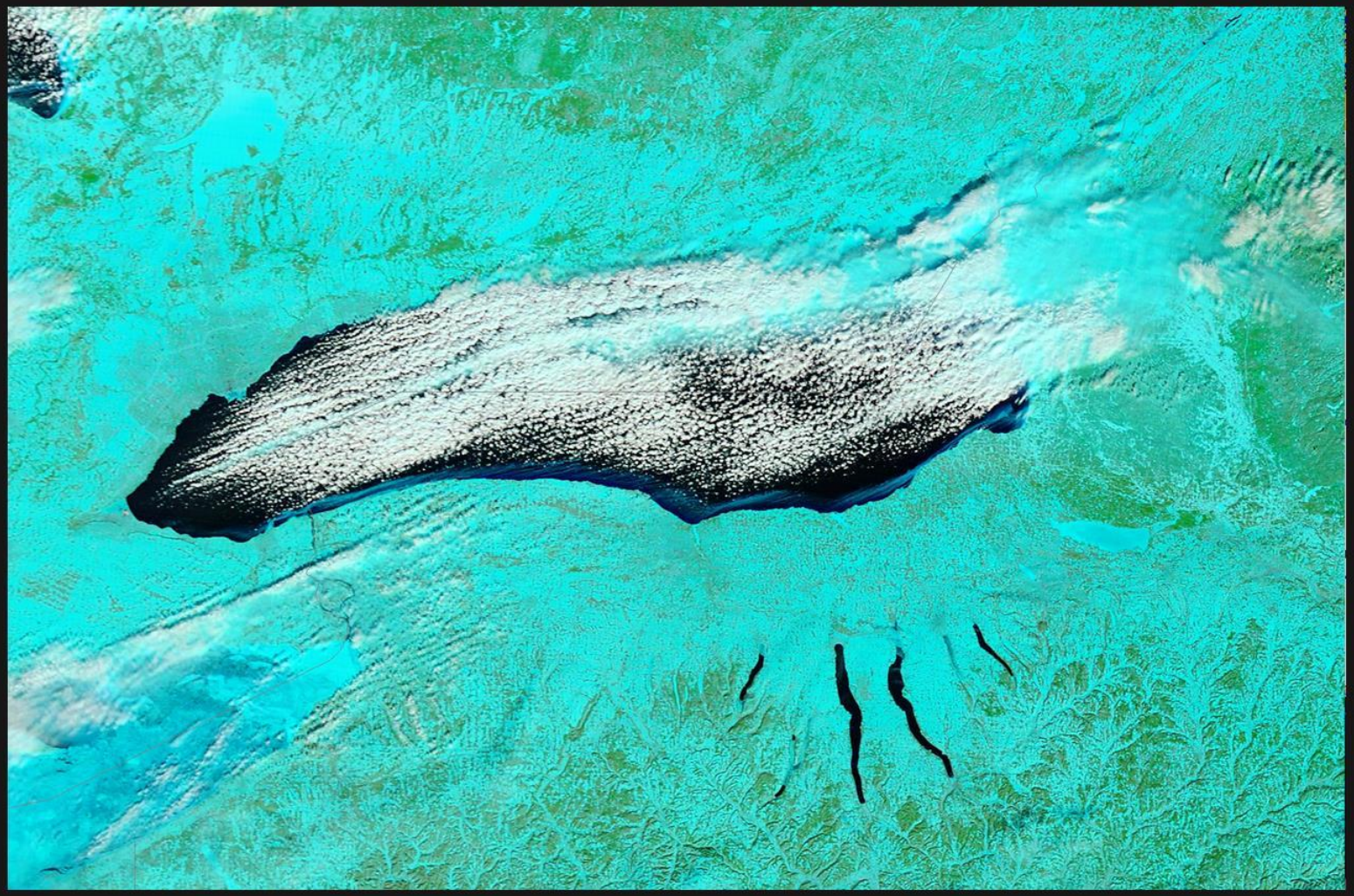

Mark Kulie, Univ. Wisc., http://ge.ssec.wisc.edu/modis-today/

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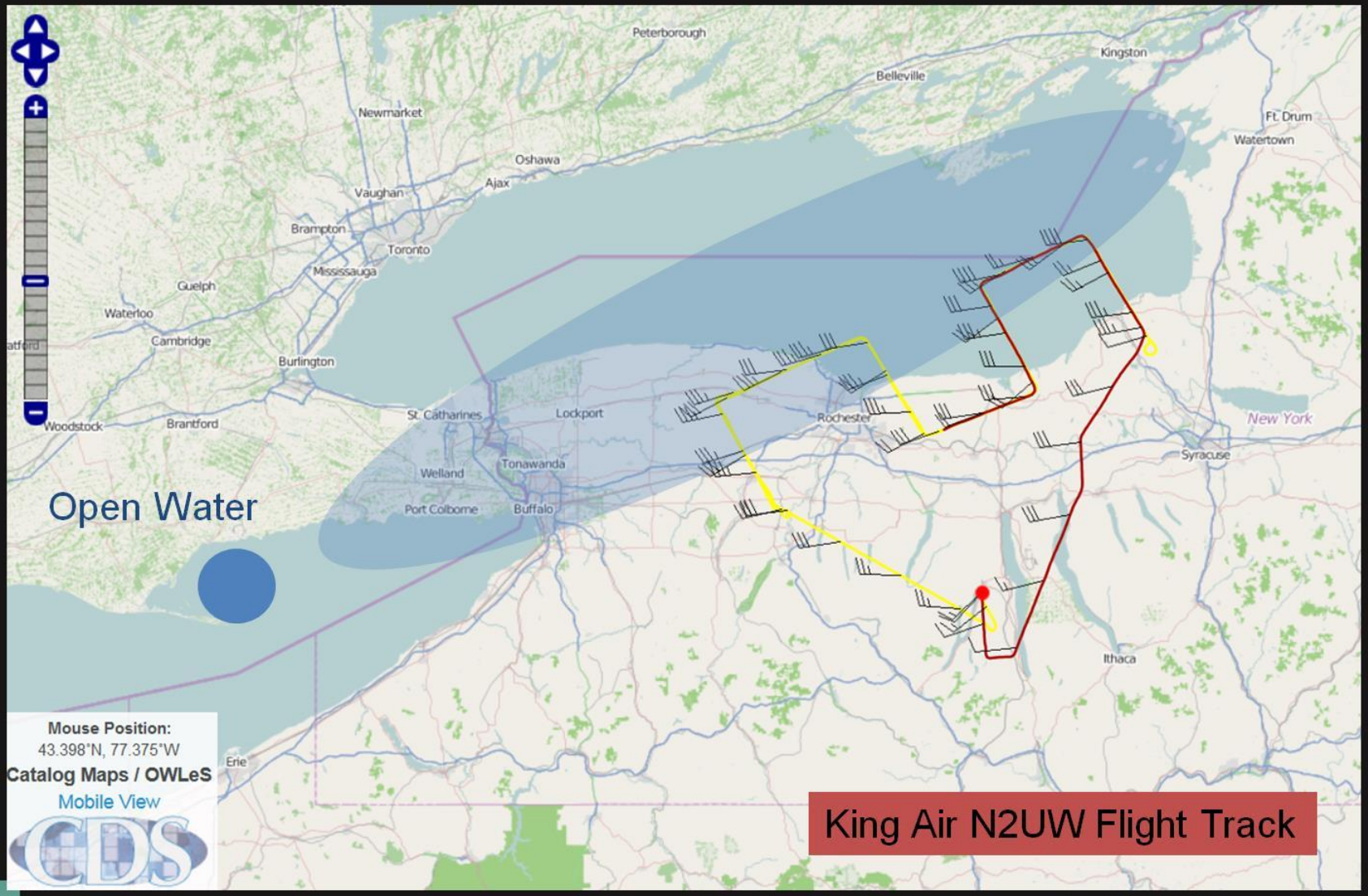

