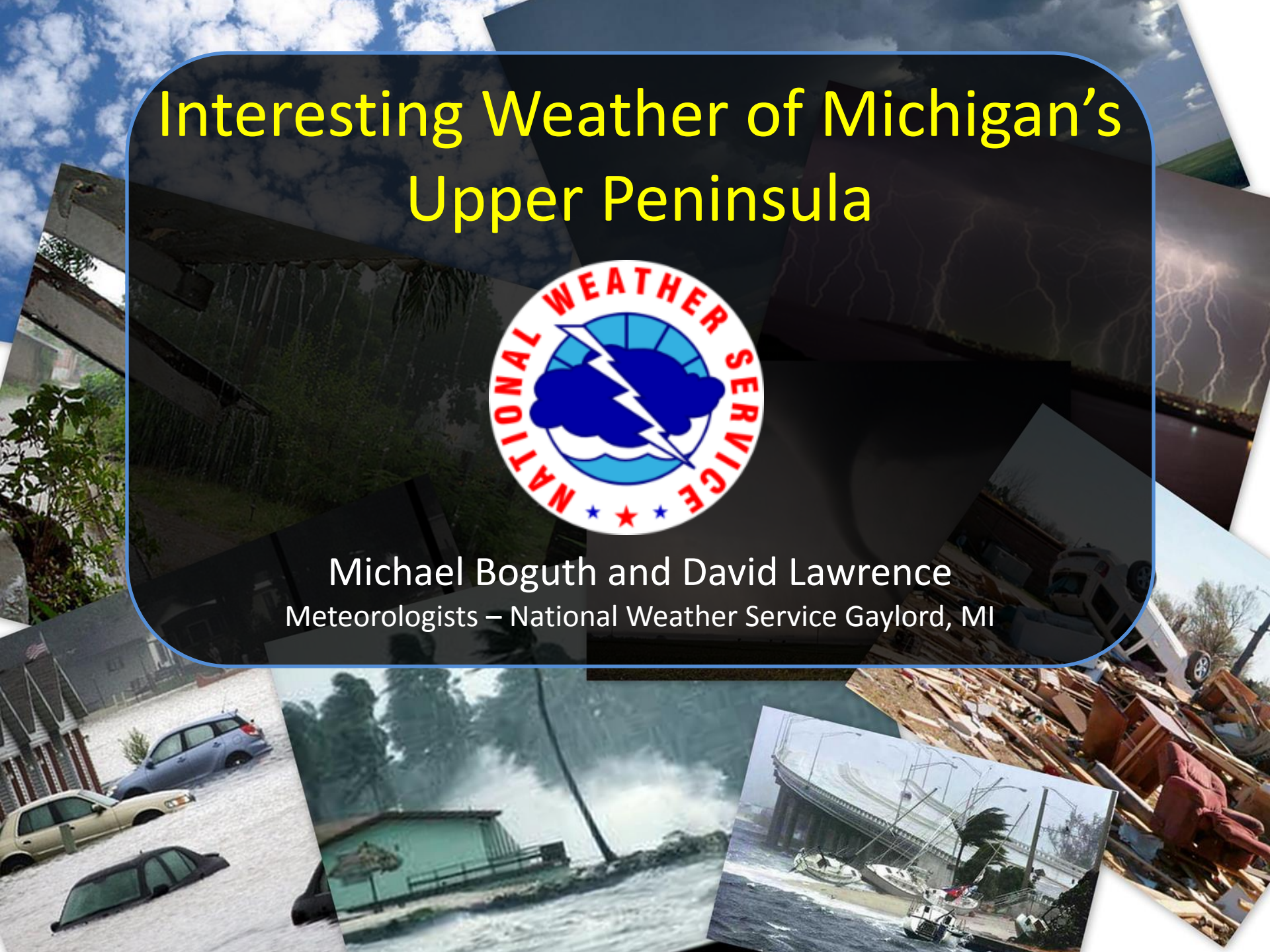
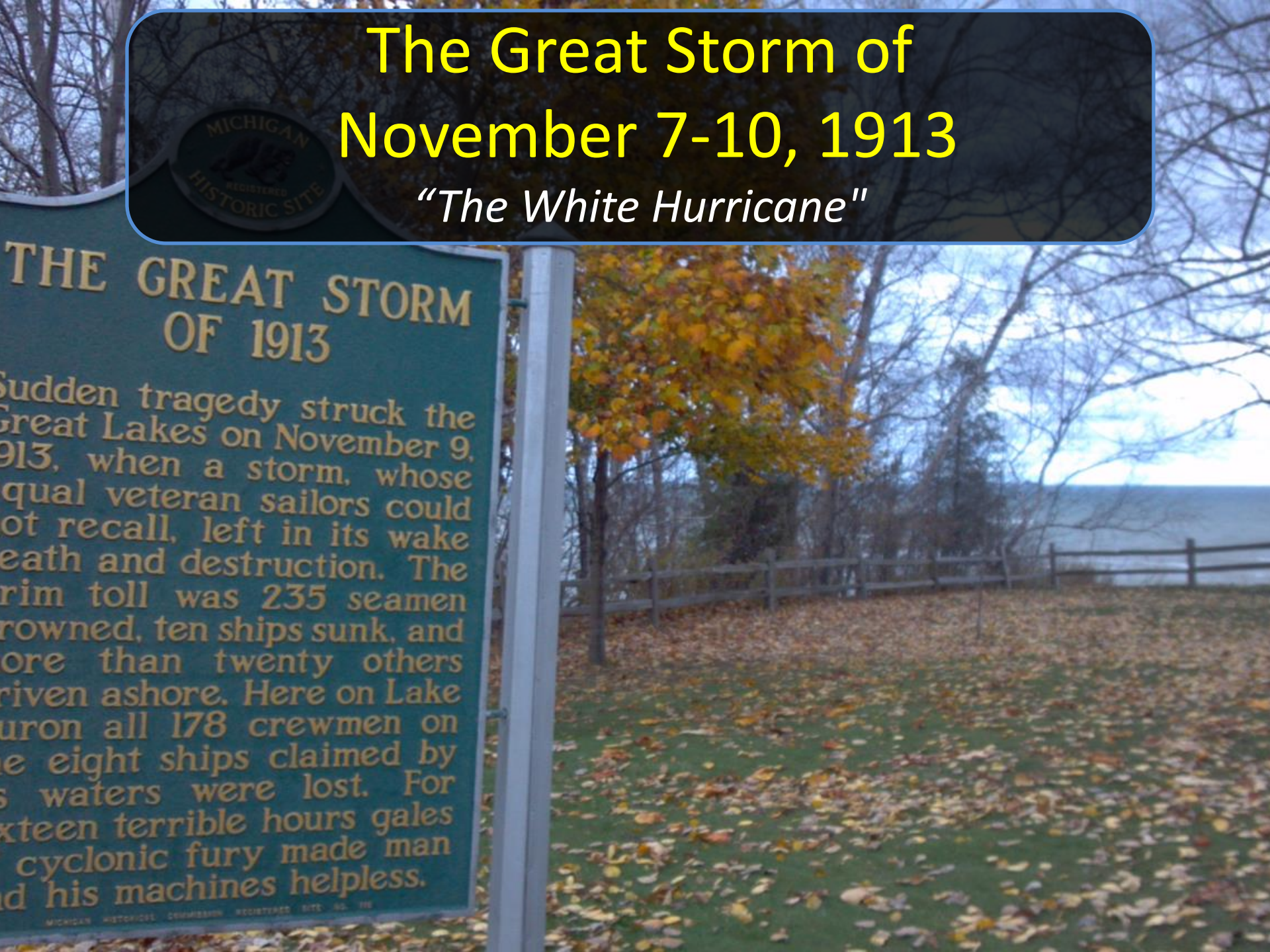
Interesting Weather of Michigan's Upper Peninsula

Michael Boguth and David Lawrence
Meteorologists – National Weather Service Gaylord, MI



The Great Storm of November 7-10, 1913

"The White Hurricane"



Great Lakes Hurricane of 1913: Overview

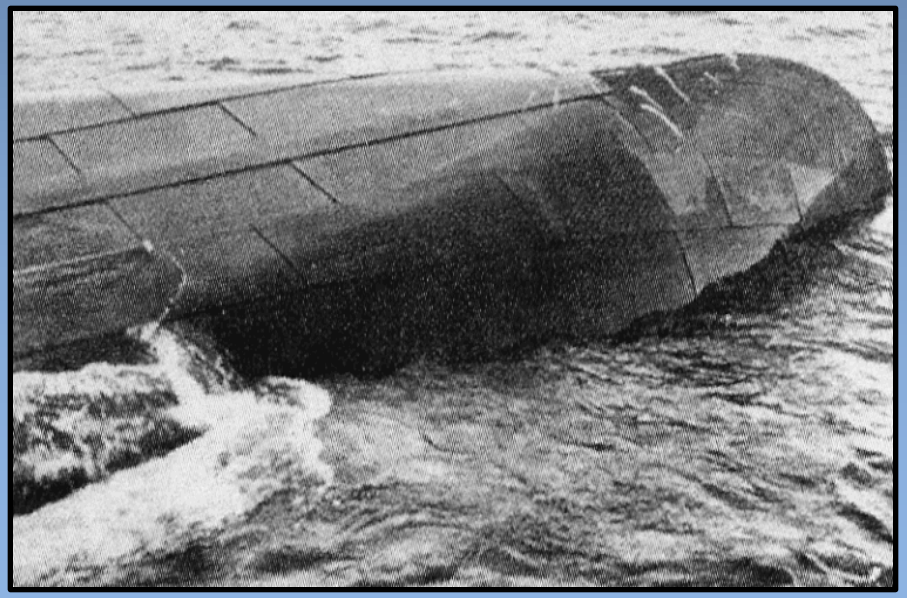
One of the most infamous storms in the recorded history of the Great Lakes!

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

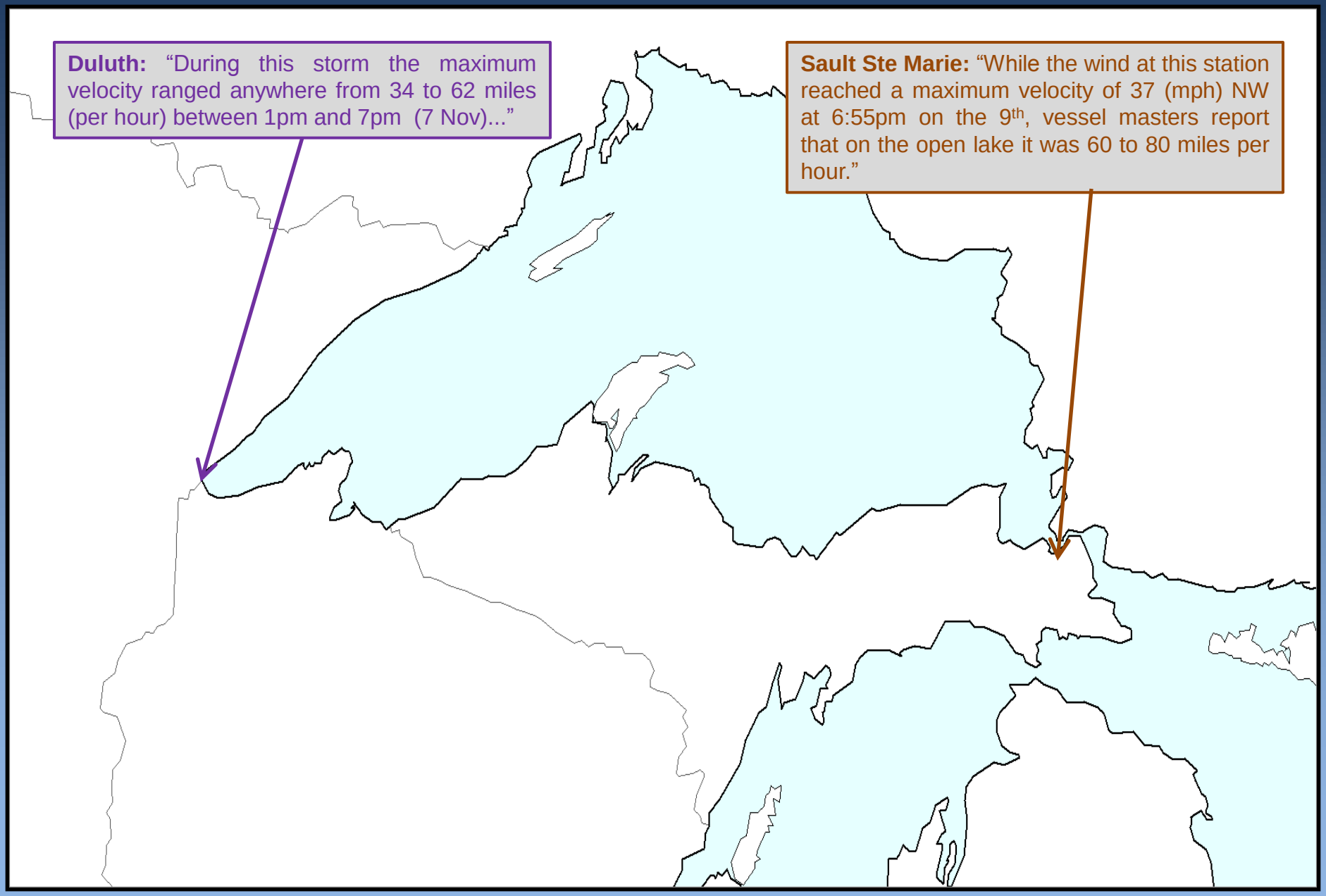
30 LOST ON STORMY HURON, AS GALE RAGES HERE

