Great Lakes Hurricane of 1913: A Meteorological Review 100 Years Later

National Weather Service Gaylord MI

Winter Talk Series 2013

Great Lakes Hurricane of 1913: Overview

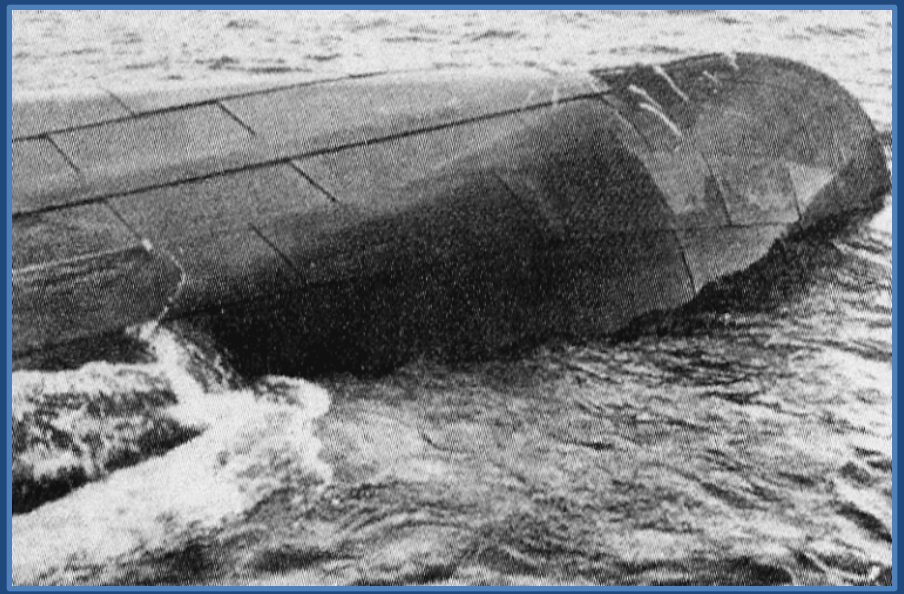
This November marks the 100 year anniversary of one of the most infamous storms in the recorded history of the Great Lakes.

7-10 November 1913

At least 258 lives lost on the Great Lakes.

Twelve ships sank, 30 other vessels crippled.

Eight out of 18 ships battling the storm on Lake Huron sank (*Wexford, Argus, John A. McGean, Hydrus, Isaac M. Scott, Regina, James C. Carruthers, Charles S. Price*). 187 lives lost.



Charles S. Price capsized in Lake Huron

CLEVELAND PLAIN DEALER EXTRA

30 LOST ON STORMY HURON, AS GALE RAGES HERE

CREW AND STEAMER SINK AS SHIPS LITTER SHORES

CITY FIGHTS GALE'S HAVOC AS FOOD FAMINE'S FEARED

Cleveland Plain Dealer -- 11 November 1913

Great Lakes Hurricane of 1913: Shipwrecks

Great Lakes Hurricane of 1913: A Little Background Meteorological History

This talk will not focus on the maritime disaster itself, but more on the local weather impacting citizens that weathered the storm on land.

We'll start by looking at how the storm evolved. But the series of weather maps we are about to see are a little different than what we are used to today.

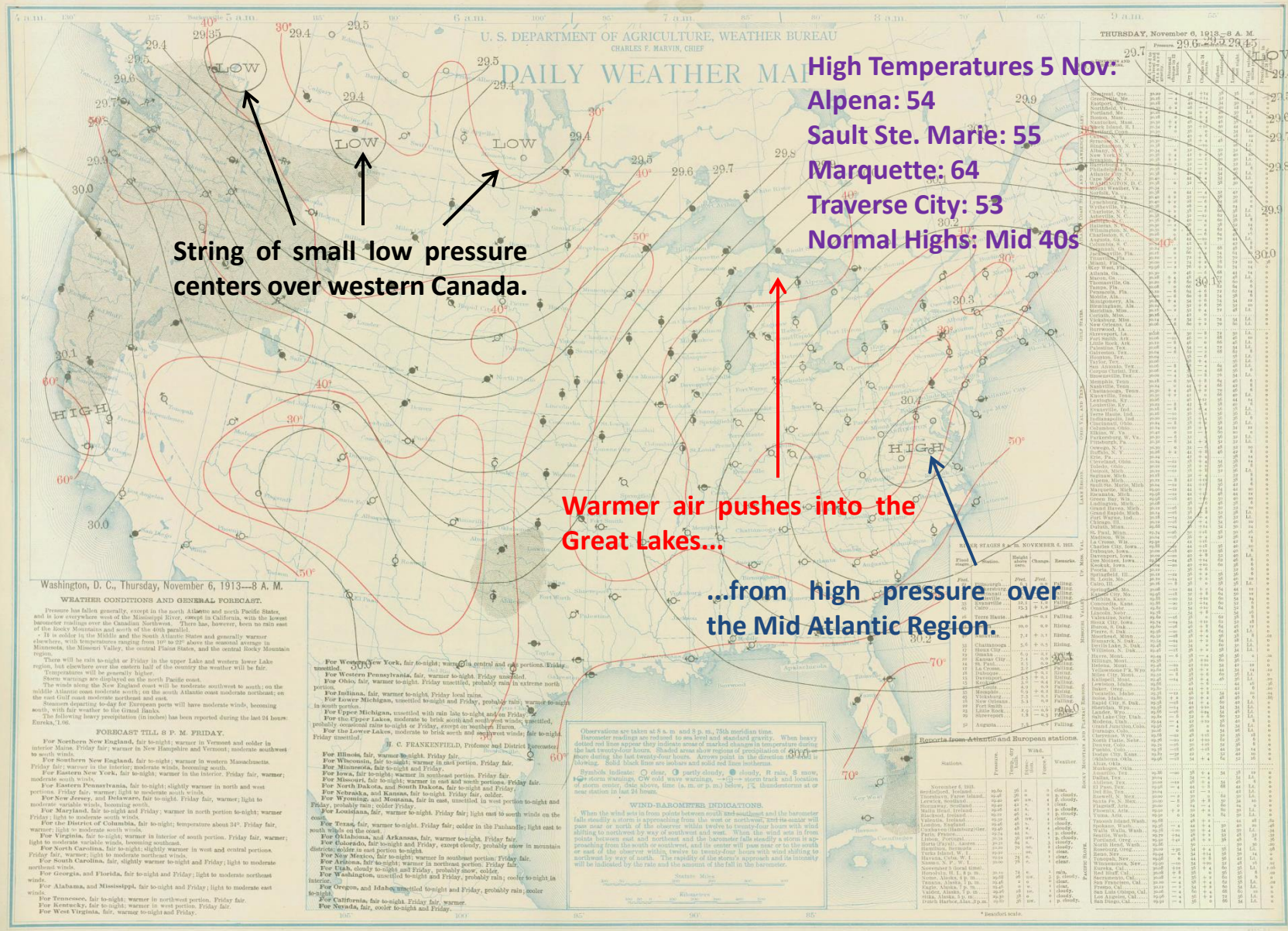
While the concept of high and low pressure were understood, our modern understanding of storm structure wasn't developed until the years following the first World War.

The formulation of the so-called "Norwegian Cyclone Model" and the formal definition of warm and cold fronts in 1919 revolutionized weather forecasting.