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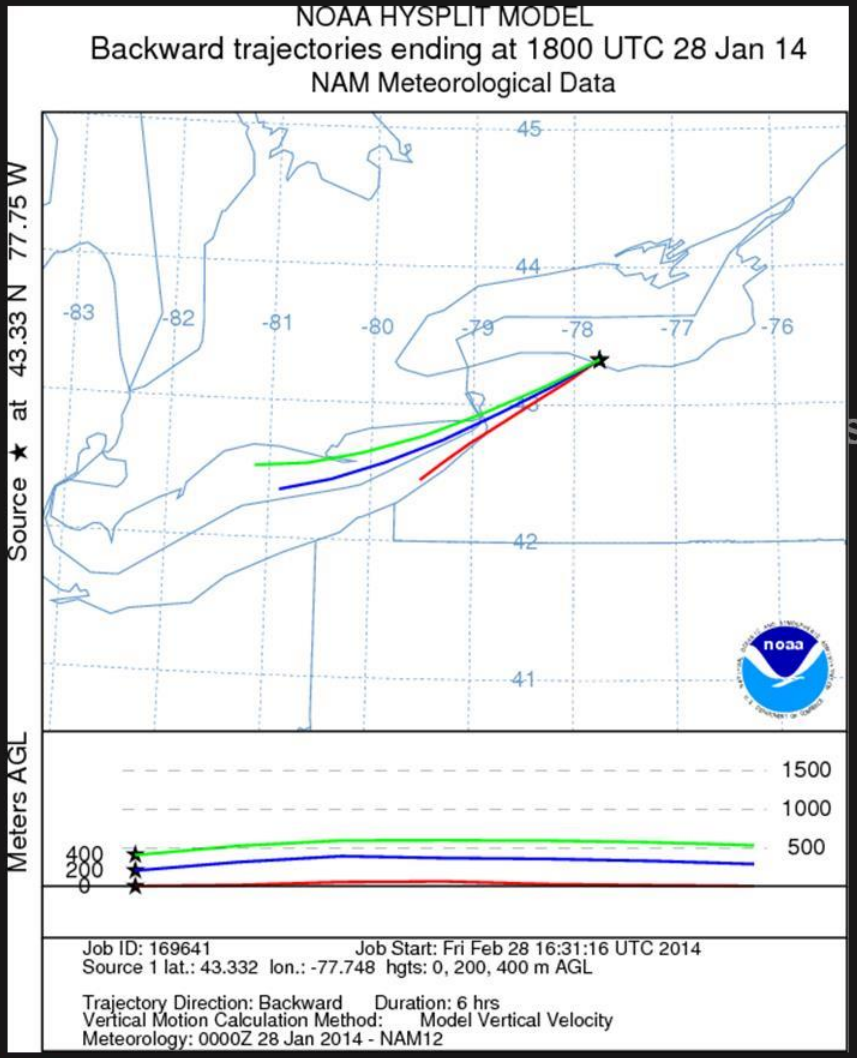