CREW AND STEAMER SINK AS SHIPS LITTER SHORES

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

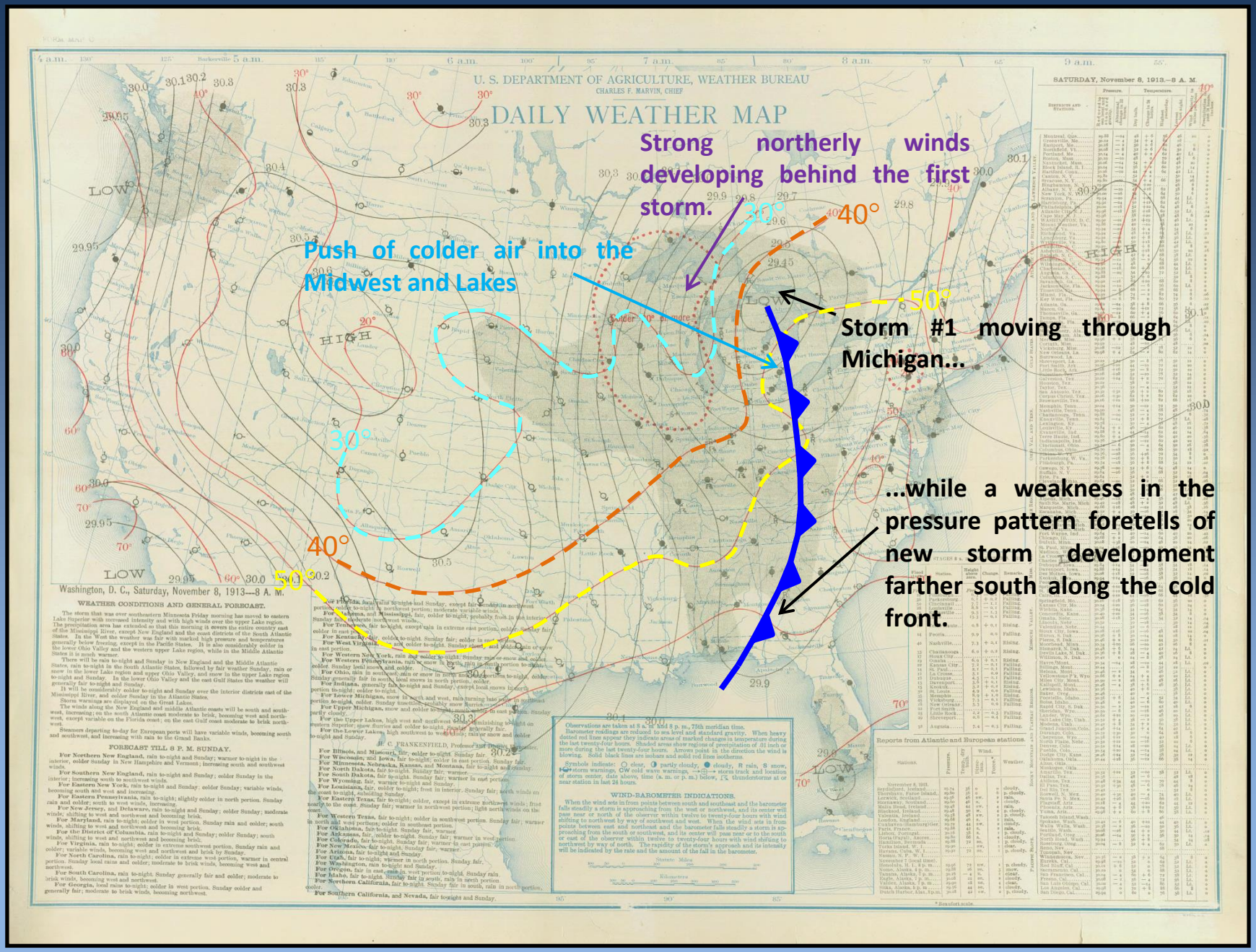
Cleveland Plain Dealer -- 11 November 1913

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

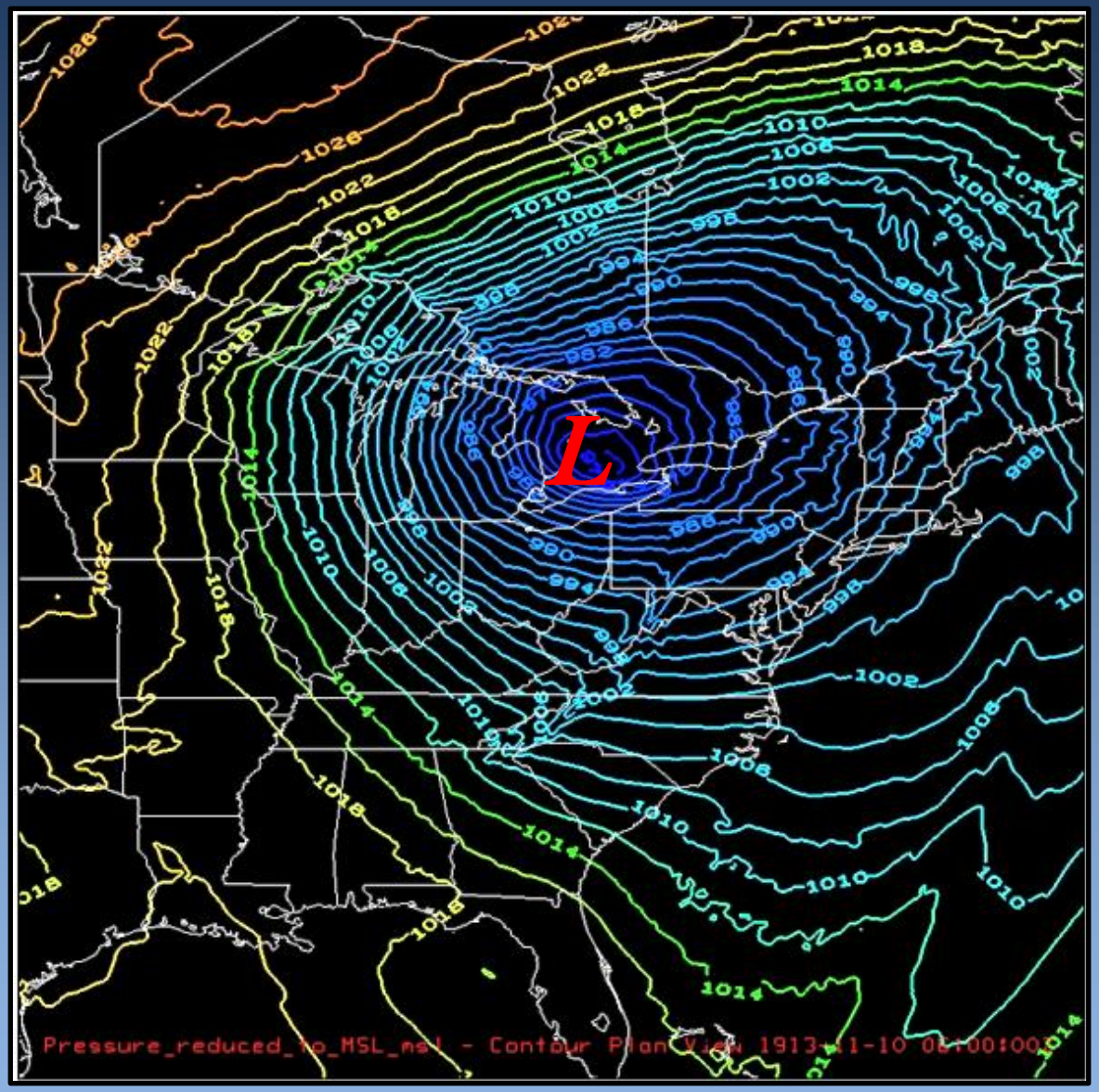


Great Lakes Hurricane of 1913: Shipwrecks

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



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



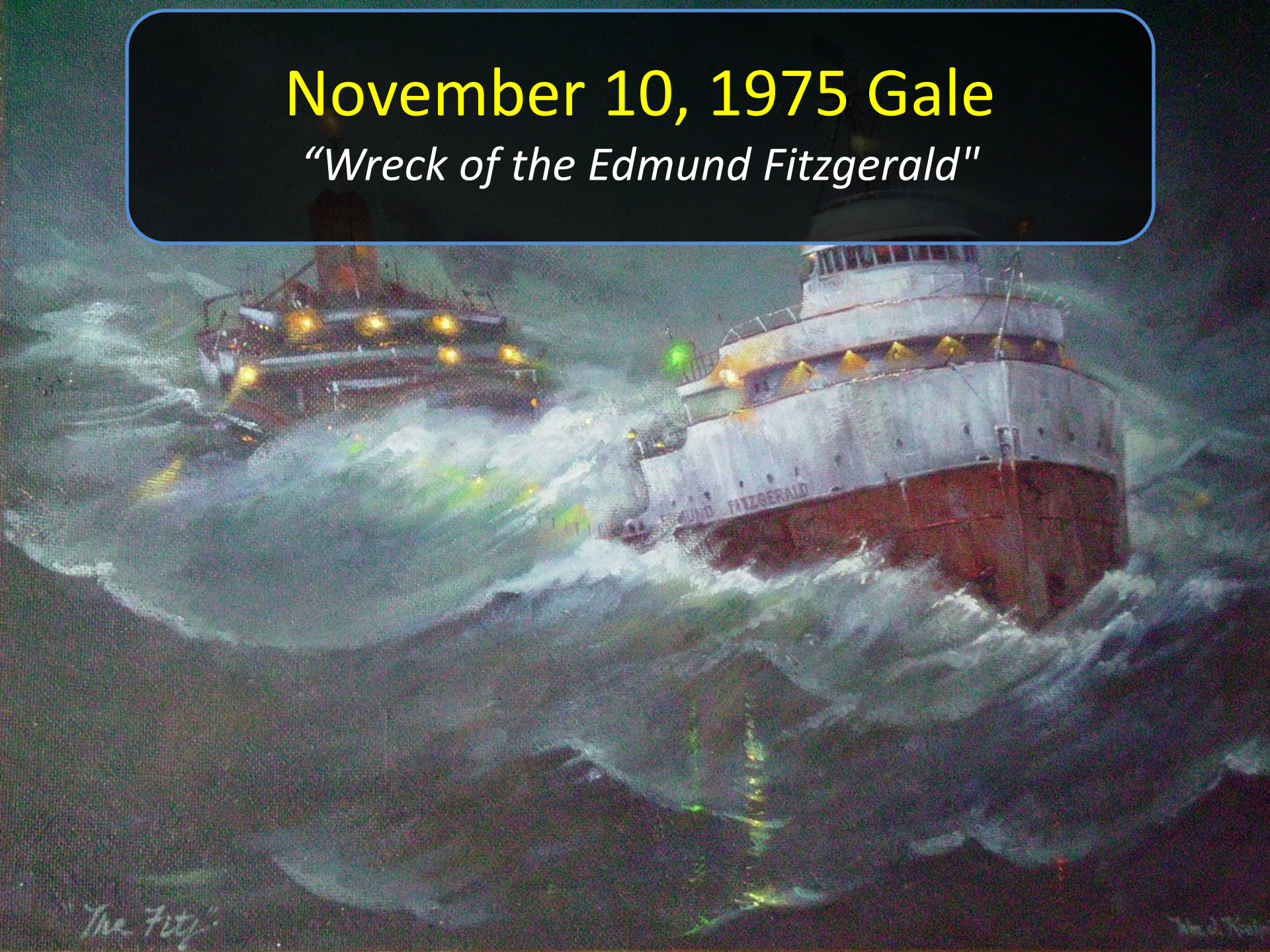
This is a computer model simulation of the storm taken from a NOAA presentation.

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).

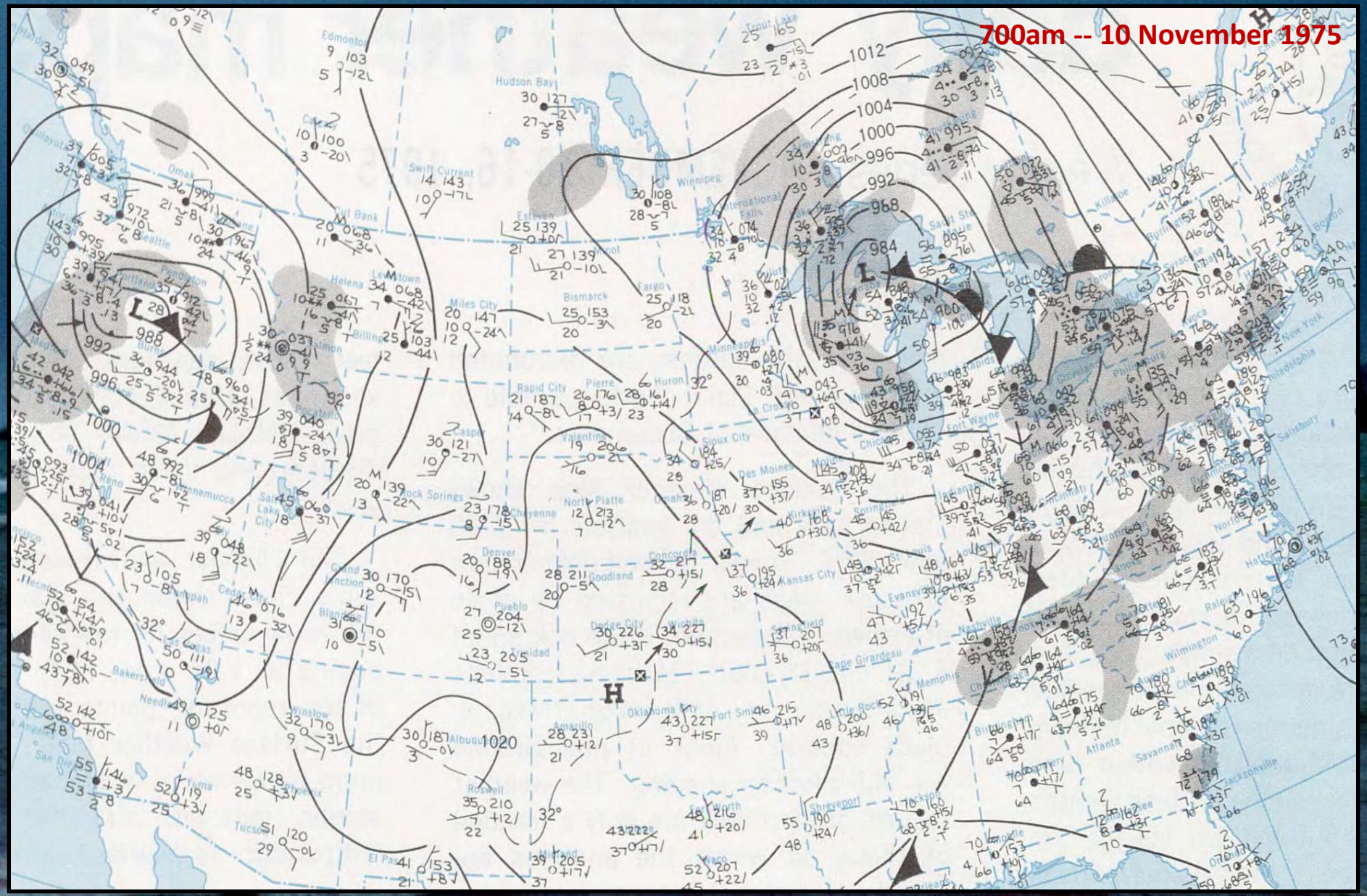
November 10, 1975 Gale

“Wreck of the Edmund Fitzgerald"