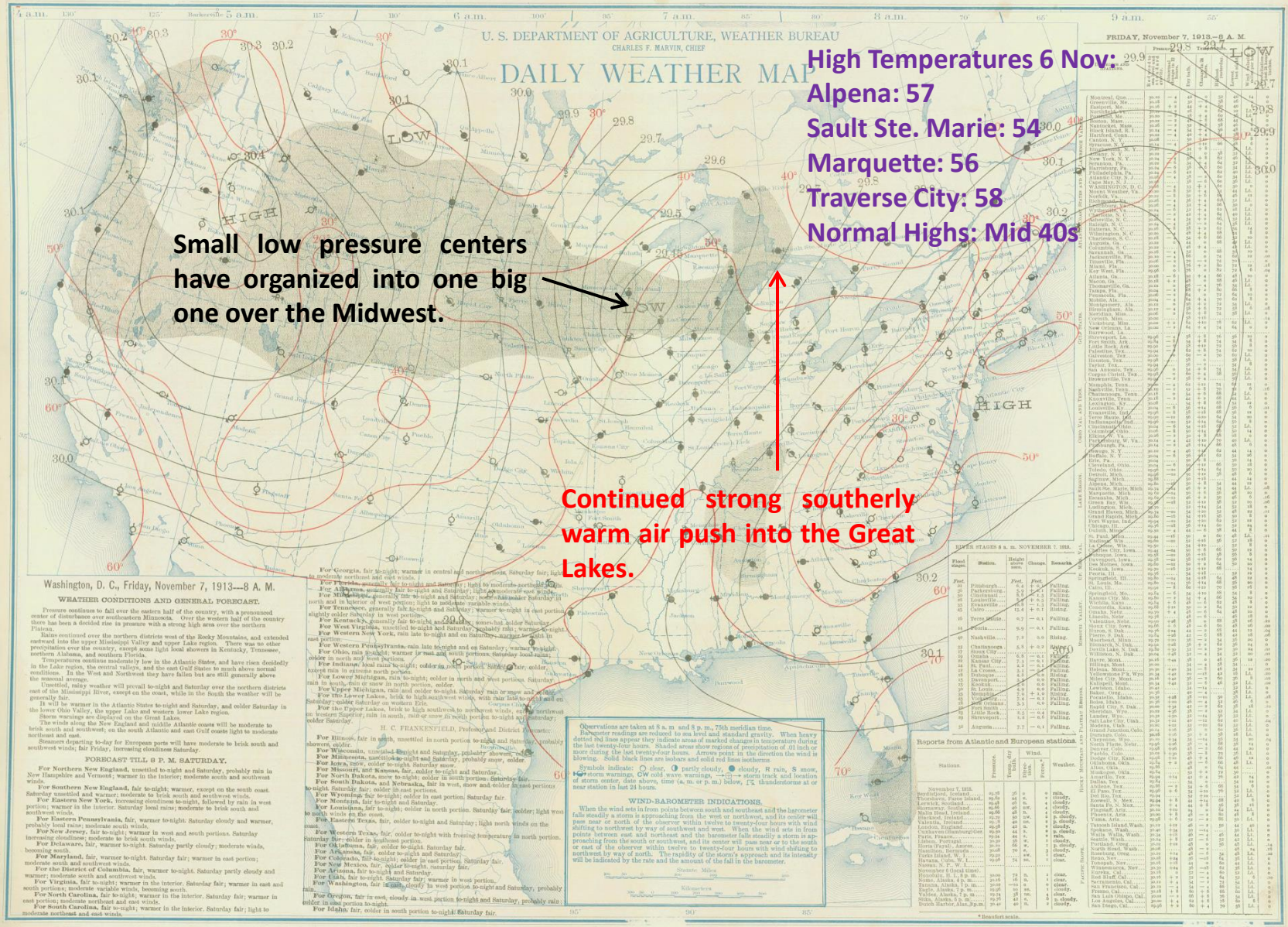
These ideas, however, took time to take hold in the United States, and it wasn't until around 1940 that the U.S. Weather Bureau adopted the analysis of fronts that we are familiar with on today's weather maps.

So the maps detailing the 1913 storm are a little primitive by comparison.

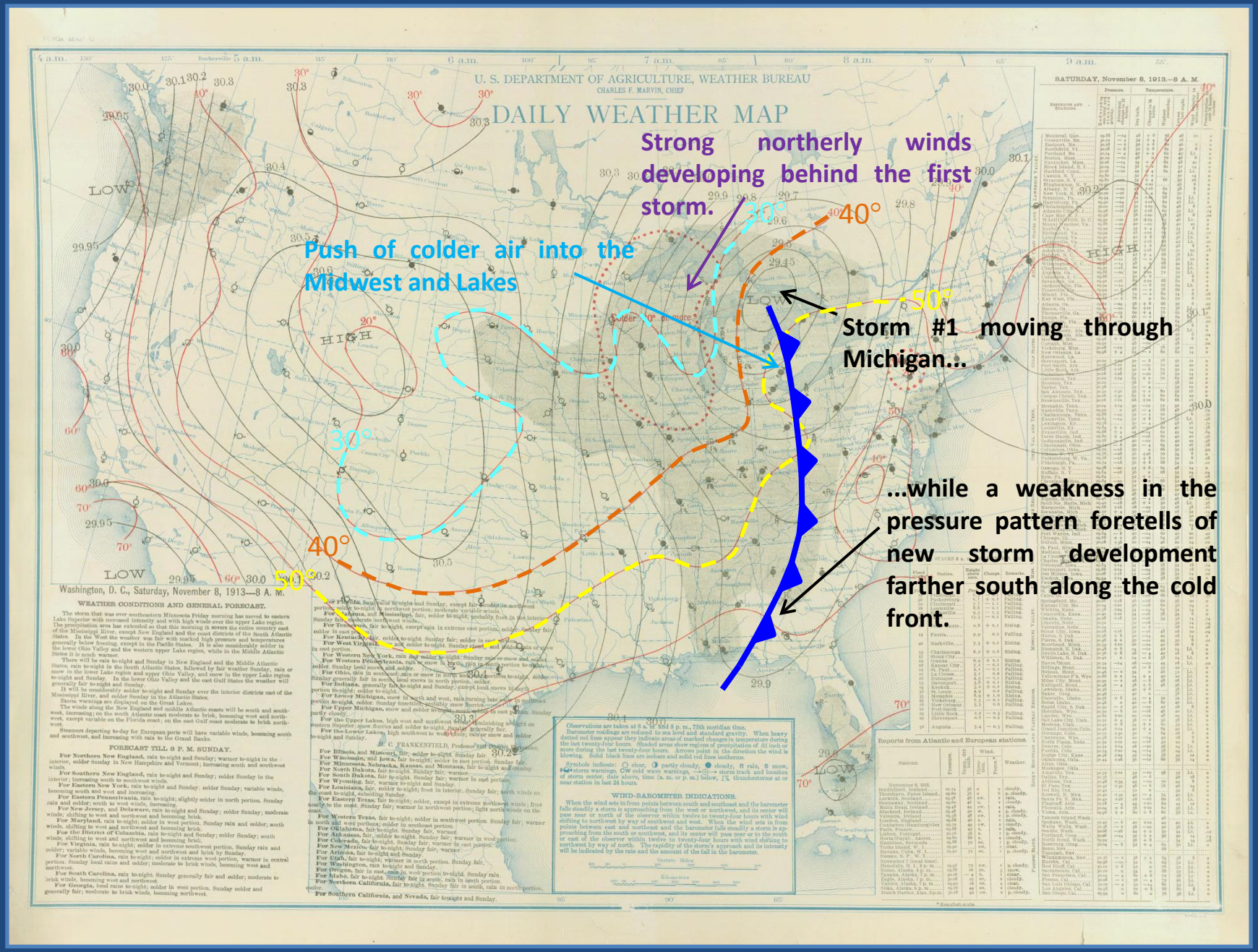
Great Lakes Hurricane of 1913: Storm Chronology: 6 November 1913