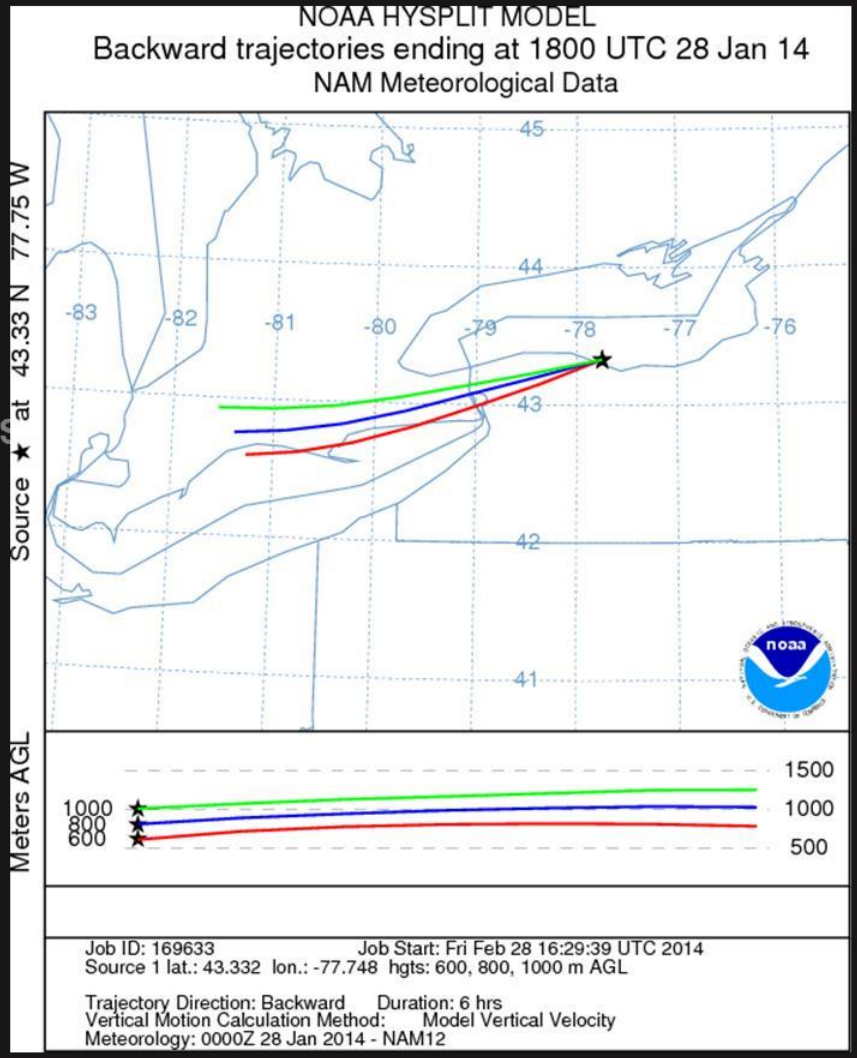

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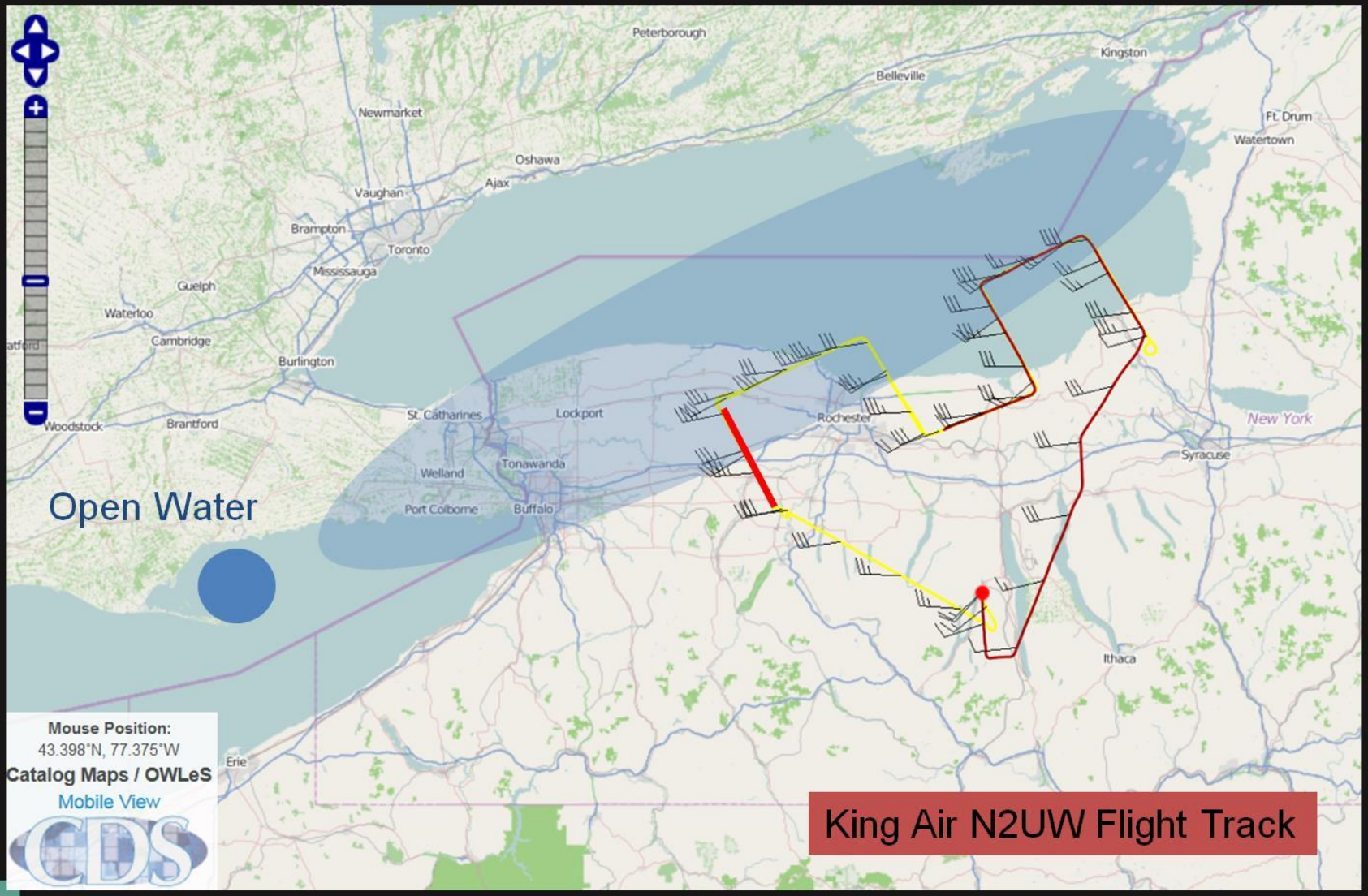

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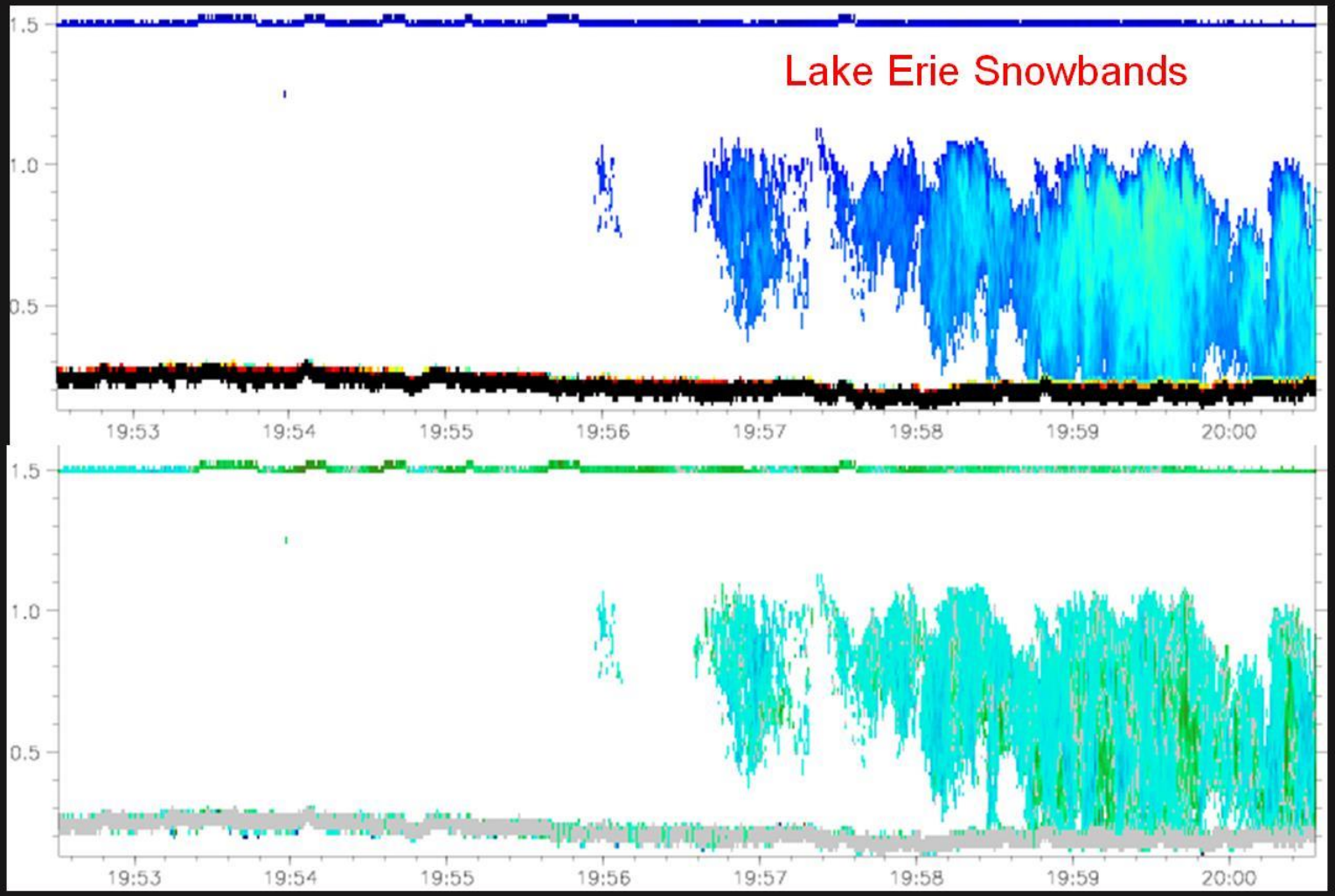