Great Storms of the Great Lakes: *The Wreck of the* Edmund Fitzgerald*: 10 November 1975*

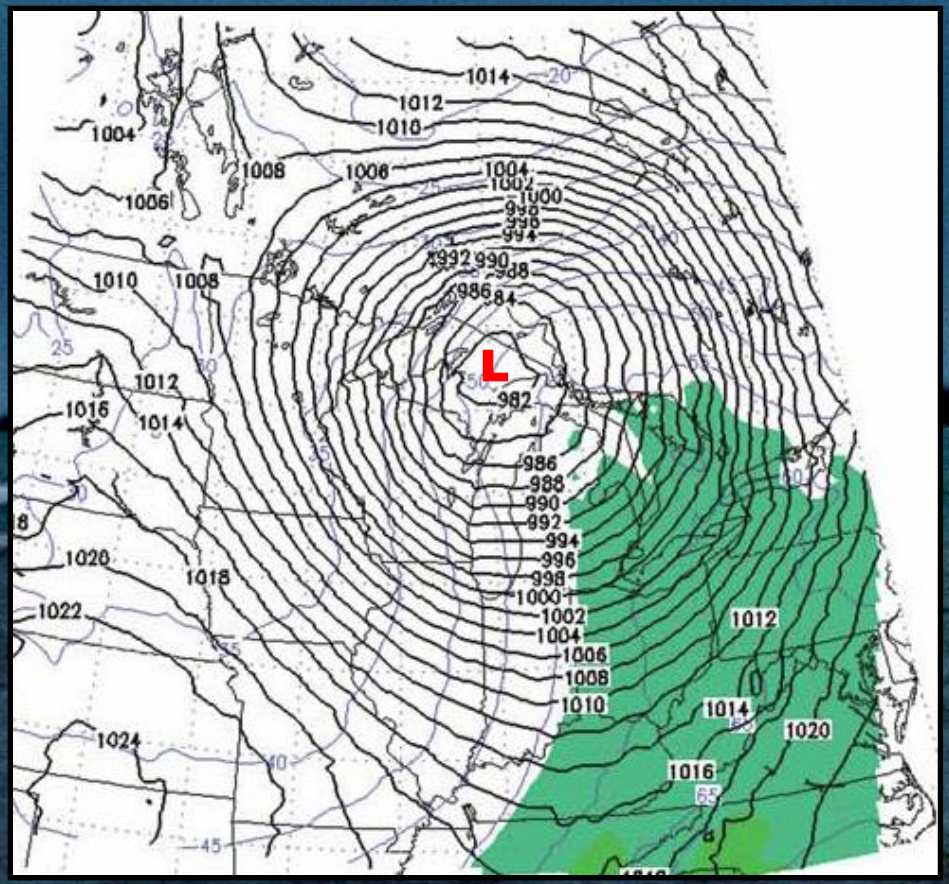
Daily Weather Map:



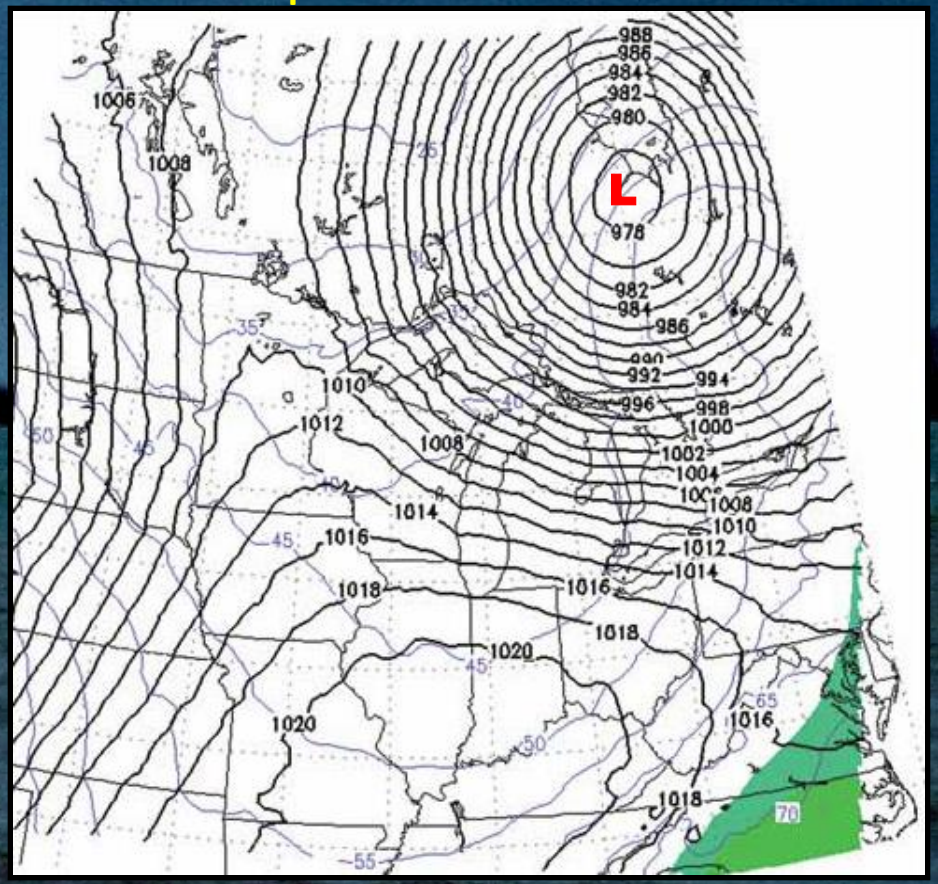
Great Storms of the Great Lakes: *The Wreck of the* Edmund Fitzgerald*: 10 November 1975*

Weather conditions during the afternoon and evening of 10 November: Surface Pressure

7:00am -- 10 November 1975



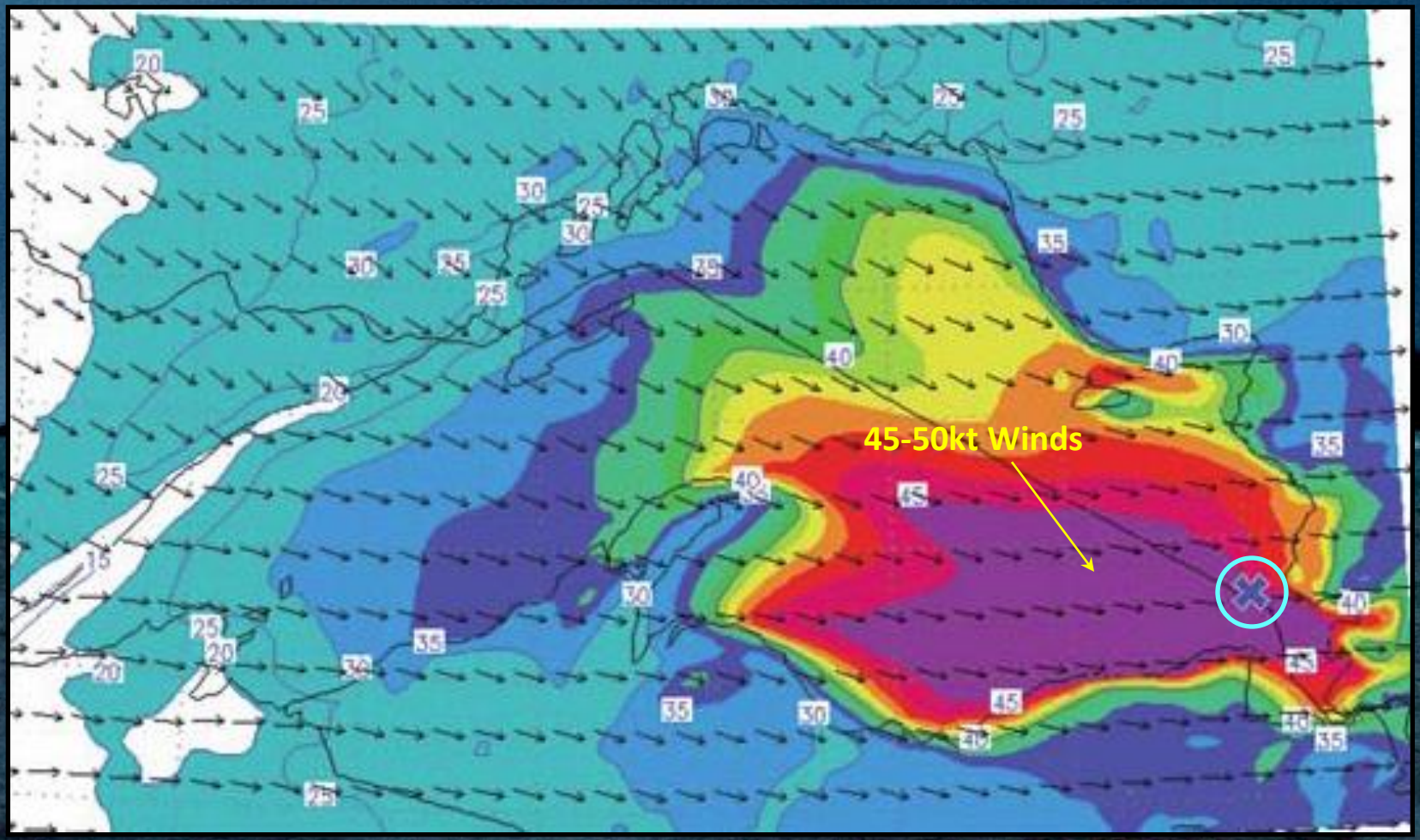
7:00pm -- 10 November 1975



Great Storms of the Great Lakes: *The Wreck of the* Edmund Fitzgerald*: 10 November 1975*

Weather conditions during the afternoon and evening of 10 November: Surface Winds