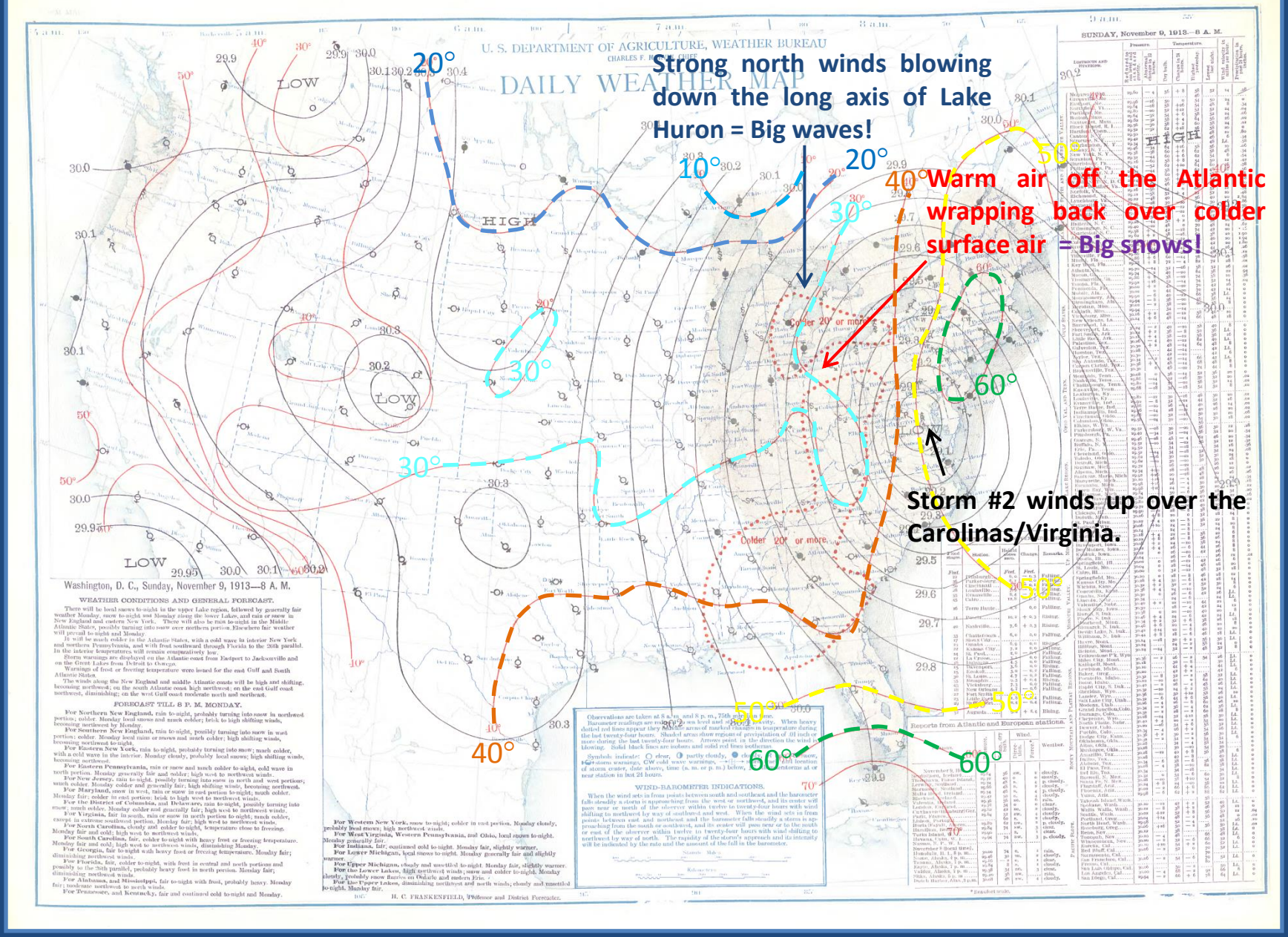
Great Lakes Hurricane of 1913: Storm Chronology: 7 November 1913



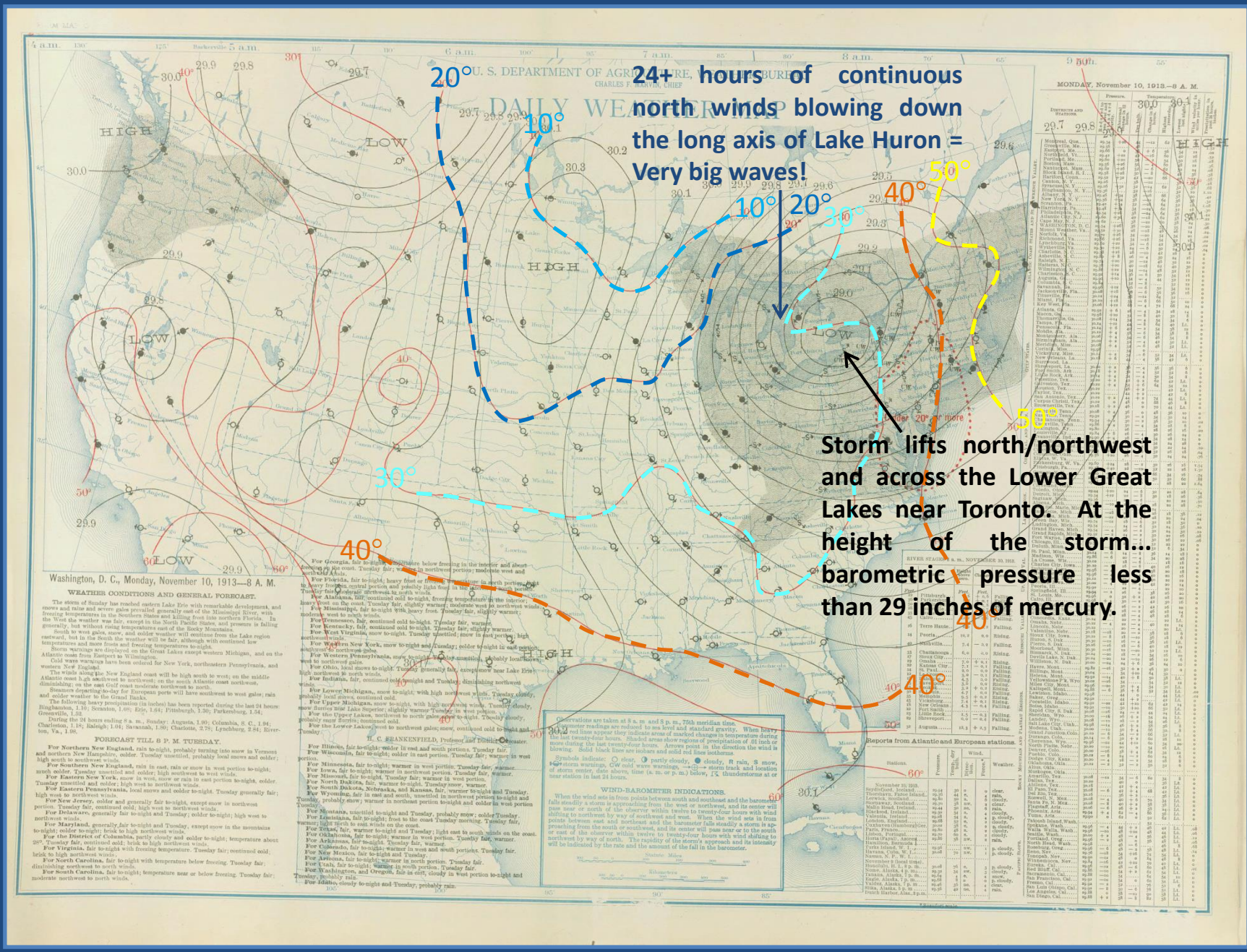
Great Lakes Hurricane of 1913: Storm Chronology: 8 November 1913