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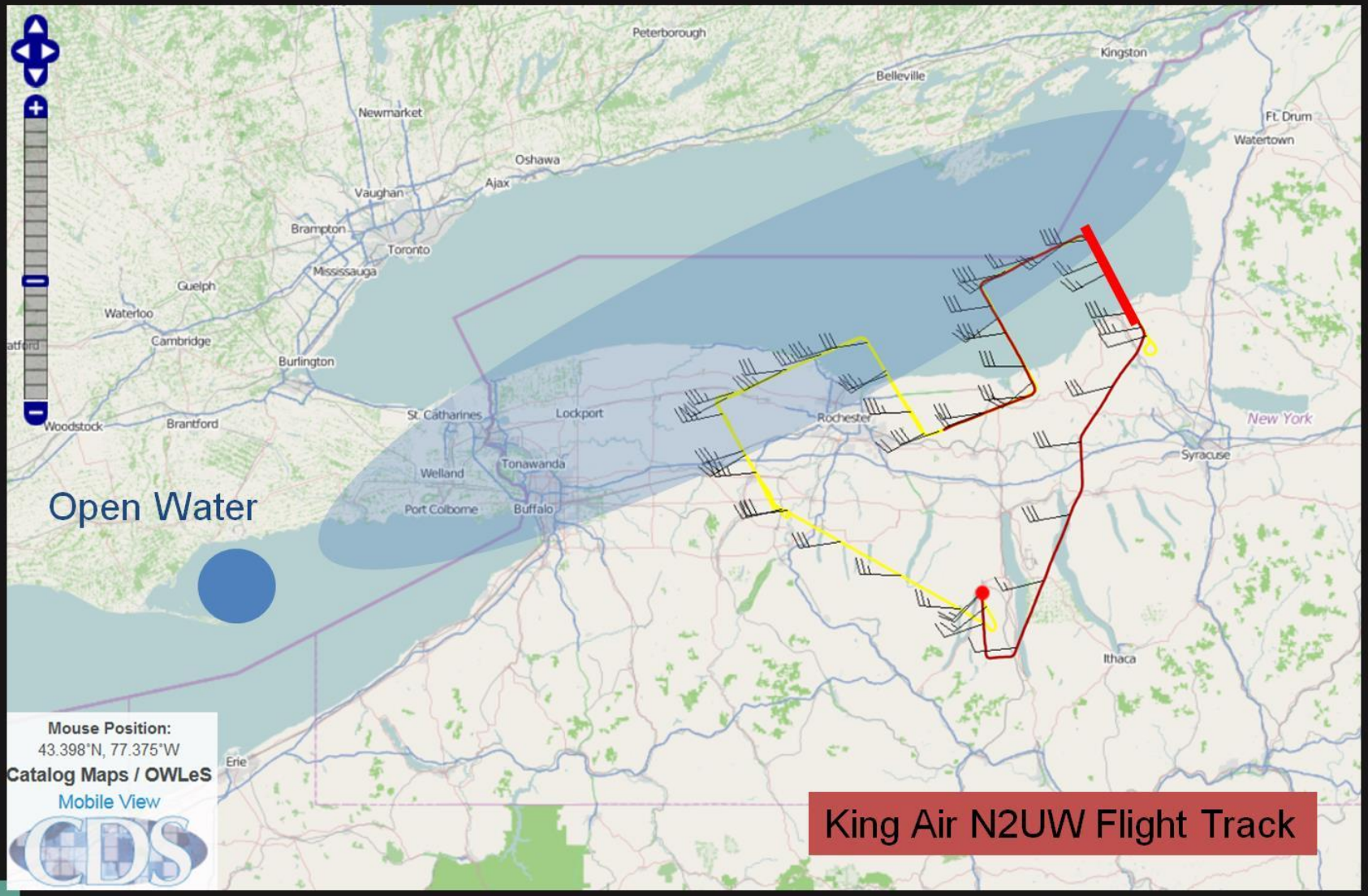
Flight Stack A, 1382 m AGL average