700pm -- 10 November 1975

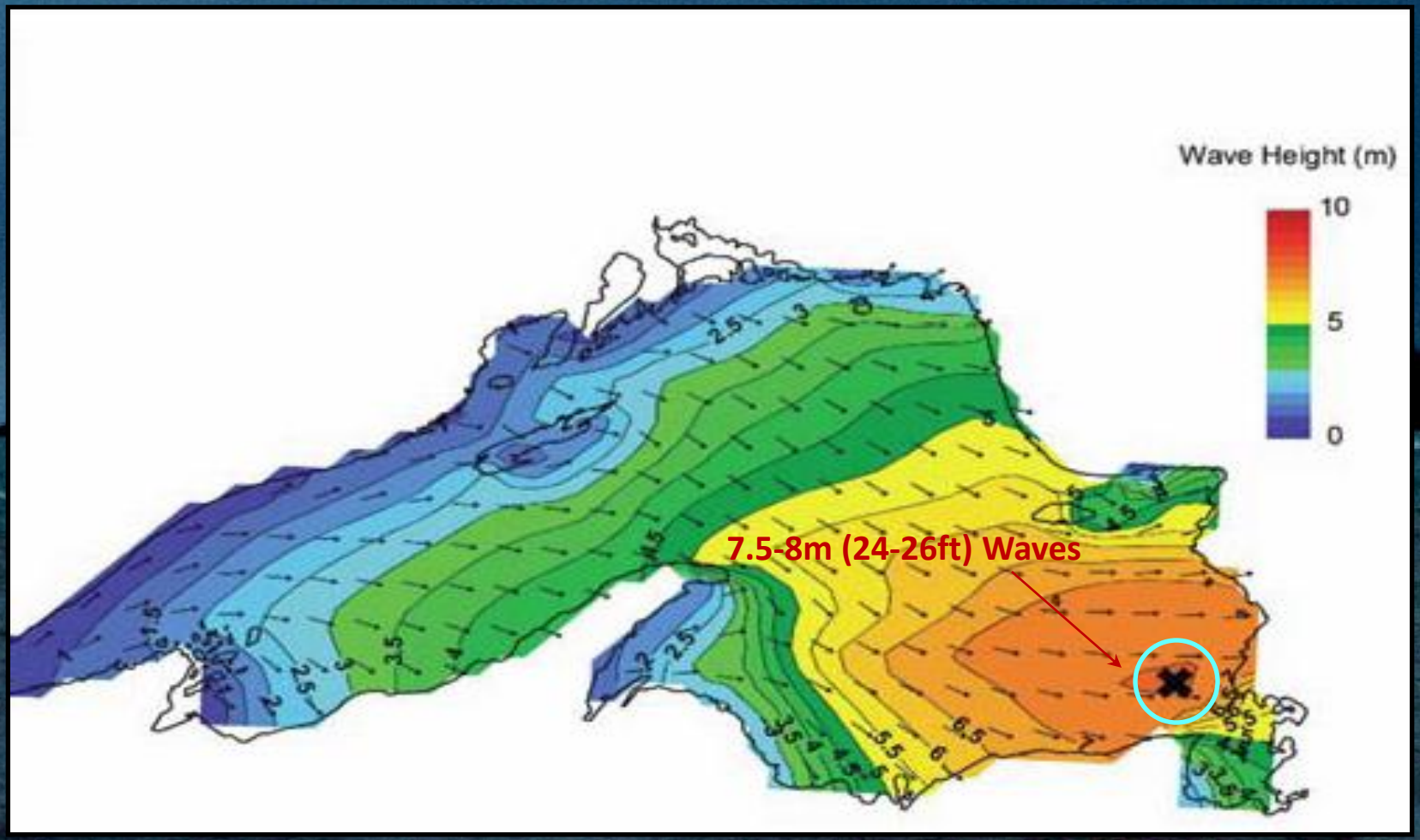


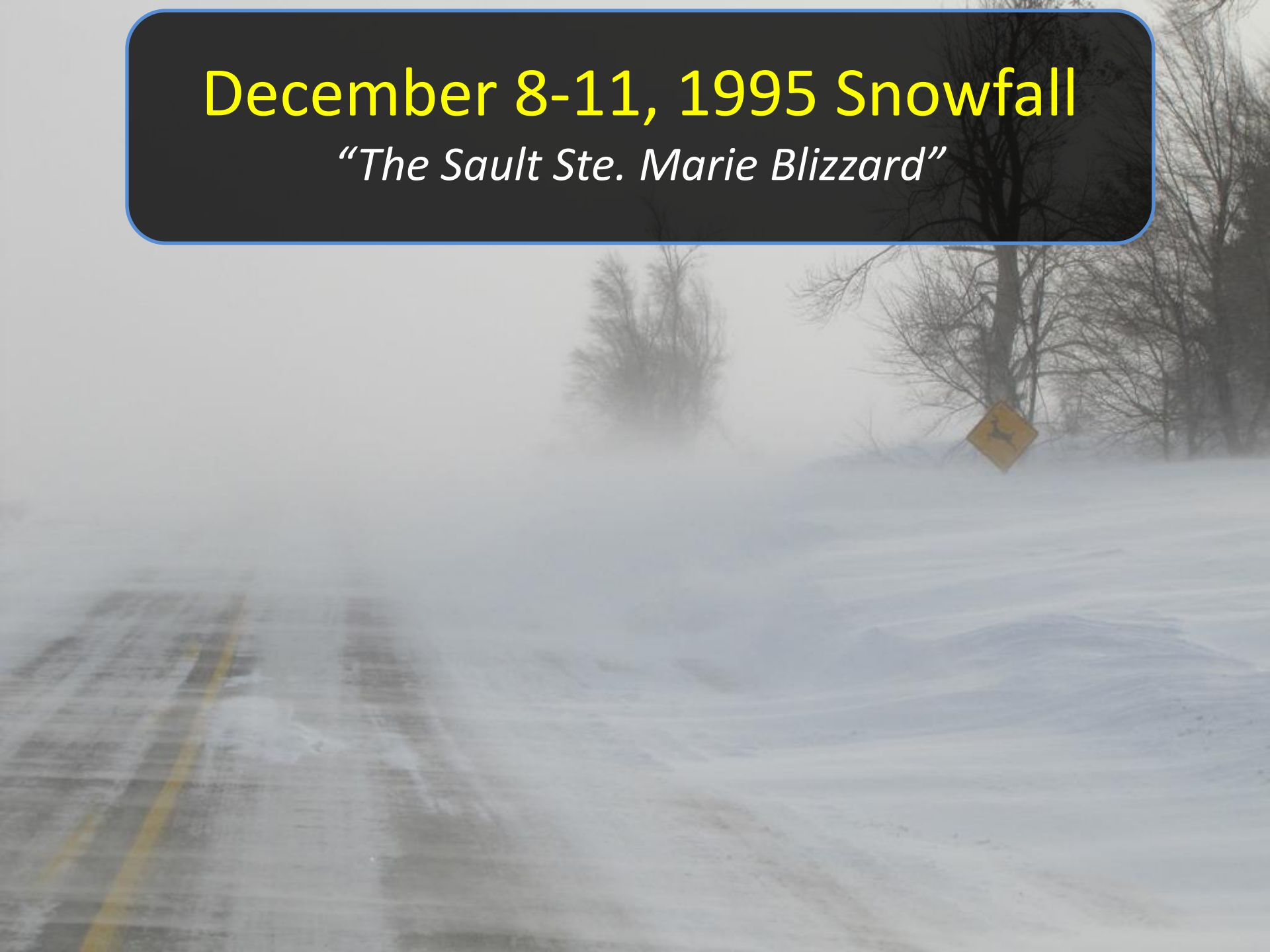
Arthur M. Anderson reports wind gusts of 75 knots (86mph) as it reaches area of *Fitzgerald* sinking.

Great Storms of the Great Lakes: *The Wreck of the* Edmund Fitzgerald*: 10 November 1975*

Weather conditions during the afternoon and evening of 10 November: Wave Heights

800pm -- 10 November 1975





December 8-11, 1995 Snowfall

"The Sault Ste. Marie Blizzard"

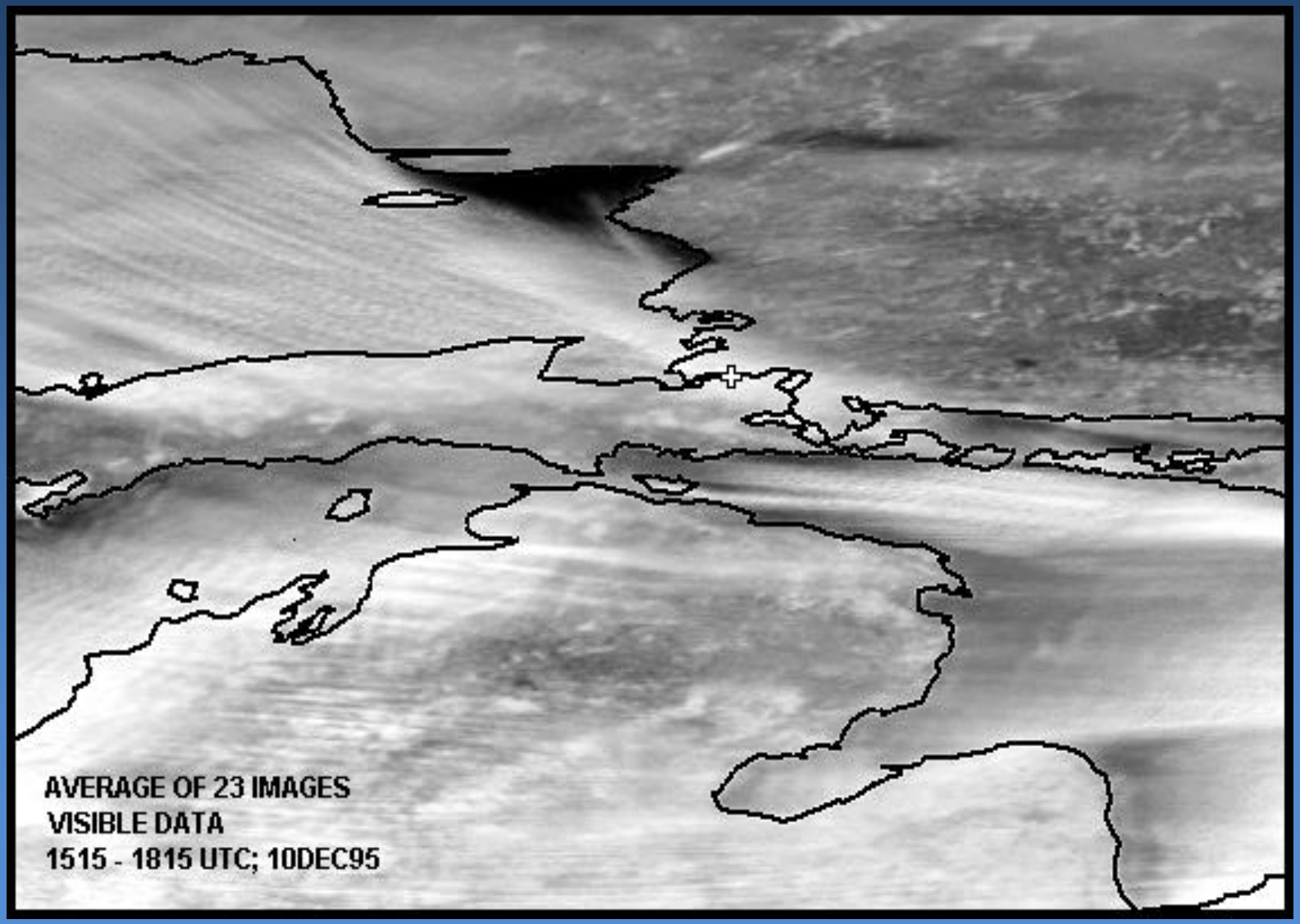
Sault Sainte Marie Lake Effect Snow Event

- December 8-11th, 1995
- 61.3 inches total snowfall
- State of emergency declared with National Guard activation
- Several collapsed roofs
- 2 phase system
- Rare Lake Huron enhancement – 24.7 inches
- Lake effect off Superior – 36.6 inches

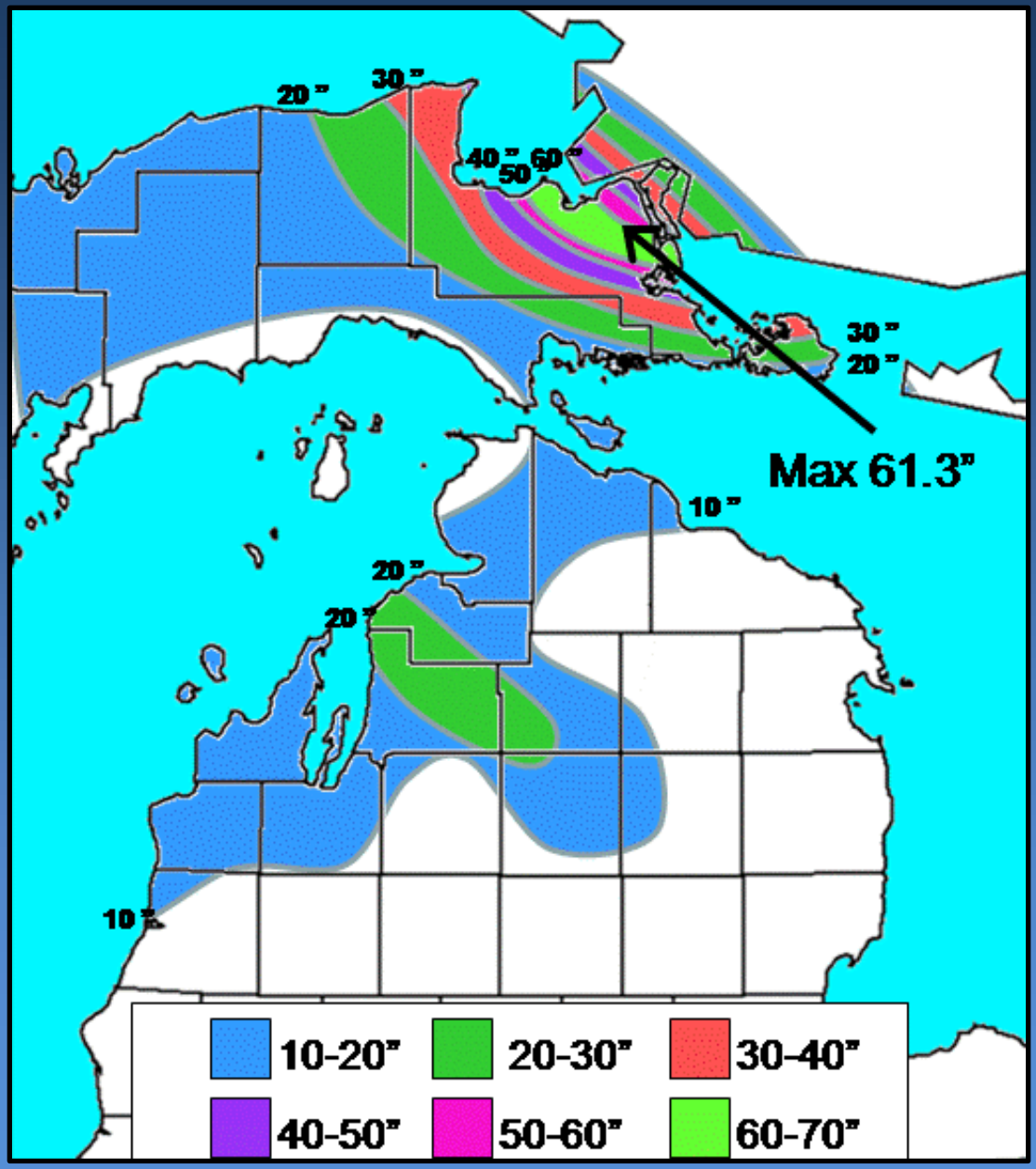
Date	Max Temperature	Min Temperature	Avg Temperature	Avg Temperature Departure	HDD	CDD	Precipitation	Snowfall	Snow Depth
1995-12-01	35	15	25.0	-2.9	40	0	0.05	0.5	8
1995-12-02	23	10	16.5	-11.0	48	0	0.25	4.0	7
1995-12-03	34	23	28.5	1.5	36	0	0.38	4.8	16
1995-12-04	34	25	29.5	2.9	35	0	0.02	0.2	16
1995-12-05	34	14	24.0	-2.2	41	0	0.65	6.8	15
1995-12-06	14	10	12.0	-13.8	53	0	0.01	T	17
1995-12-07	20	8	14.0	-11.4	51	0	0.21	4.2	17
1995-12-08	22	8	15.0	-10.0	50	0	0.27	4.8	18
1995-12-09	22	-0	11.0	-13.6	54	0	1.46	19.4	38
1995-12-10	17	-3	7.0	-17.2	58	0	1.36	26.6	42
1995-12-11	14	4	9.0	-14.9	56	0	0.57	10.5	48
1995-12-12	13	-5	4.0	-19.5	61	0	0.05	1.1	49
1995-12-13	15	-6	4.5	-18.6	60	0	0.02	0.6	43
1995-12-14	21	15	18.0	-4.7	47	0	0.35	5.6	43
1995-12-15	28	20	24.0	1.7	41	0	0.05	0.9	40
1995-12-16	26	20	23.0	1.0	42	0	0.14	3.1	42
1995-12-17	23	20	21.5	-0.1	43	0	0.00	0.0	38
1995-12-18	26	13	19.5	-1.8	45	0	0.00	0.0	38
1995-12-19	17	3	10.0	-10.9	55	0	0.00	0.0	37
1995-12-20	12	-2	5.0	-15.6	60	0	0.10	1.0	34
1995-12-21	24	-6	9.0	-11.2	56	0	T	T	35
1995-12-22	26	18	22.0	2.1	43	0	0.01	0.3	32
1995-12-23	20	11	15.5	-4.1	49	0	T	0.2	31
1995-12-24	28	10	19.0	-0.3	46	0	0.10	2.0	31
1995-12-25	24	-0	12.0	-7.0	53	0	0.04	0.6	34
1995-12-26	13	-13	0.0	-18.7	65	0	0.00	0.0	33
1995-12-27	22	9	15.5	-2.9	49	0	0.01	0.1	32
1995-12-28	24	1	12.5	-5.6	52	0	0.00	0.0	30
1995-12-29	29	20	24.5	6.7	40	0	T	T	29
1995-12-30	29	23	26.0	8.4	39	0	T	T	29
1995-12-31	29	17	23.0	5.7	42	0	0.14	1.4	30
Sum	718	282	-	-	1510	0	6.24	98.7	-
Average	23.2	9.1	16.1	-6.1	-	-	-	-	30.7
Normal	28.6	15.8	22.2	-	1327	0	2.79	33.5	-