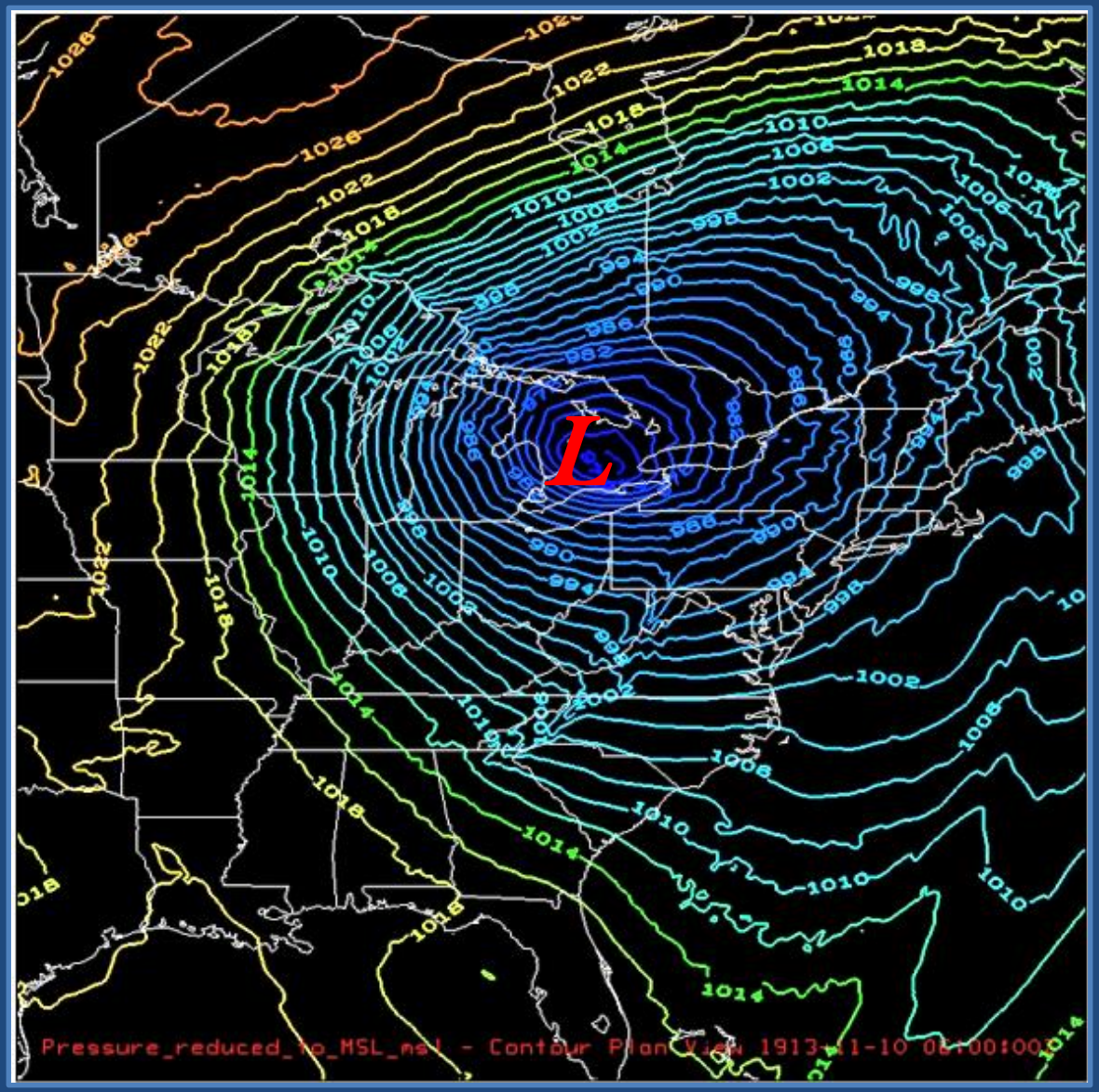
Great Lakes Hurricane of 1913: Storm Chronology: 9 November 1913



Great Lakes Hurricane of 1913: Storm Chronology: 10 November 1913



Great Lakes Hurricane of 1913: Storm Simulation: 10 November 1913



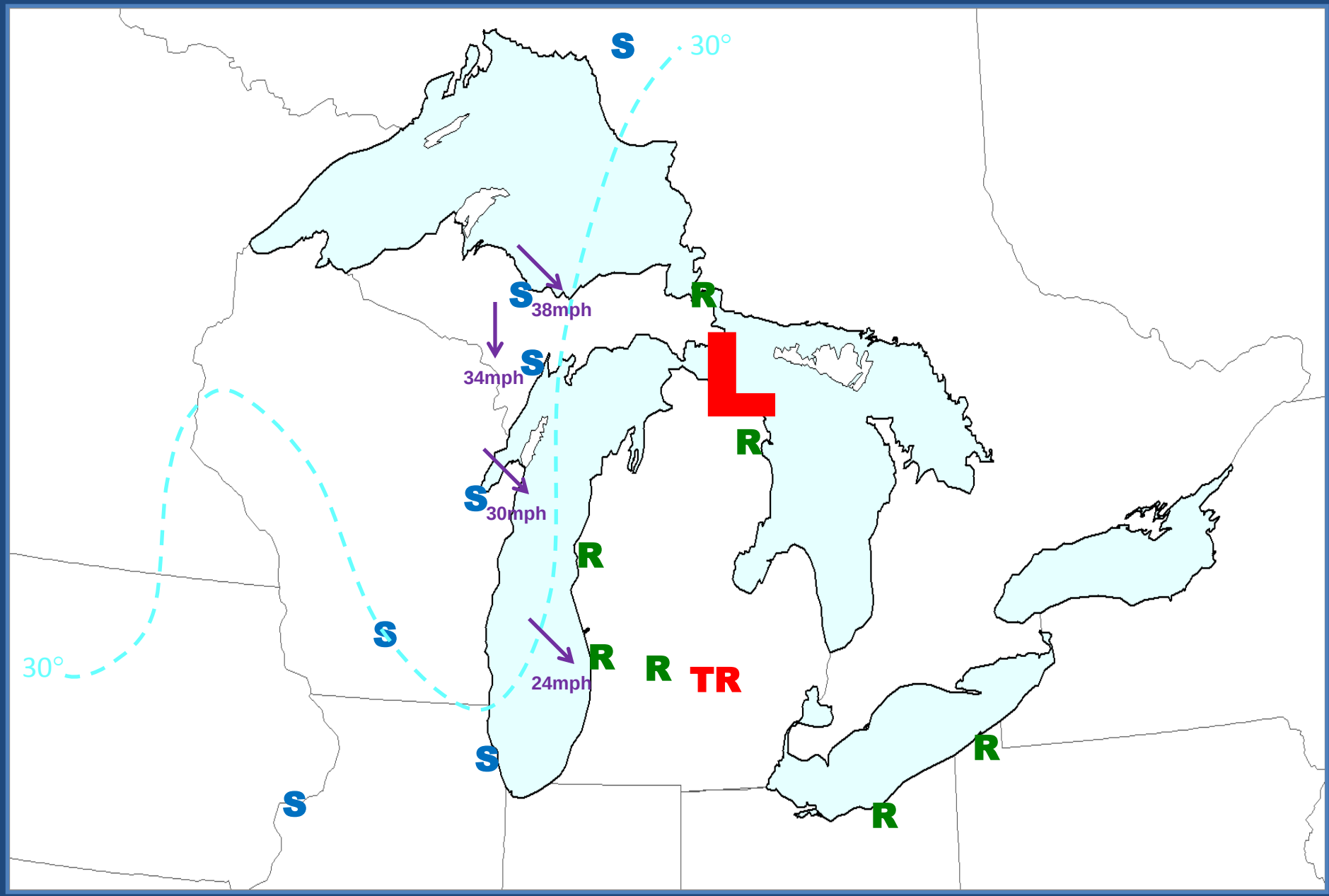
This is a computer model simulation of the storm taken from a NOAA presentation.