OWLeS Project IOP #23



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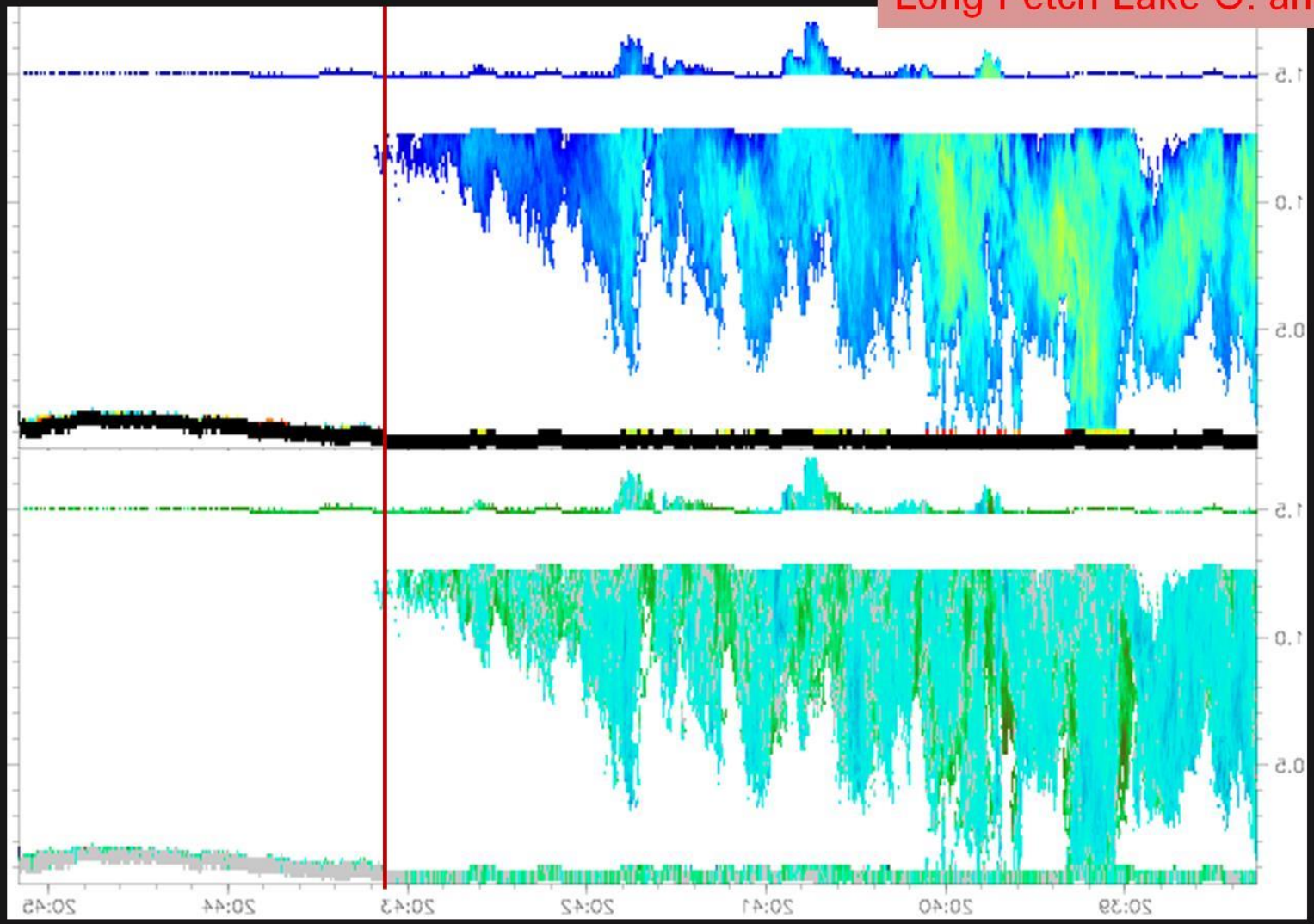
Weak over Lake O.

Long Fetch Lake O.

Long Fetch Lake O. and Erie



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Flight Stack G, 1382 m AGL average

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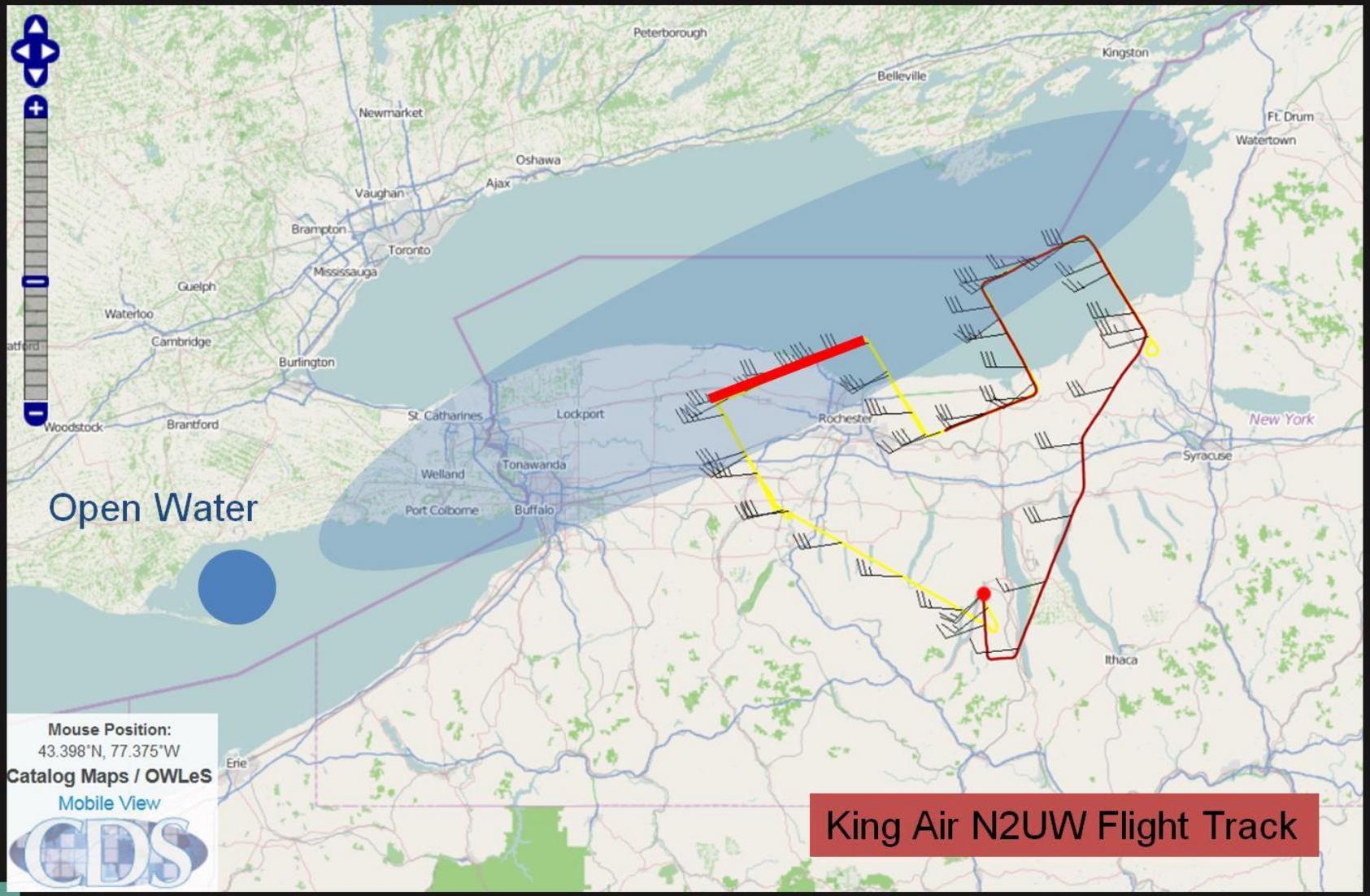