Lake Huron Enhancement

Lake Superior Lake effect



Snowfall Totals

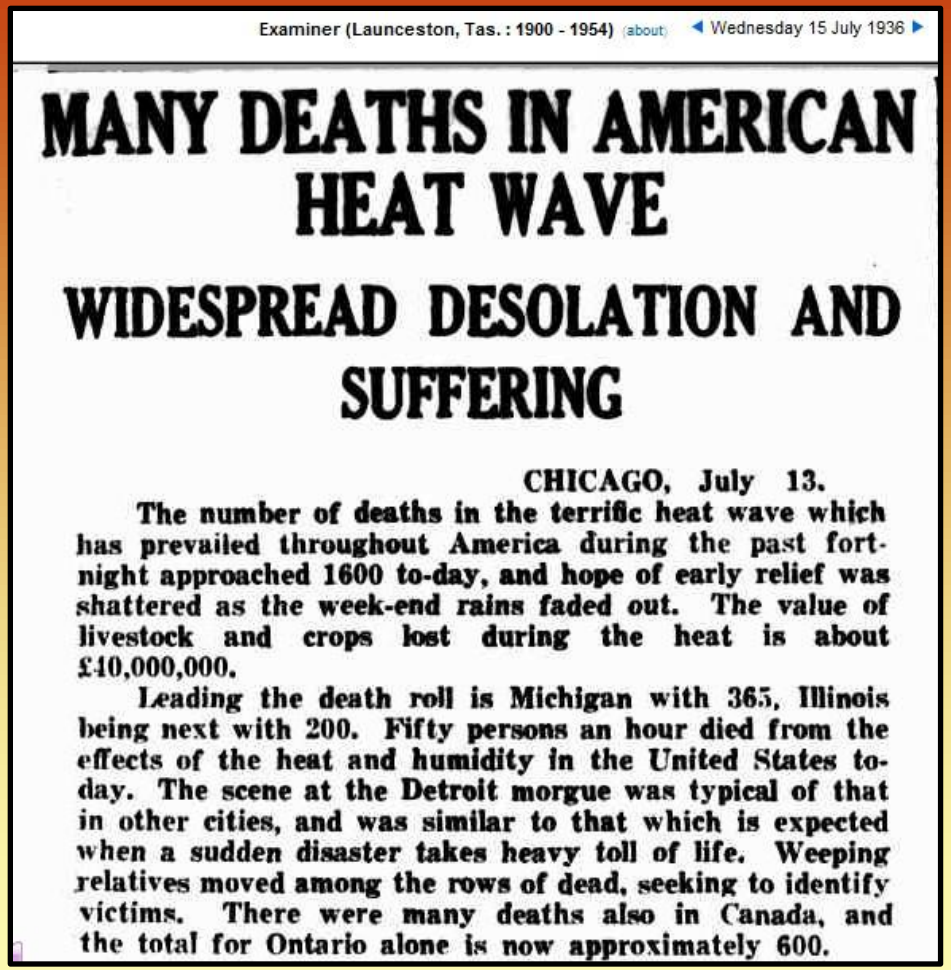


July 1936 Heat Wave

"Most Severe in Modern History"

The Heatwave of 1936

- Developed just after Independence day
- Lasted for over a week
- Record setting heat across the Upper Midwest and Great Lakes
- Still stands as the most intense heat wave in United States history
- All time Michigan high temperature occurred at Mio, which reached 112° on the 13th.
- Nations death toll exceeded 5,000.



Examiner (Launceston, Tas. : 1900 - 1954) (about) ◀ Wednesday 15 July 1936 ▶

MANY DEATHS IN AMERICAN HEAT WAVE

WIDESPREAD DESOLATION AND SUFFERING

CHICAGO, July 13.

The number of deaths in the terrific heat wave which has prevailed throughout America during the past fortnight approached 1600 to-day, and hope of early relief was shattered as the week-end rains faded out. The value of livestock and crops lost during the heat is about £40,000,000.

Leading the death roll is Michigan with 365, Illinois being next with 200. Fifty persons an hour died from the effects of the heat and humidity in the United States to-day. The scene at the Detroit morgue was typical of that in other cities, and was similar to that which is expected when a sudden disaster takes heavy toll of life. Weeping relatives moved among the rows of dead, seeking to identify victims. There were many deaths also in Canada, and the total for Ontario alone is now approximately 600.

The Heatwave of 1936

- Several factors led to the deadly heat of early July 1936: A series of droughts effected the U.S. during the early 1930s. The lack of rain parched the earth and killed vegetation, especially across the Plains states.

- Poor land management (farming techniques) across the Plains furthered the impact of the drought, with lush wheat fields becoming barren waste lands.

- Without the vegetation and soil moisture, the Plains acted as a furnace. The climate of that region took on desert qualities, accentuating its capacity to produce heat.

- A strong ridge of high pressure set up over the west coast and funneled the heat northward across the Upper Midwest and Great Lakes.

Over A Week Of Extreme Heat

Sault Ste. Marie Temperatures

- Has NEVER recorded 100°F, but has recorded 95°F or higher 23 times since 1888
- 4 of those occurred in July 1936 alone

Date	High	Low	Average	Departure
7/6/1936	88	51	69.5	5
7/7/1936	93	54	73.5	8.9
7/8/1936	95	61	78	13.2
7/9/1936	96	63	79.5	14.6
7/10/1936	93	64	78.5	13.5
7/11/1936	96	65	80.5	15.4
7/12/1936	96	66	81	15.8
7/13/1936	89	68	78.5	13.2

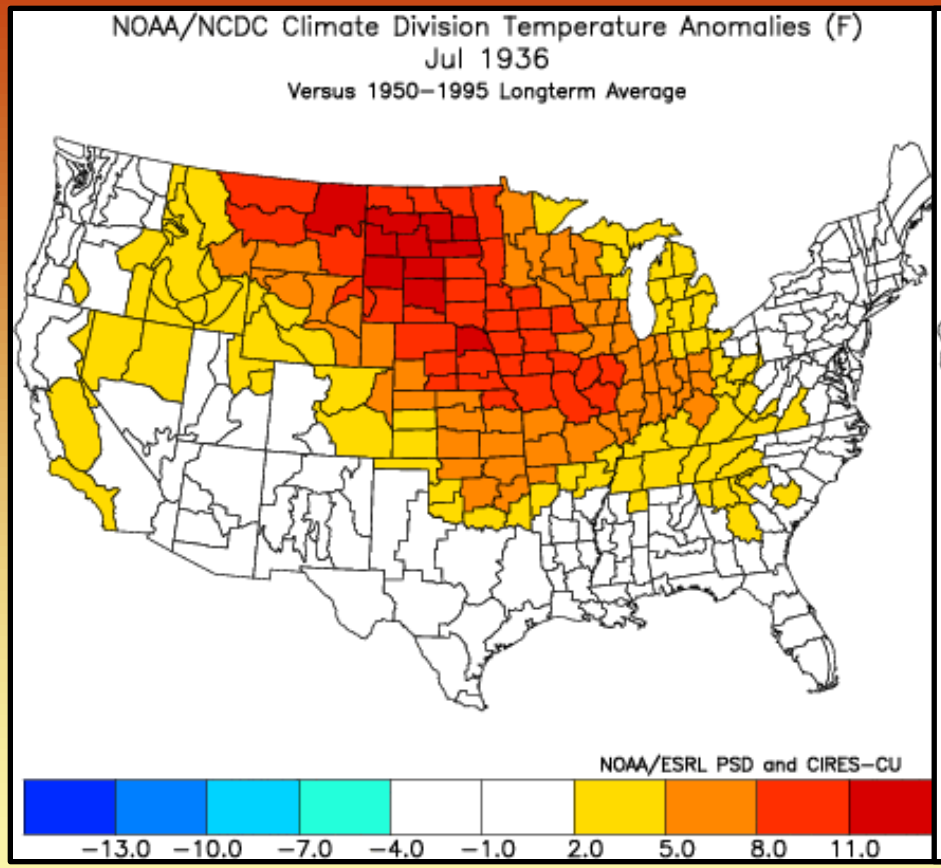
Over A Week Of Extreme Heat

Marquette Temperatures

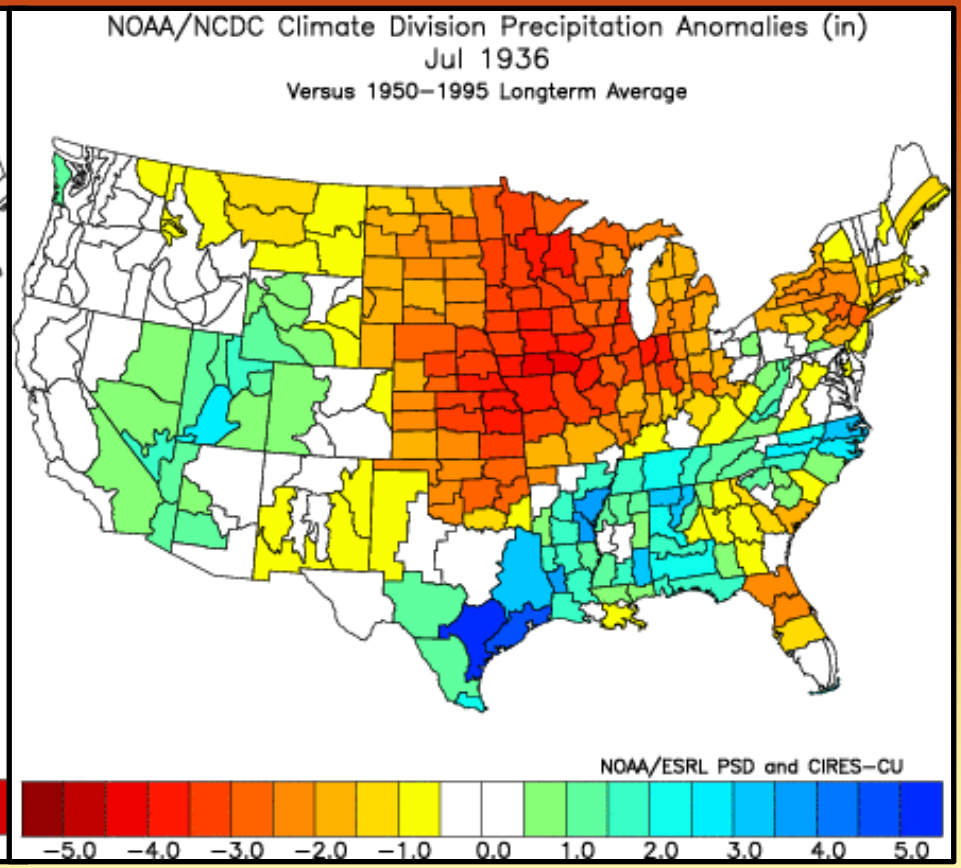
- Has only recorded 100°F 23 times since 1875
- 4 of those occurred in July 1936 alone

Date	High	Low	Average	Departure
7/6/1936	88	62	75	9.8
7/7/1936	103	64	83.5	18.2
7/8/1936	101	80	90.5	25.1
7/9/1936	101	80	90.5	25
7/10/1936	96	74	85	19.4
7/11/1936	84	68	76	10.3
7/12/1936	88	69	78.5	12.8
7/13/1936	104	76	90	24.2