Time of this simulated pressure pattern is 1am 10 November...at the point that the storm was deepest.

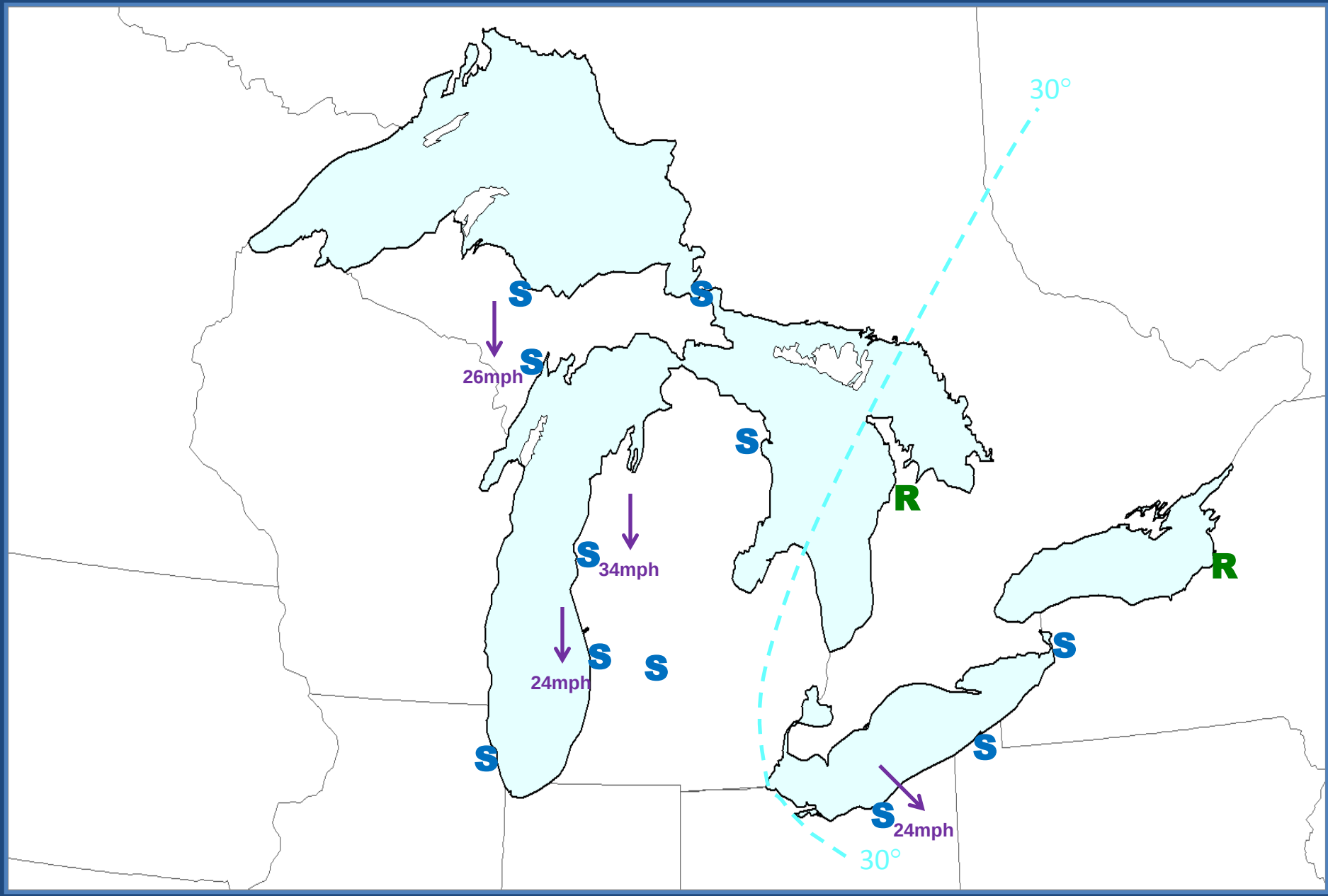
Lowest central pressure in the simulation was 969mb (28.61 inches mercury).