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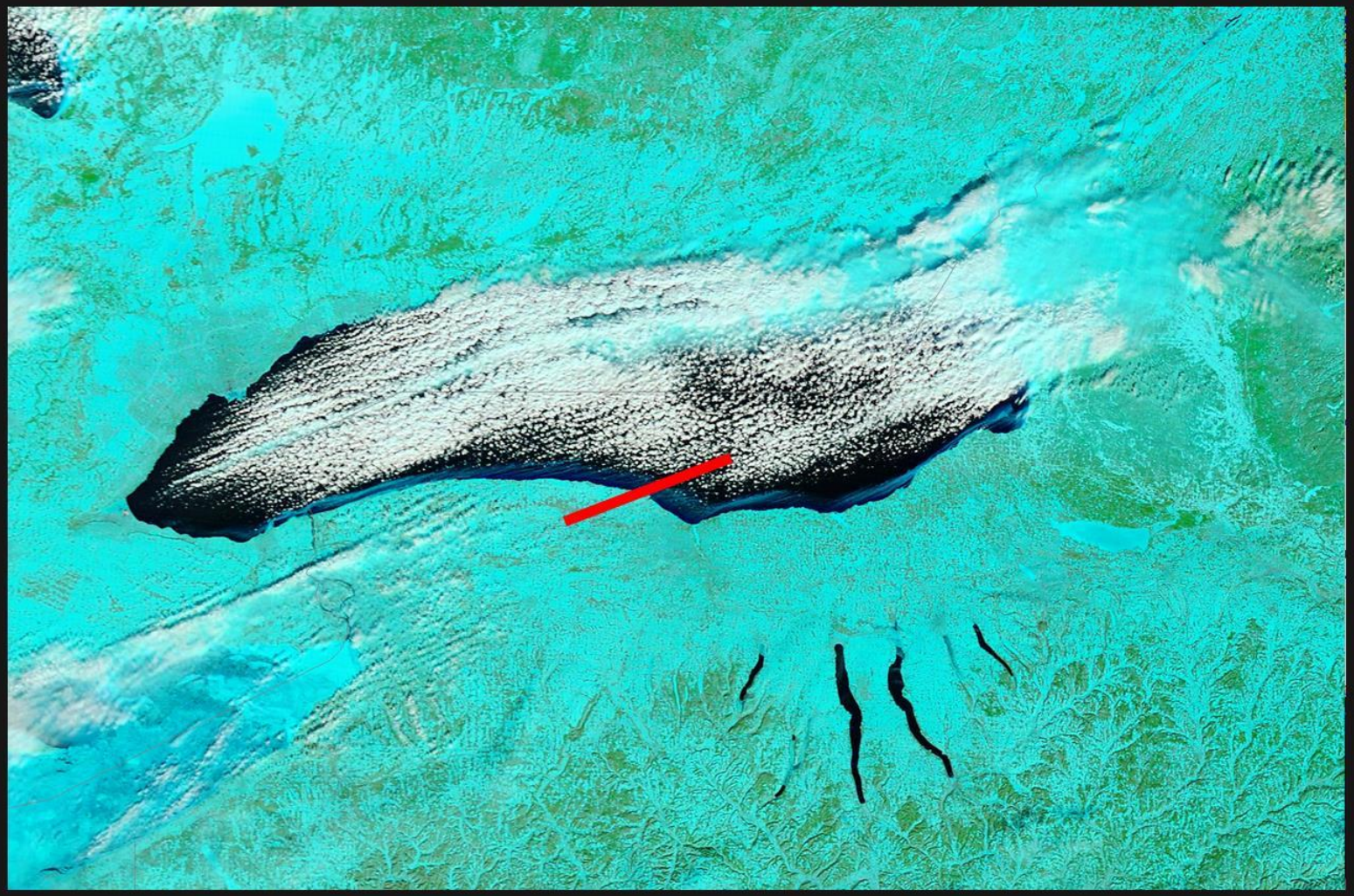

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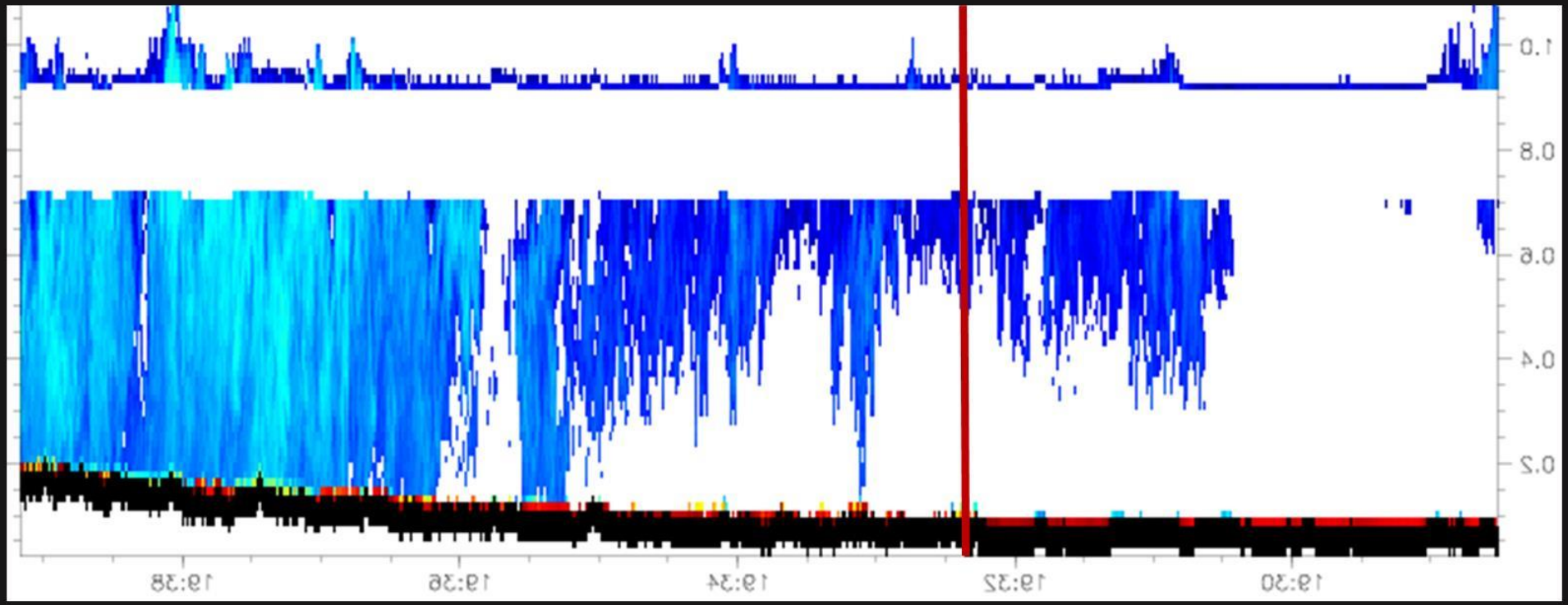