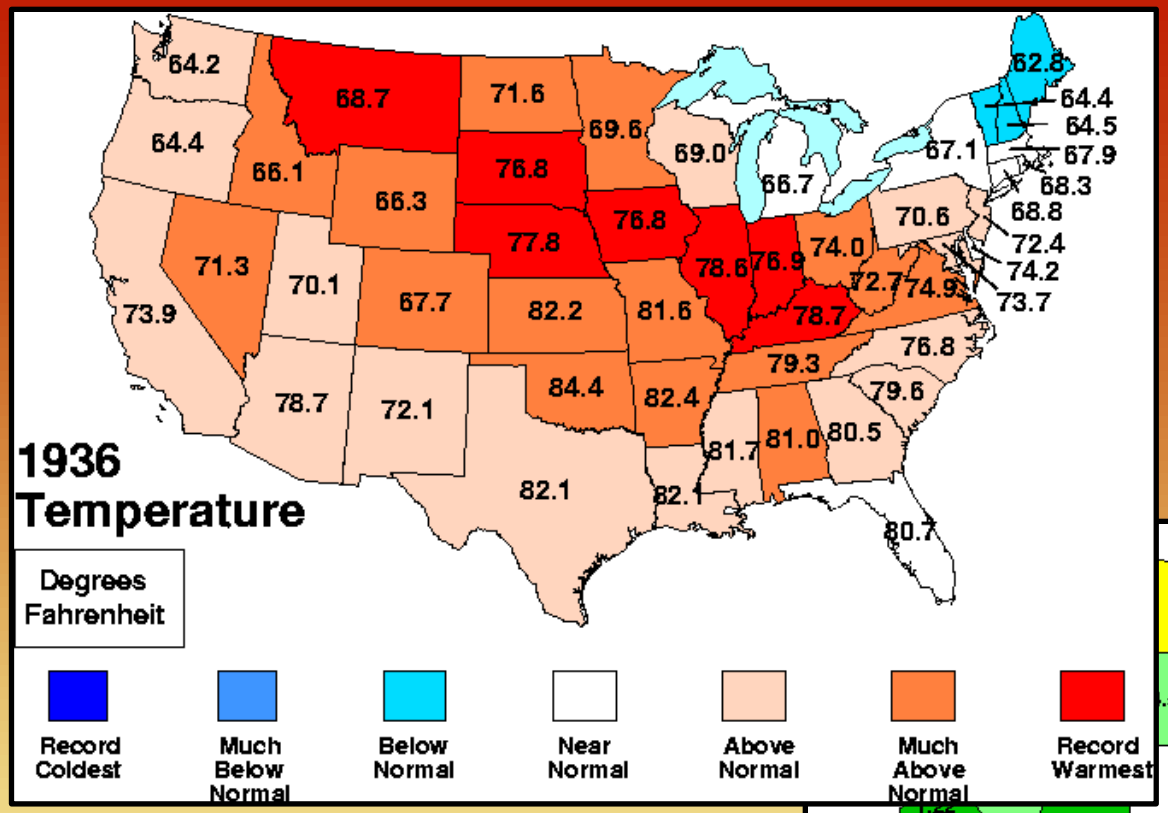
July 1936 Temperature Anomalies

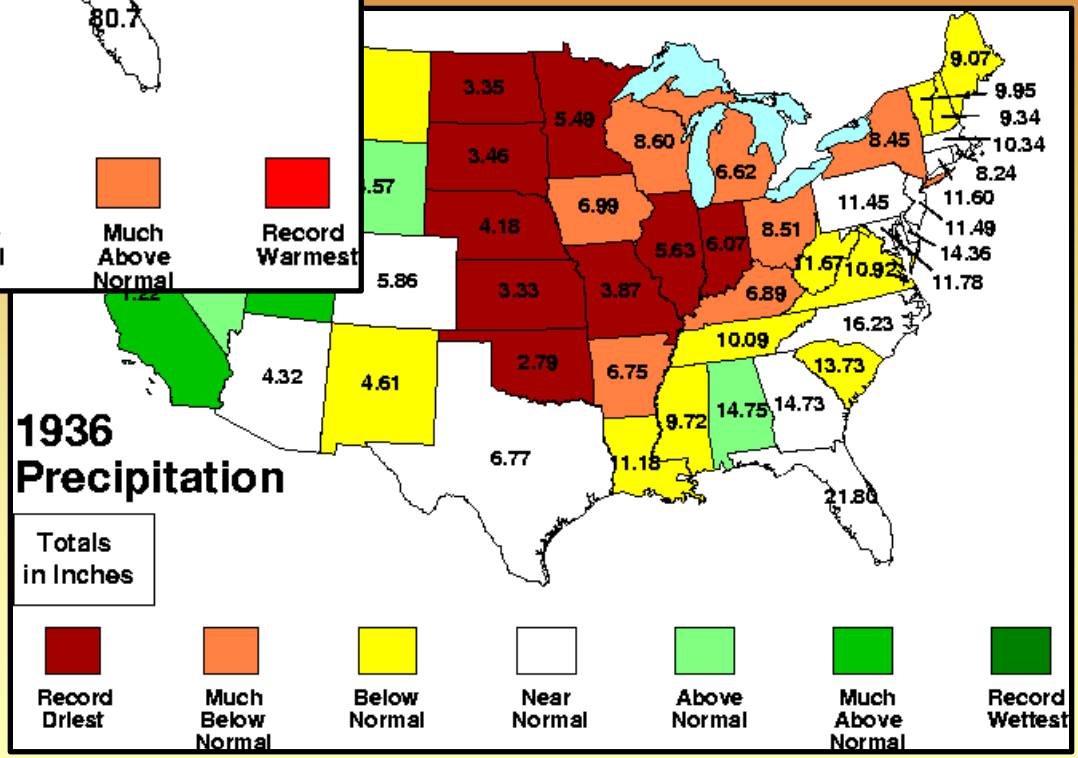


July 1936 Precipitation Anomalies



1936 - It Could Have Been Worse





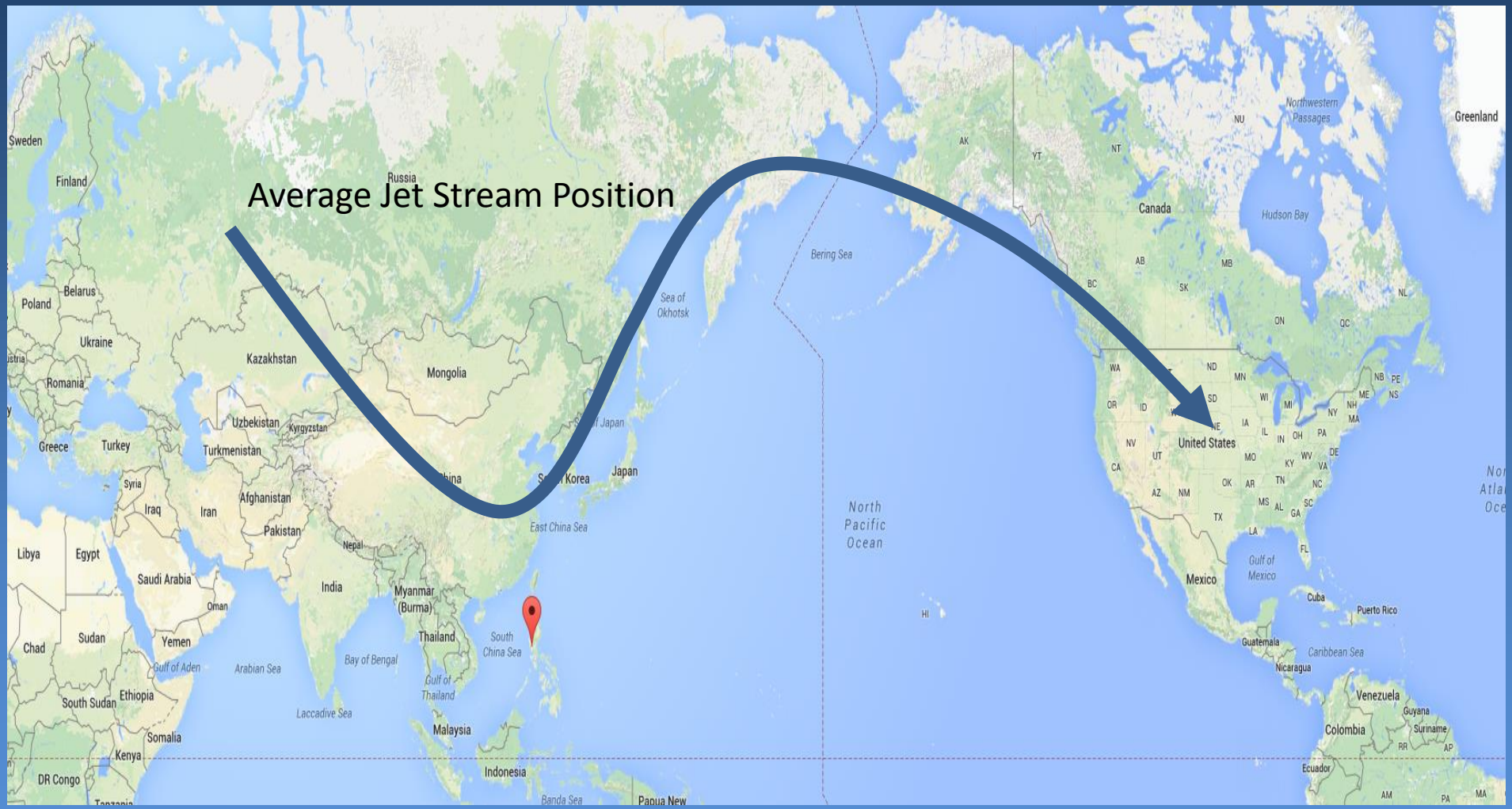

Summer of 1992
“The Year Without a Summer”

1992 – The Year Without A Summer

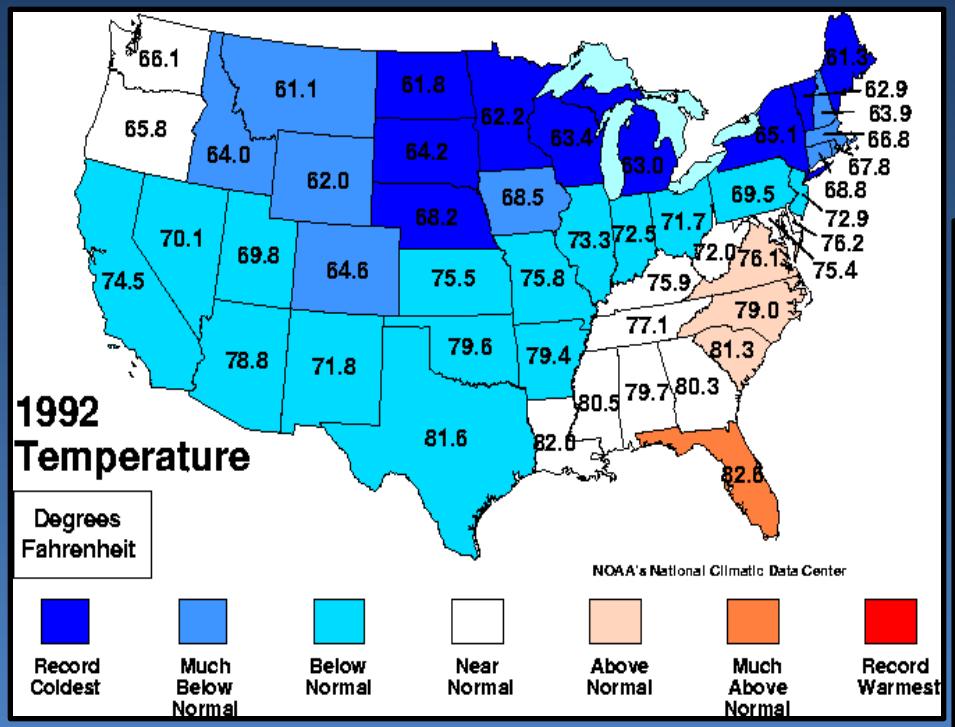
Mt. Pinatubo Eruption - Philippines June 1991

- June 1991 Mt. Pinatubo eruption sends record setting amounts of ash into the atmosphere for the 20th century.
- Resultant ash cloud reduces sunlight reaching the Earth's surface by nearly 10%.
- Northern Hemisphere average temperatures decrease by 0.9°F to 1.1°F, with global temperatures dipping by 0.5°C

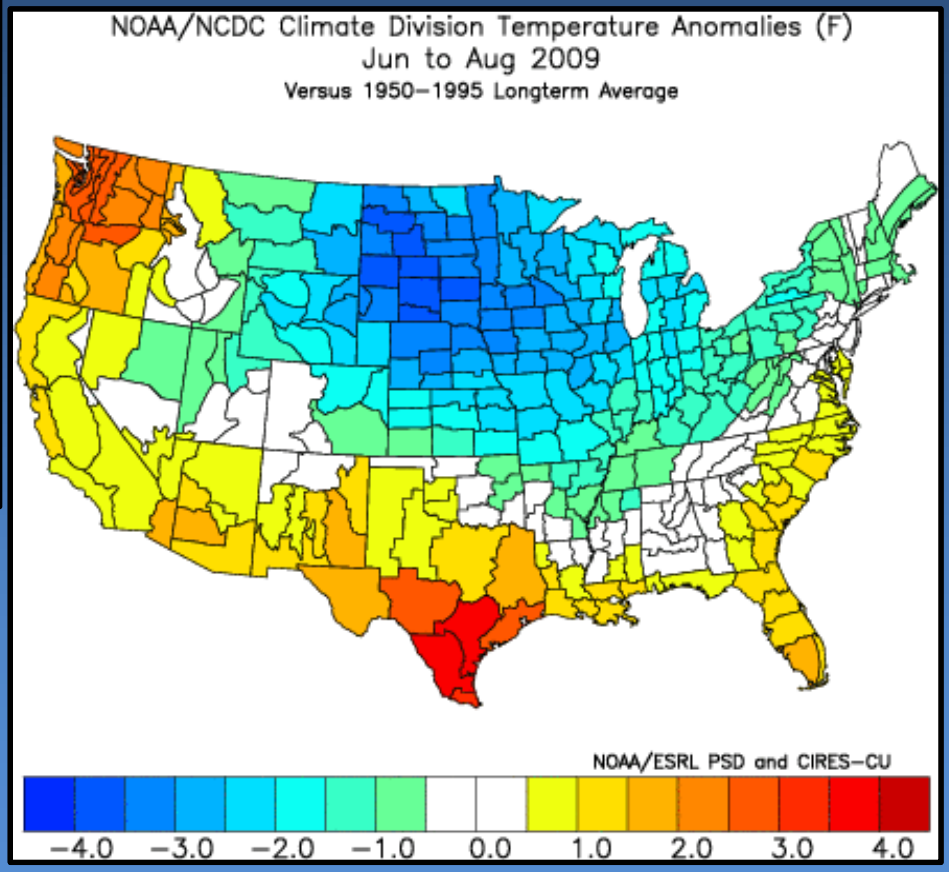
Why Such an Influence?