Great Lakes Hurricane of 1913: Weather Distribution – 8am 7 November 1913

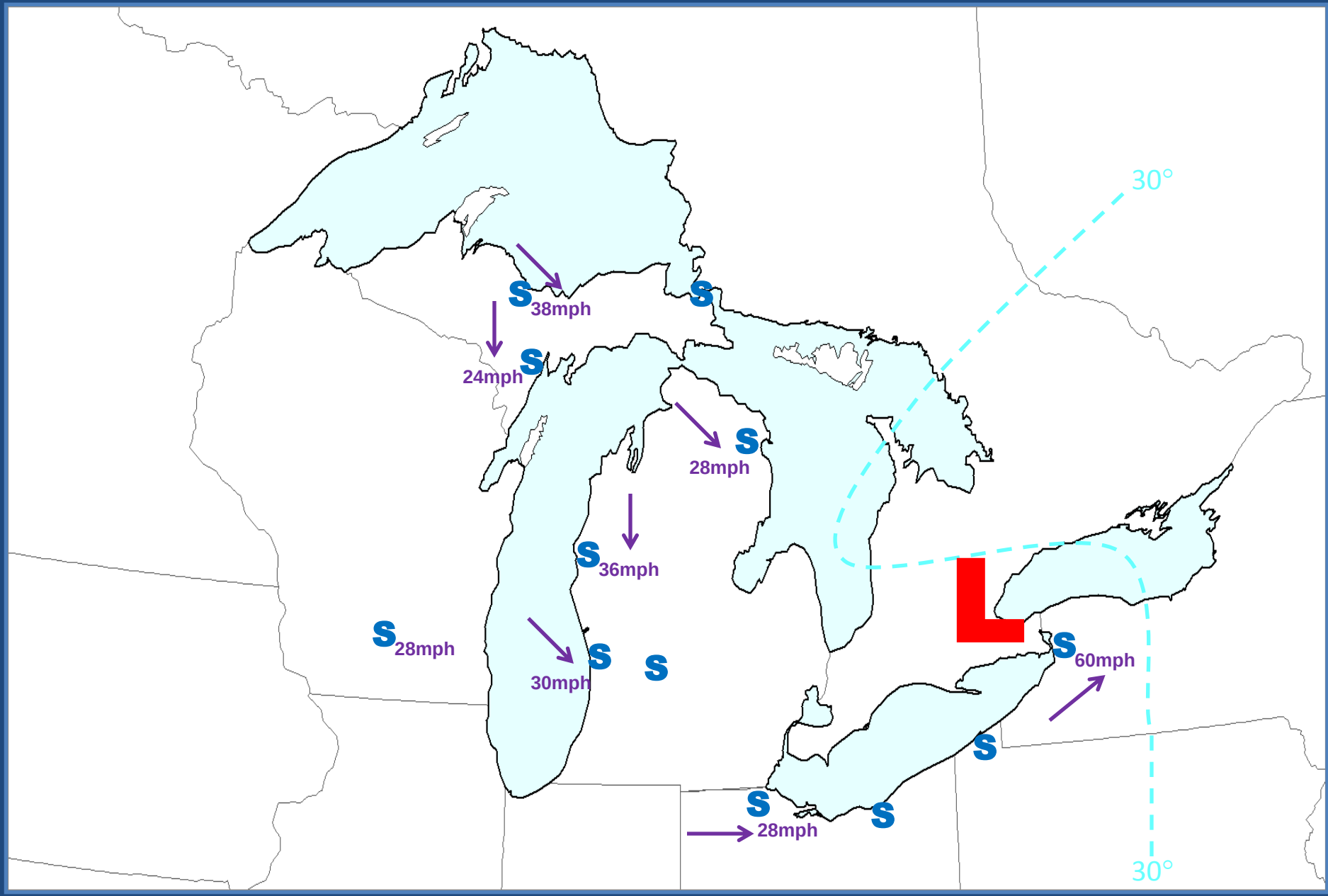
Great Lakes Hurricane of 1913: Weather Distribution – 8am 8 November 1913



Great Lakes Hurricane of 1913: Weather Distribution – 8am 9 November 1913



Great Lakes Hurricane of 1913: Weather Distribution – 8am 10 November 1913



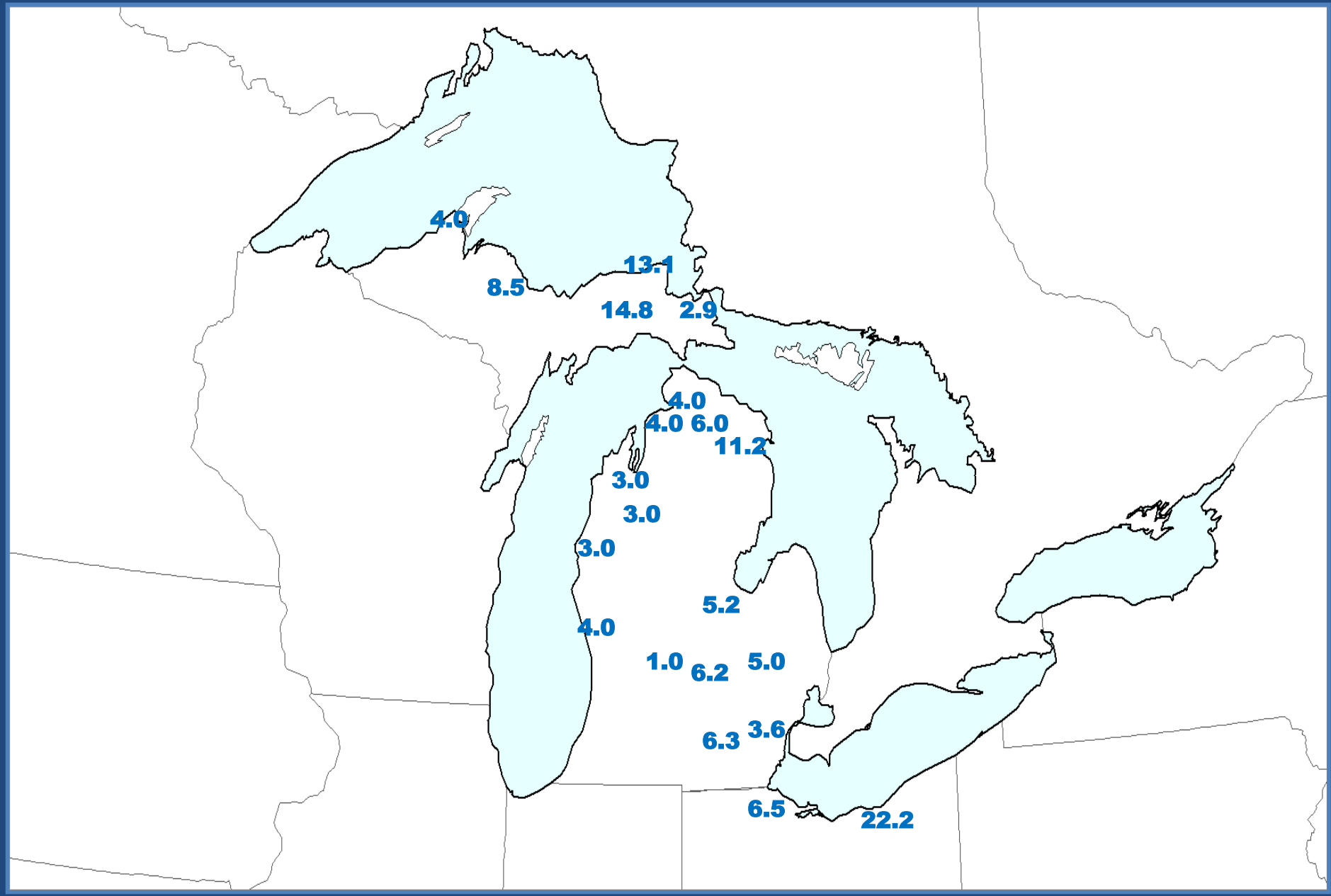
Great Lakes Hurricane of 1913: Snowfall

As the previous slides indicated...precipitation initially started as rain on the warm side of the initial area of low pressure crossing Wisconsin...then changed to snow on the 9th as colder air swept across the Great Lakes.

Snowfall intensity increased on the 9th and continued into the 10th as warm and moist air from the Atlantic was pulled over the cold surface air. This process helps wring moisture out of the atmosphere in the form of copious amounts of snow. In addition...the development of lake effect snow squalls in the cold air behind this system added to the snow totals especially over the Lower Great Lakes.

The result was a significant early season winter storm for much of the Great Lakes...