Leg 13: 19:28:31-
19:39:10

The red line indicates the shore line

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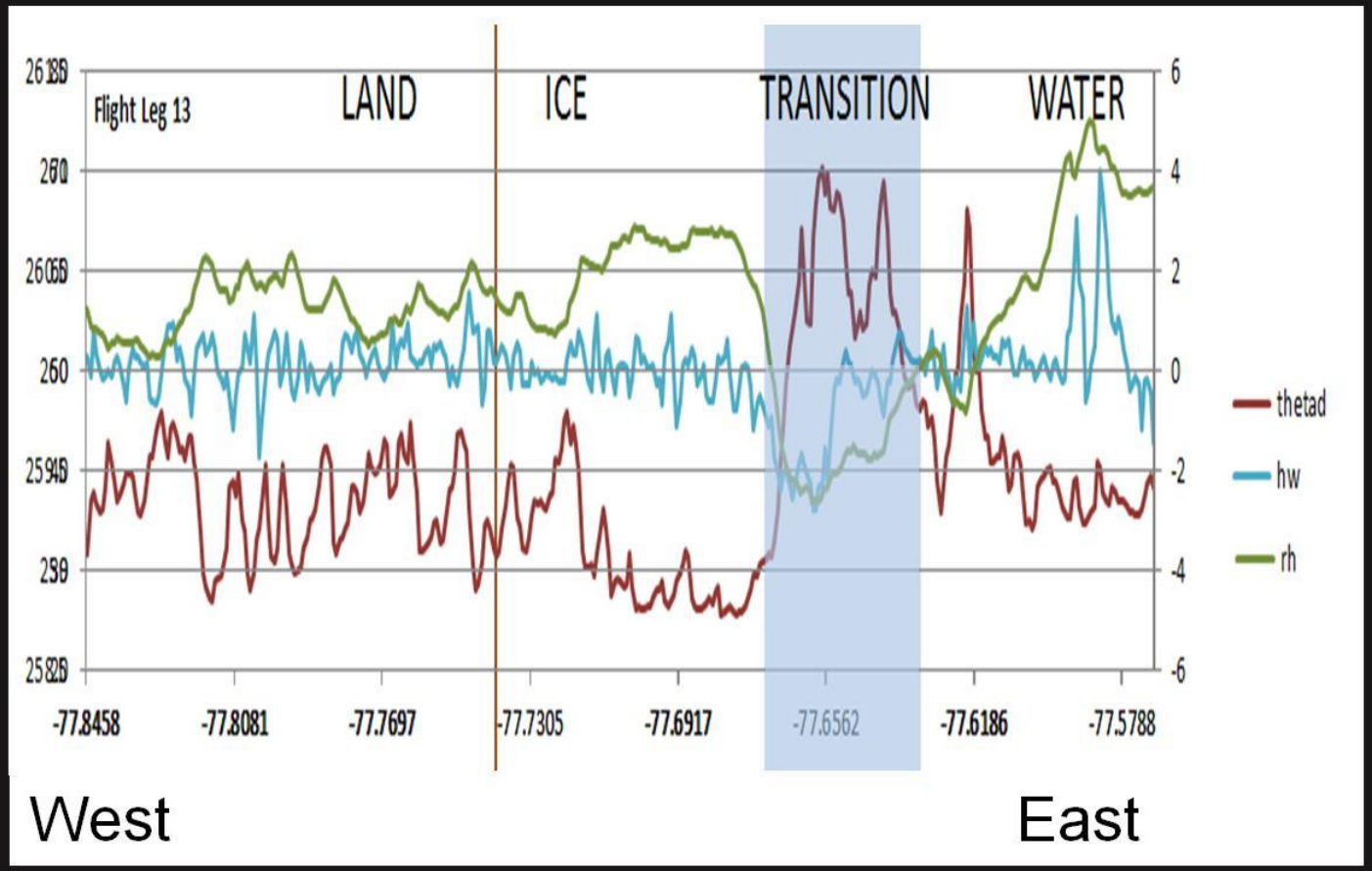

Flight Leg 13, Flight Stack B, 818 m AGL average

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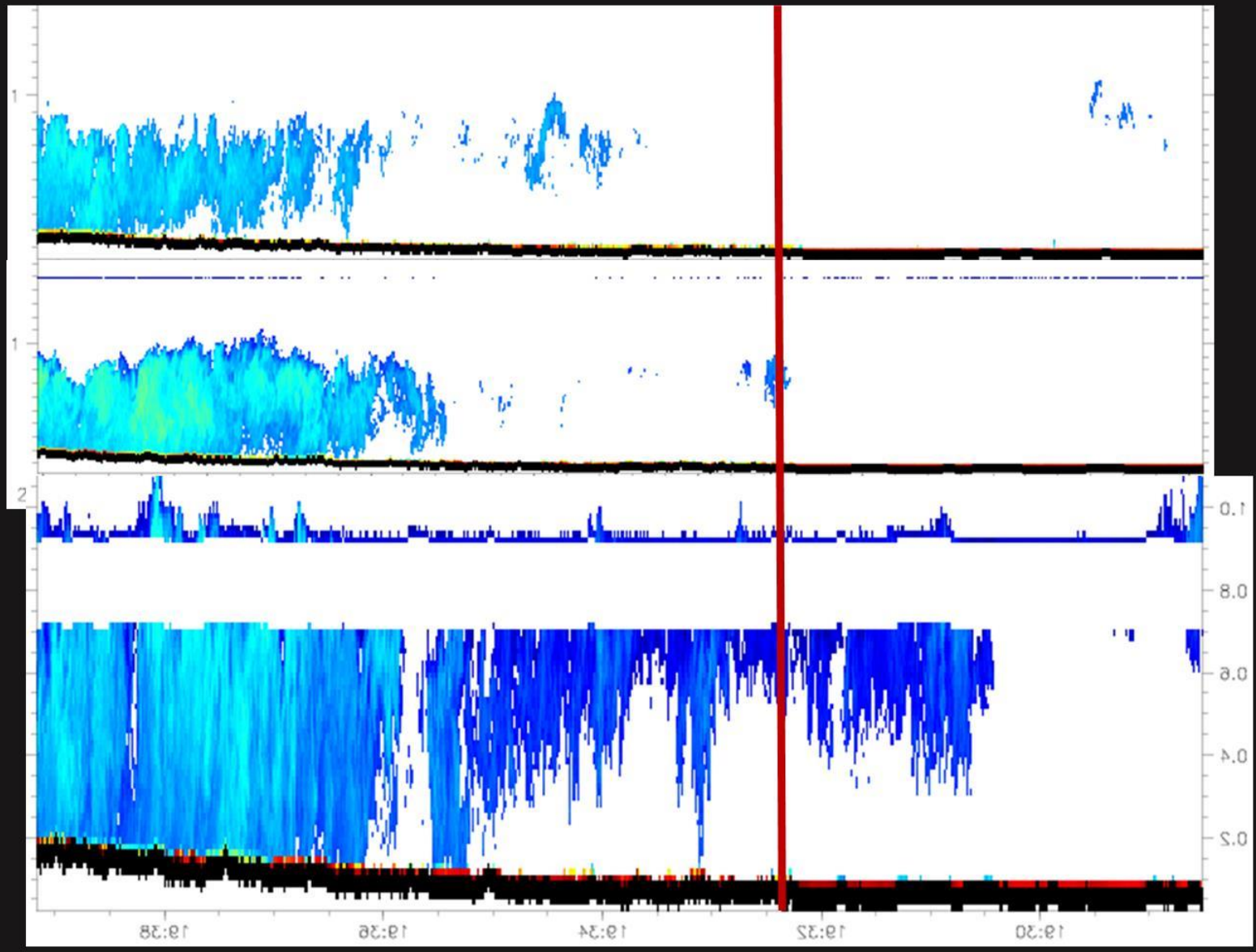
Leg 2: 18:00:05-18:06:51