July 1992 Average Temperatures



Interestingly – not terribly dissimilar from the summer of 2009

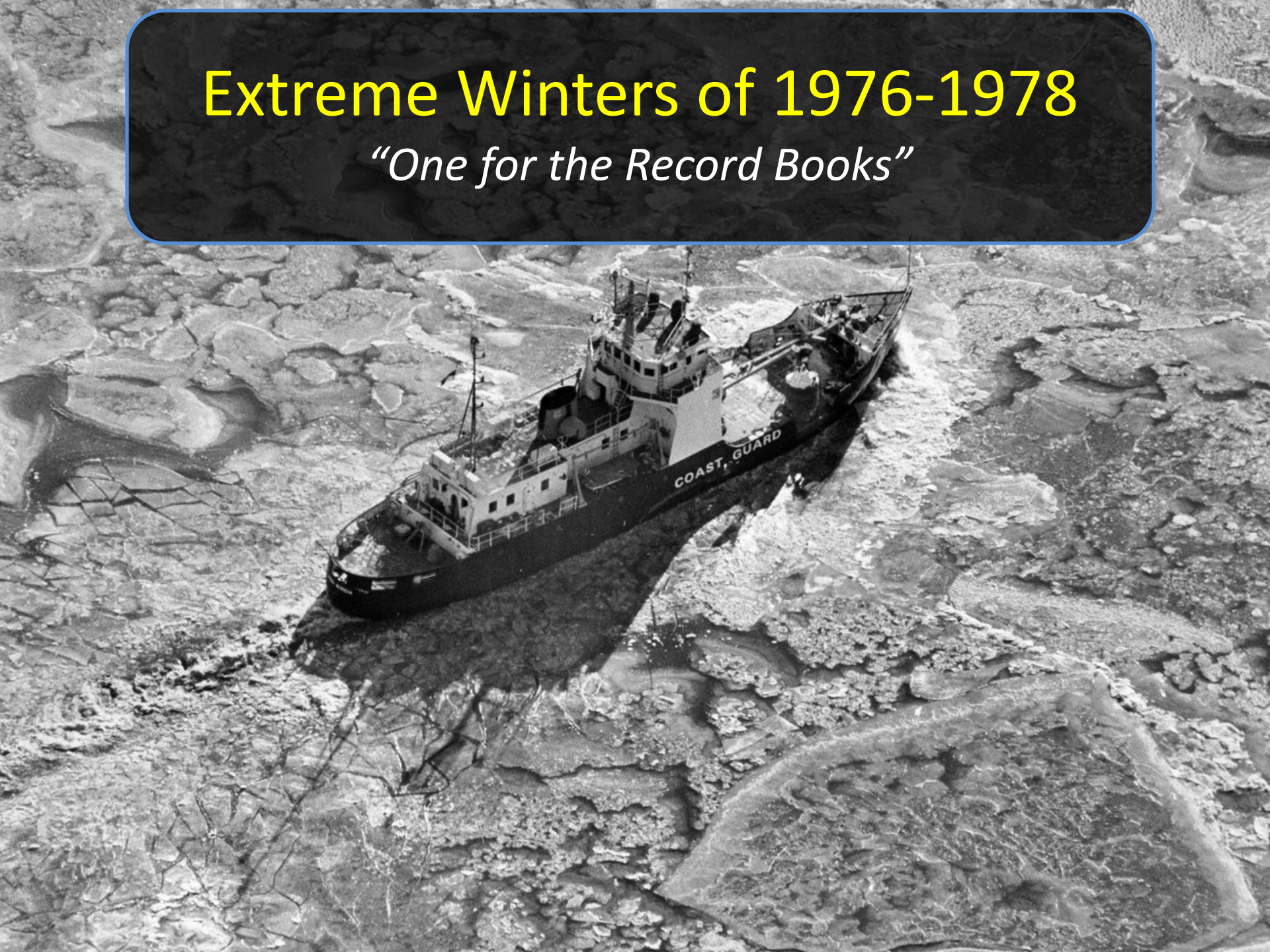


Some Cold Mornings!

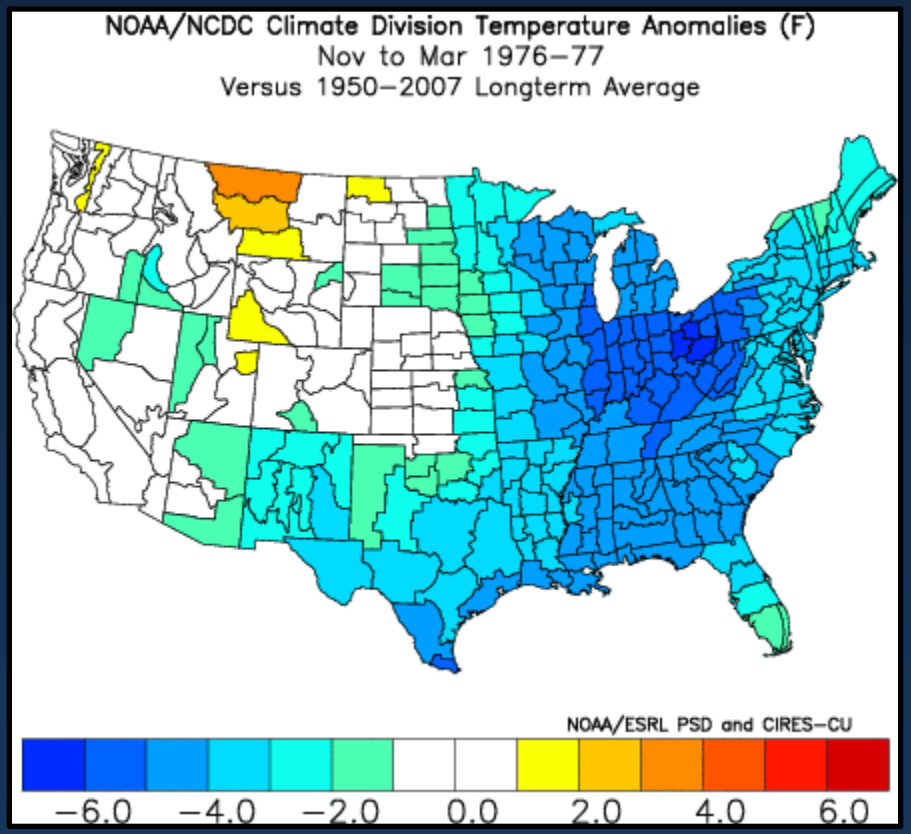
Location	Date	Low Temp
Sault Ste. Marie	6/22/1992	31°
Tahquamenon Falls	6/22/1992	26°
Tahquamenon Falls	7/21/1992	29°
Marquette	6/22/1992	32°
Ironwood	6/21/1992	28°
Newberry	7/21/1992	32°

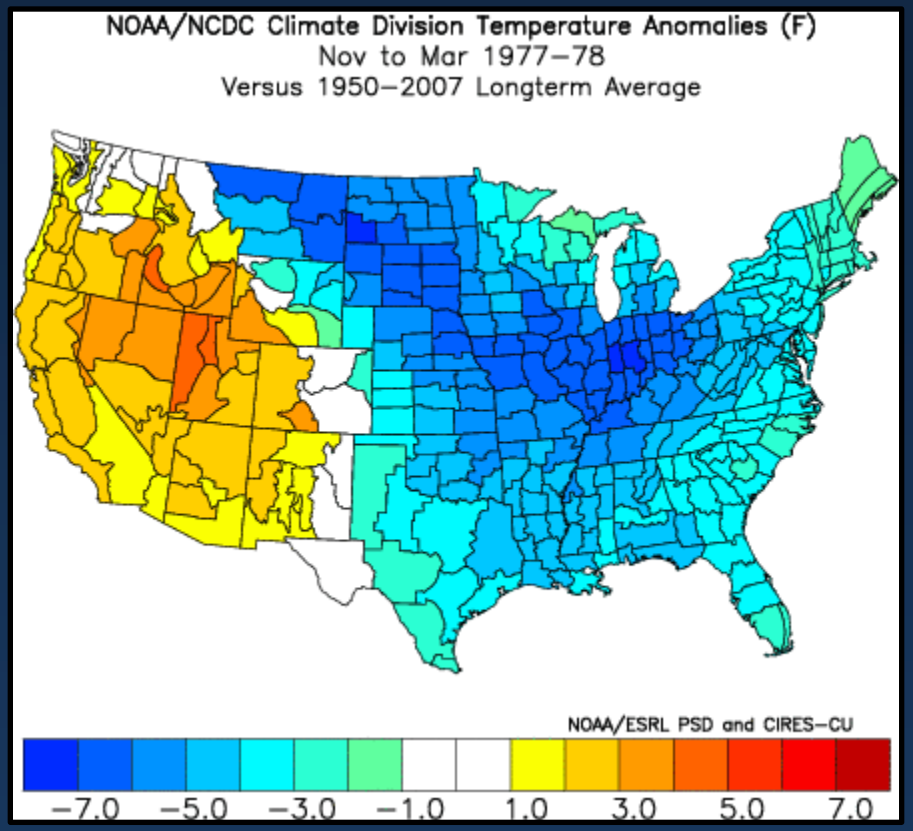
Extreme Winters of 1976-1978

"One for the Record Books"