Great Lakes Hurricane of 1913: Snowfall Totals...7-11 November 1913

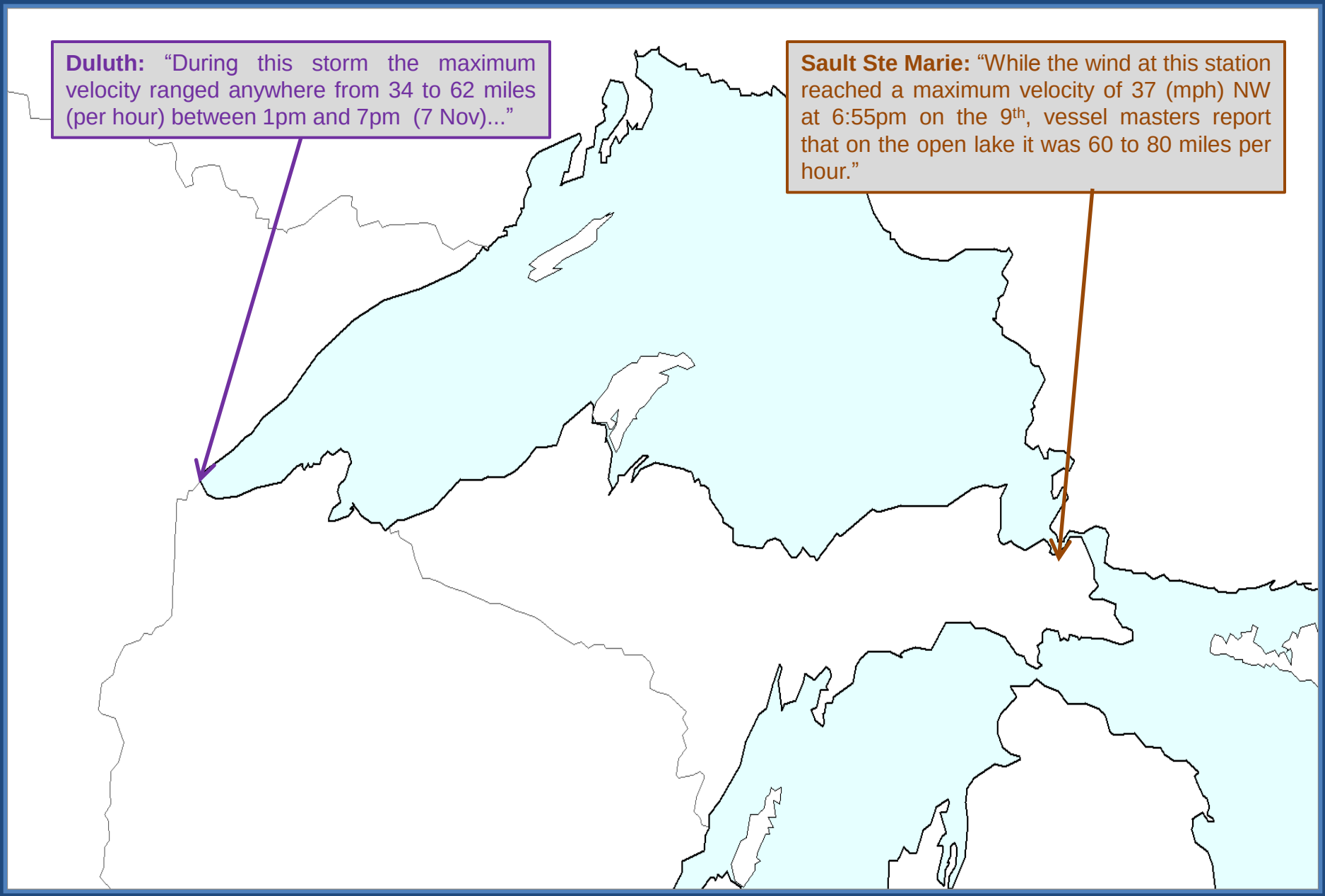


Great Lakes Hurricane of 1913: Cleveland Blizzard

Cleveland, Ohio was slammed particularly hard from the storm...with nearly two feet of snow falling from the 9th through the 11th...including 17.4 inches on the 10th alone.

Travel was paralyzed by snow clogging streets...and power was out for multiple days.