Leg 16: 20:01:58-20:09:05

Leg 13: 19:28:31-19:39:10

The red line indicates the shore line



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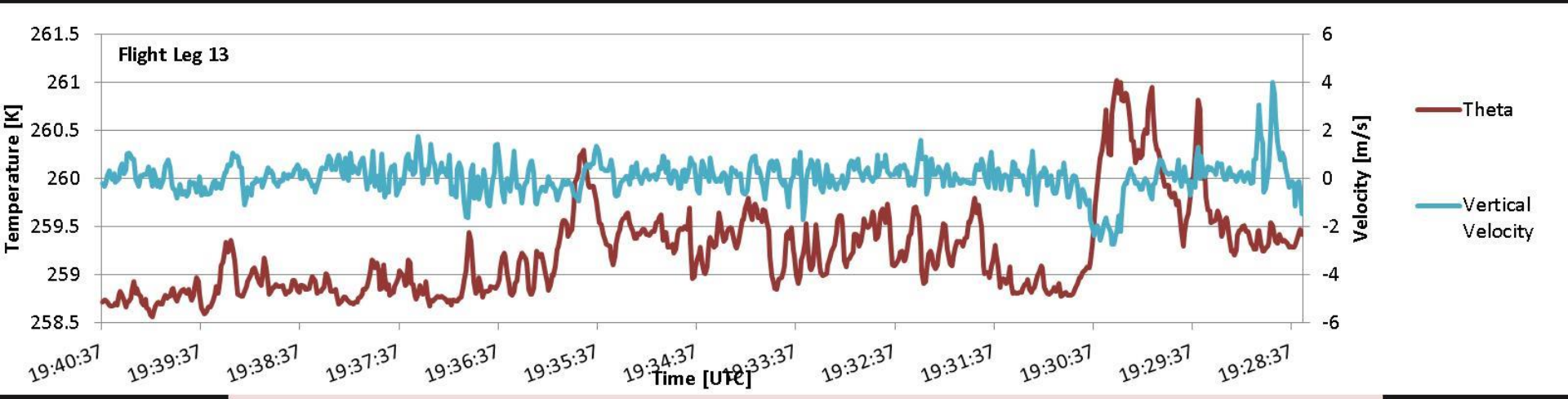

Reflectivity time series from WCR – about 150 m below KA
In situ observations from KA

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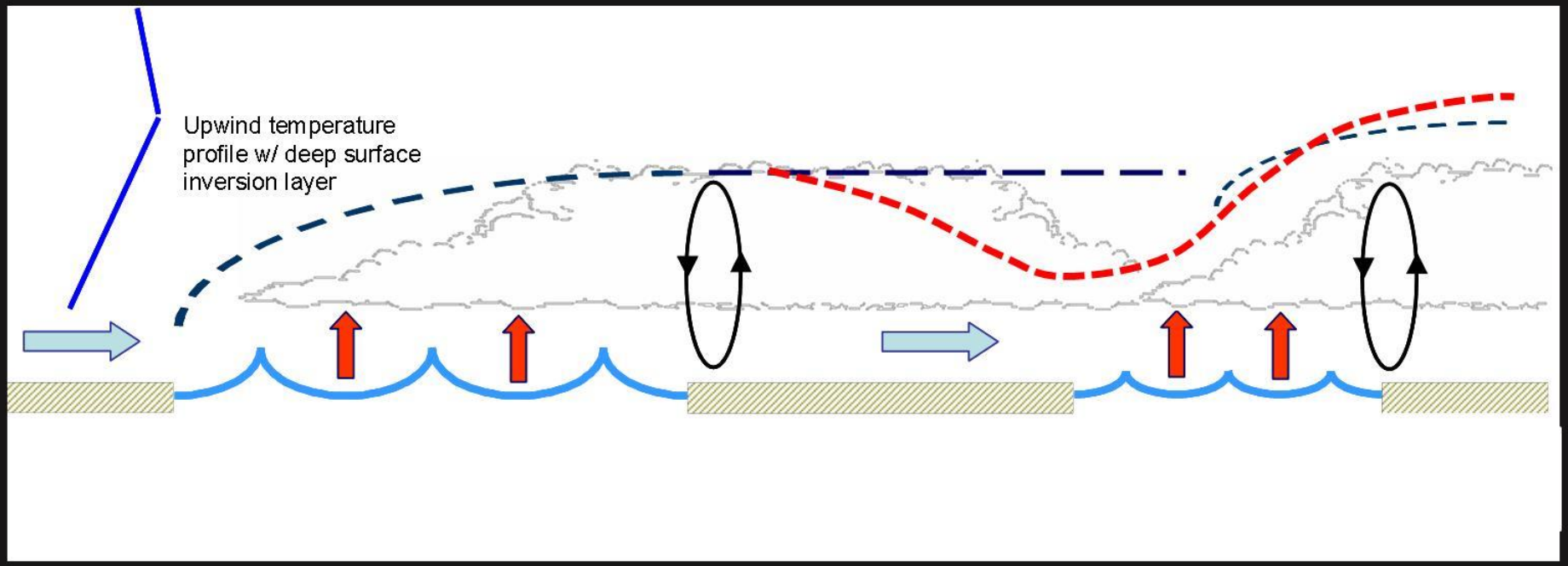
WSW ENE



Adapted from: Laird, N. F., 2008: Lake-effect Snows Associated with Small and Large Lakes. *Sigma Xi*, February.

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Findings

- Clear plume of modified air on north end of the AC tracks
- Cross-wind correspondence of in-situ hw, WCR VV, and WCR Refl
- Correspondence of Refl and VV over lake

Questions

- How much influence did Lake Erie have after being “squeezed” by near-shore downdraft?
- Importance of temporal changes
- How does relationship btwn patches of high refl and vertical motions differ between water/land?
- What controls the size/intensity of the near-shore downdraft?
- What is influence of snow particles seen above the PBL?
- Etc., etc., etc., etc., …

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