Great Lakes Hurricane of 1913: Excerpts from Local Weather Bureau Reports



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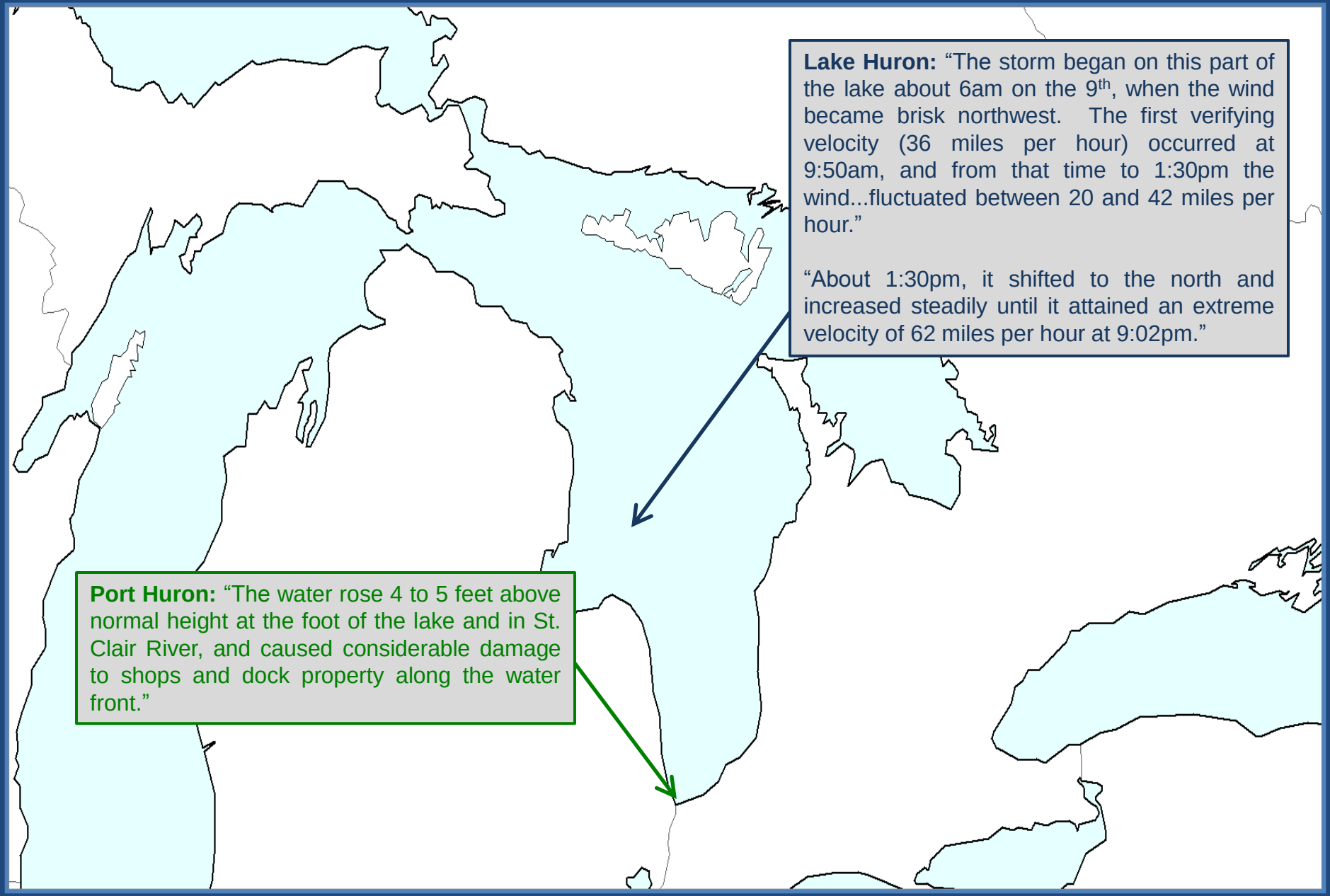
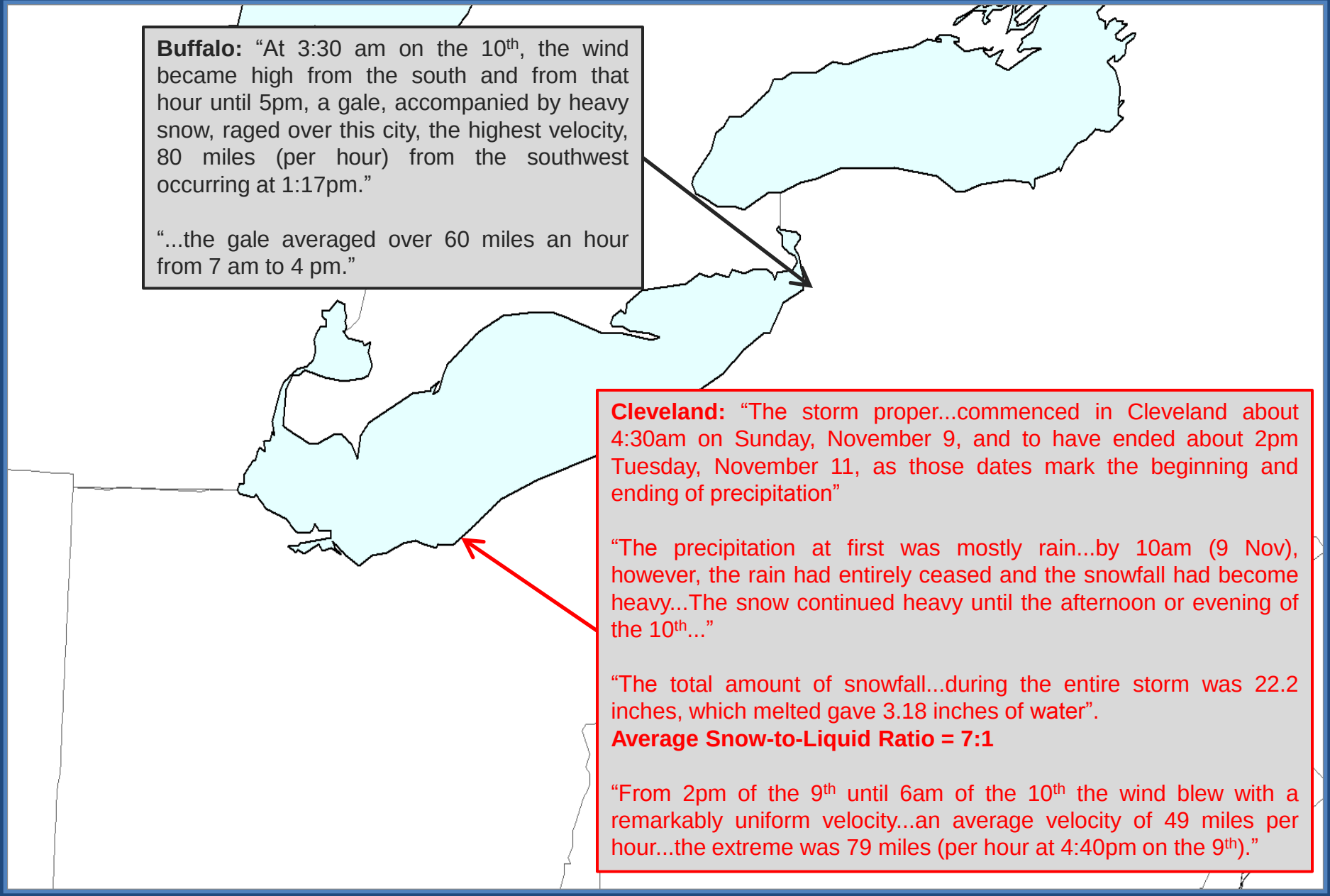


Lake Huron: "The storm began on this part of the lake about 6am on the 9th, when the wind became brisk northwest. The first verifying velocity (36 miles per hour) occurred at 9:50am, and from that time to 1:30pm the wind...fluctuated between 20 and 42 miles per hour."

"About 1:30pm, it shifted to the north and increased steadily until it attained an extreme velocity of 62 miles per hour at 9:02pm."

Port Huron: "The water rose 4 to 5 feet above normal height at the foot of the lake and in St. Clair River, and caused considerable damage to shops and dock property along the water front."

Great Lakes Hurricane of 1913: Excerpts from Local Weather Bureau Reports



Buffalo: "At 3:30 am on the 10th, the wind became high from the south and from that hour until 5pm, a gale, accompanied by heavy snow, raged over this city, the highest velocity, 80 miles (per hour) from the southwest occurring at 1:17pm."

"...the gale averaged over 60 miles an hour from 7 am to 4 pm."

Cleveland: "The storm proper...commenced in Cleveland about 4:30am on Sunday, November 9, and to have ended about 2pm Tuesday, November 11, as those dates mark the beginning and ending of precipitation"

"The precipitation at first was mostly rain...by 10am (9 Nov), however, the rain had entirely ceased and the snowfall had become heavy...The snow continued heavy until the afternoon or evening of the 10th..."

"The total amount of snowfall...during the entire storm was 22.2 inches, which melted gave 3.18 inches of water".
Average Snow-to-Liquid Ratio = 7:1

"From 2pm of the 9th until 6am of the 10th the wind blew with a remarkably uniform velocity...an average velocity of 49 miles per hour...the extreme was 79 miles (per hour at 4:40pm on the 9th)."

Thanks for your attention!

Excerpts from Weather Bureau "Daily Local Record" November 7-11 1913...

Friday, November 7

Storm Warning: "Hoist southwest storm warning 10:00am. Storm over upper Mississippi valley moving northeast. Brisk to high southwest winds this afternoon and tonight, shifting to northwest Saturday on upper Lakes. Warnings ordered throughout Great Lakes."

Saturday, November 8

Storm Warning: "Change to northwest storm warning 10:00am. Storm over eastern Lake Superior moving east-northeast. High west to northwest winds."

Monday, November 10

Storm Warning: "Continue northwest storm warning 10:00am."

The daily press (*Free Press*) reports the following: "Steamer Pollock (thought to be) blown ashore above ship canal at St. Clair Flats. Forty vessels driven to anchor in St. Clair and Detroit Rivers. Fifty reported anchored in Thunder Bay. Fifty more reported as finding refuge between 'Soo' and White Fish Point."

Sunday, November 9

Storm Warning: "Continue northwest storm warning. Storm over Virginia moving northeast."

The press reports four ships driven ashore or on rocks, viz.,: "Louisiana" off Port Washington, Wisconsin; "Mary" aground near Algonac; unidentified ship on Point Pelee, Lake Erie; "Mary Elphicke" on Bar Point (aground).