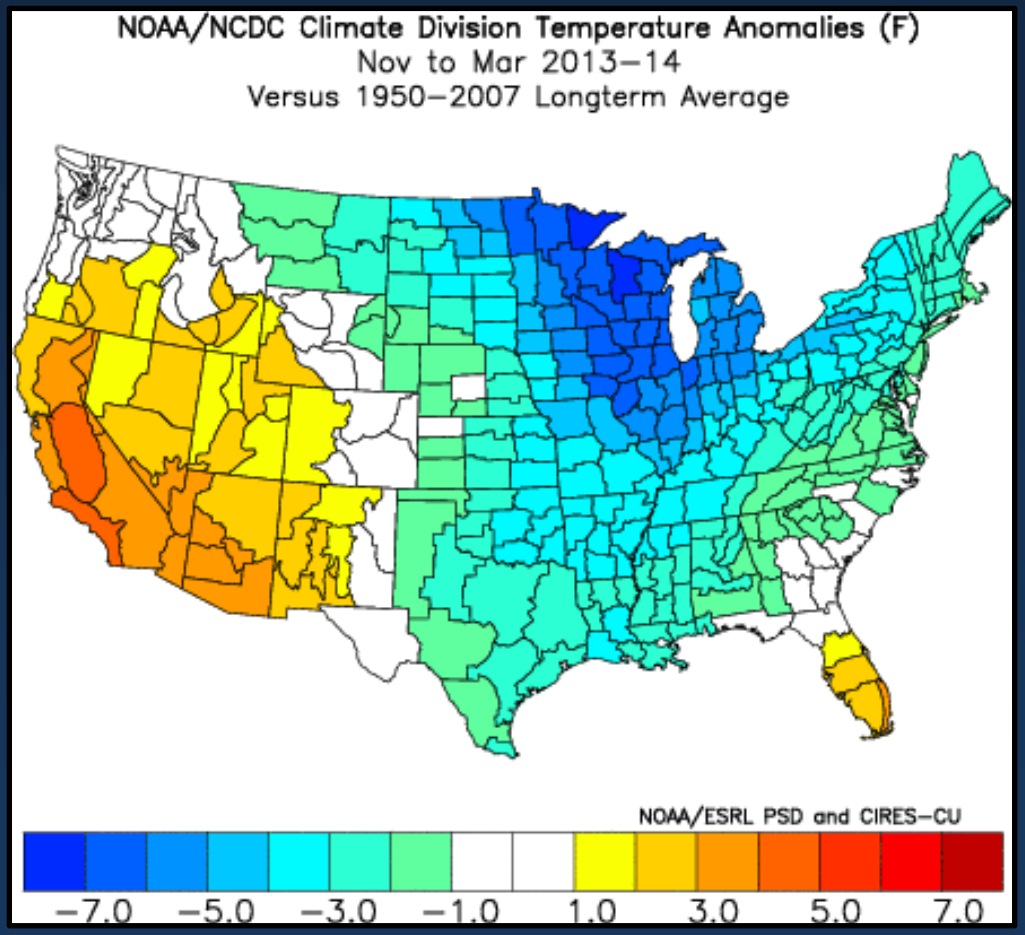


Cold Winters of 1976-77 and 1977-78



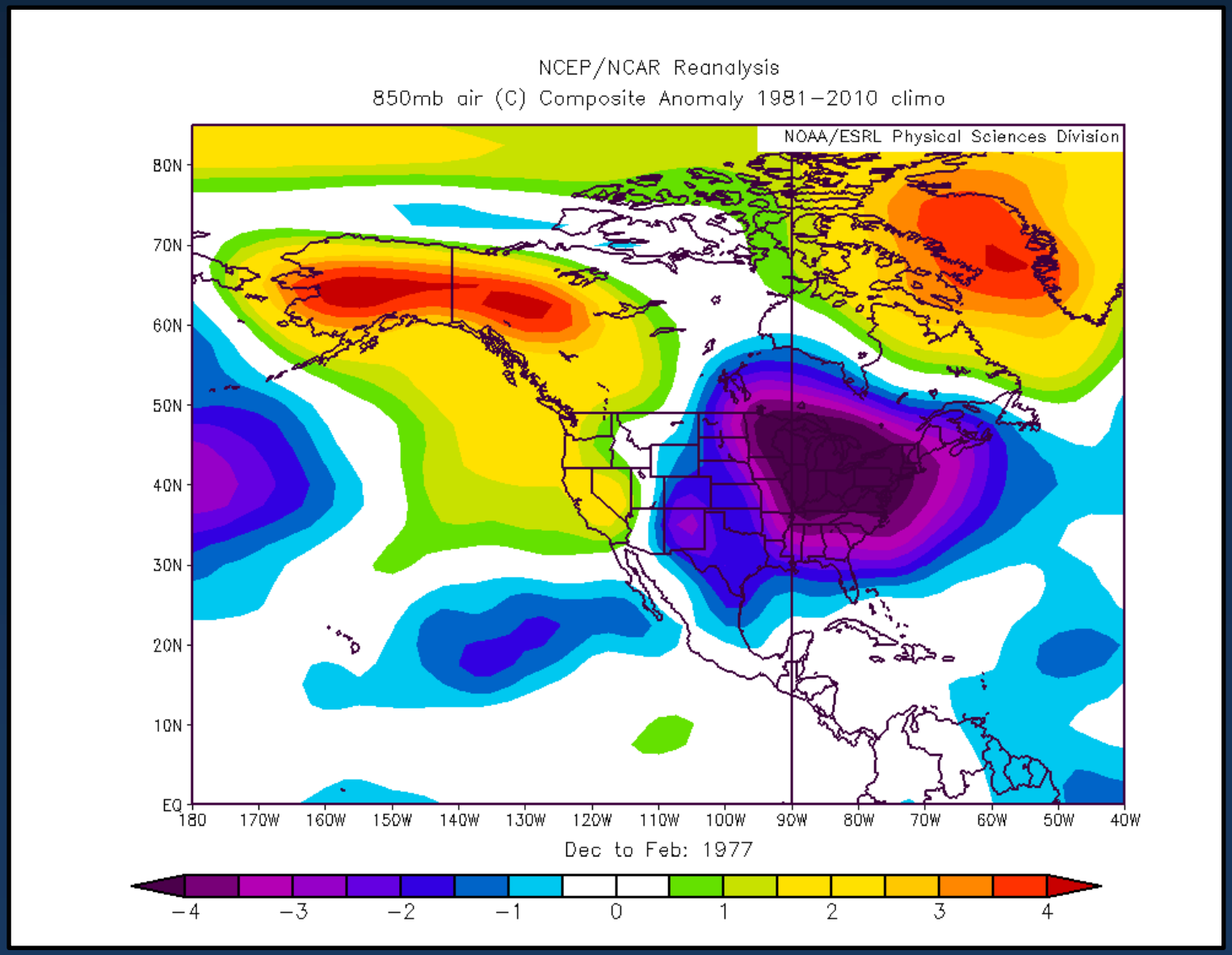


Cold Winter of 1976-77 Comparison to Last Year

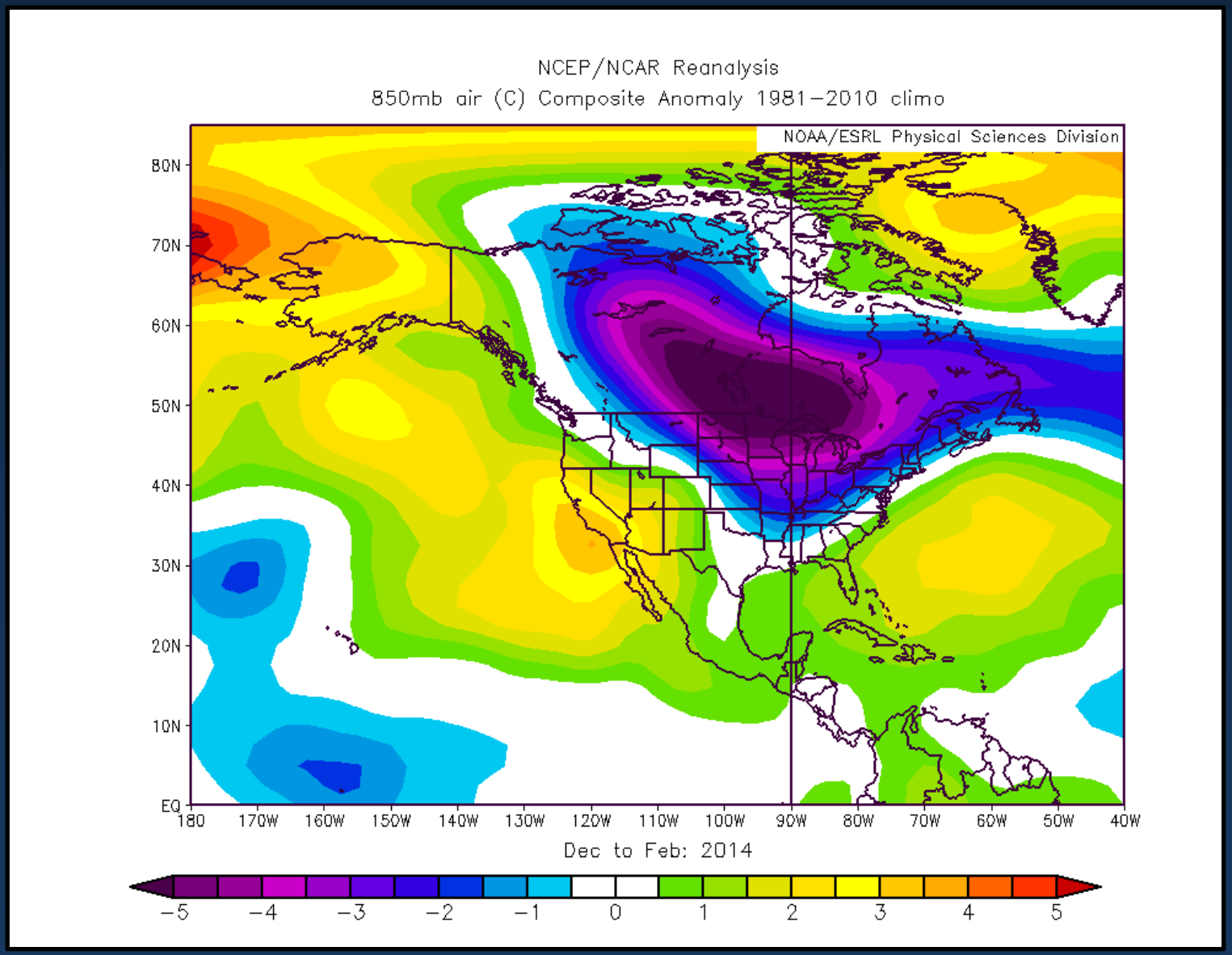


- 1976: Cold began in earnest in October and persisted through early March. Quick moderation into the spring months.
- Cold was far-reaching, with Lake Erie completely frozen by New Years Day.
- Ships became stuck in the Chesapeake Bay!
- 2013: Cold began in earnest in October and persisted through April. The spring and summer were also cold!

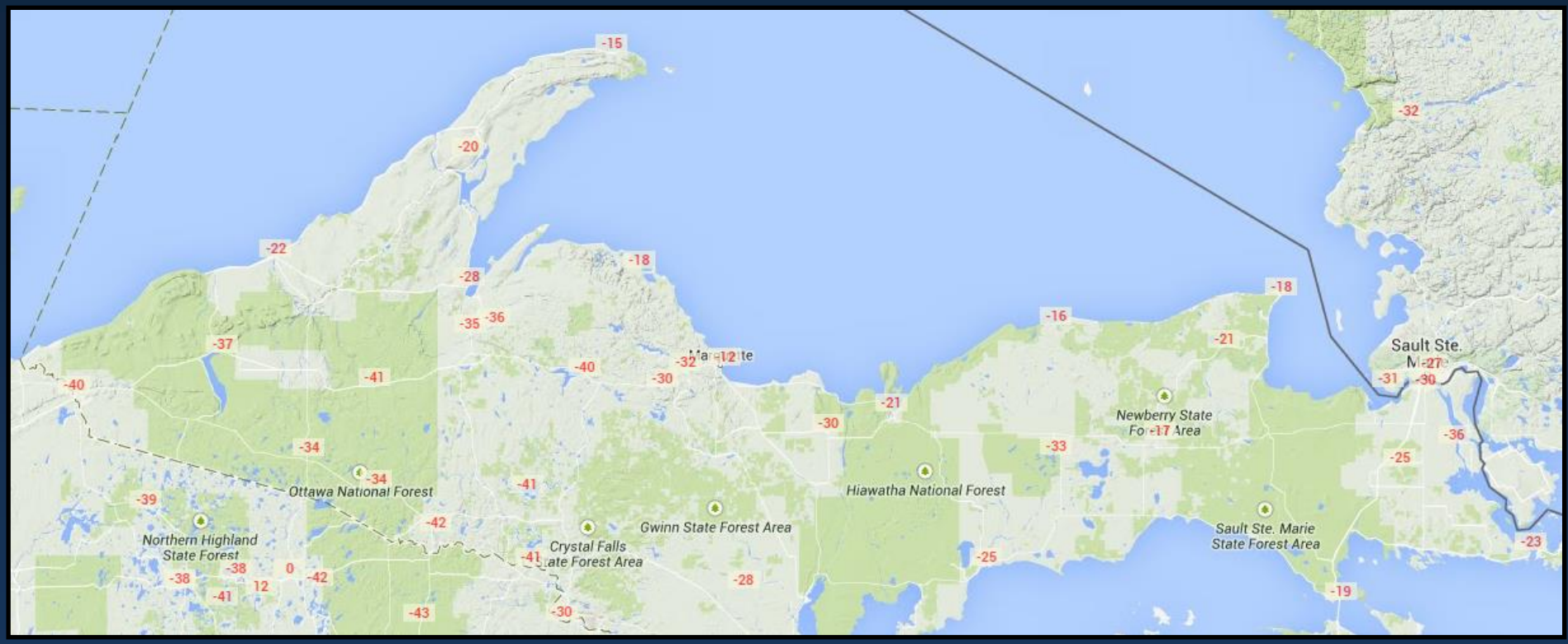
1976-77 Upper Level Pattern



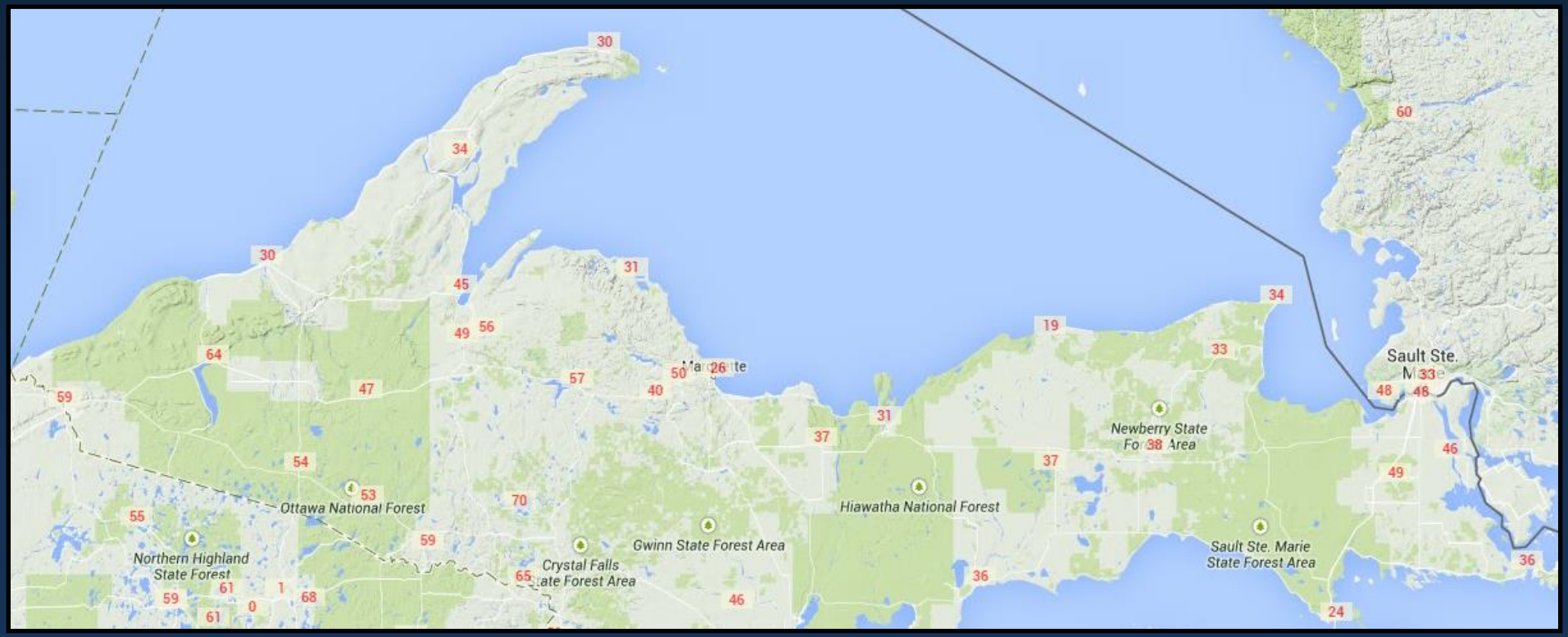
2013-14 Upper Level Pattern



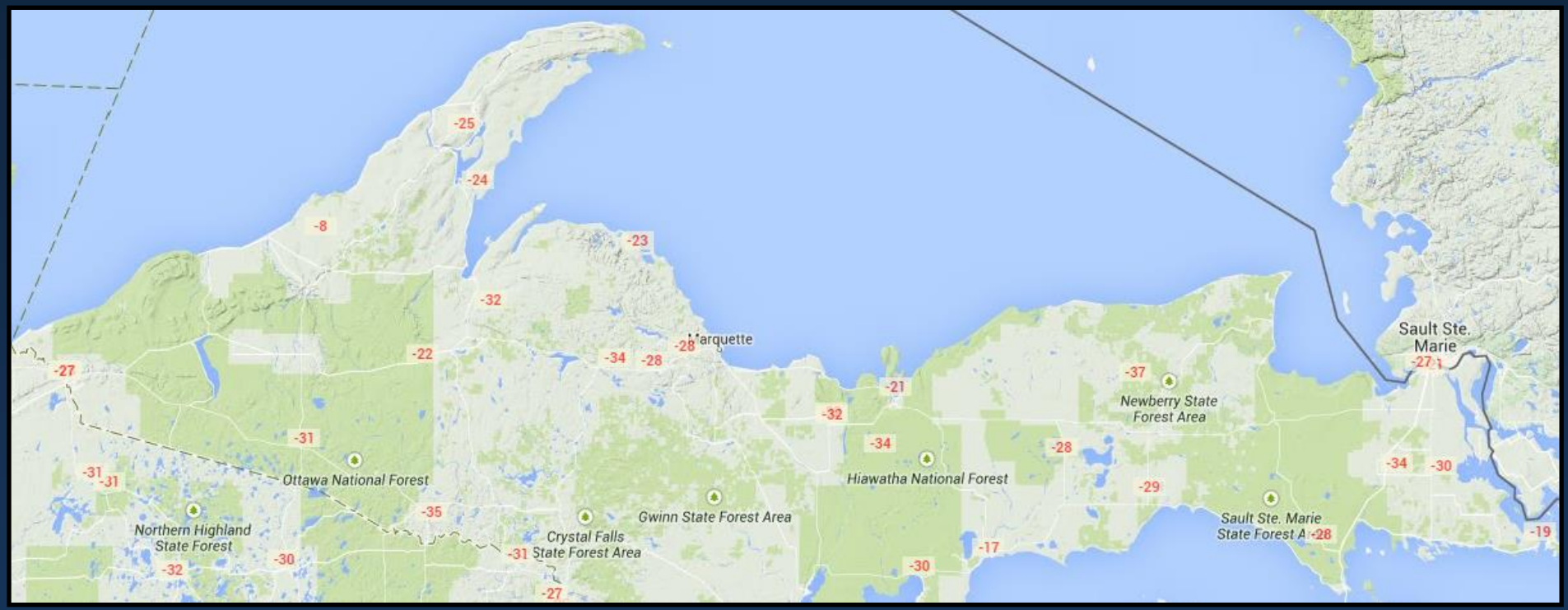
Coldest 1976-77 Temperatures



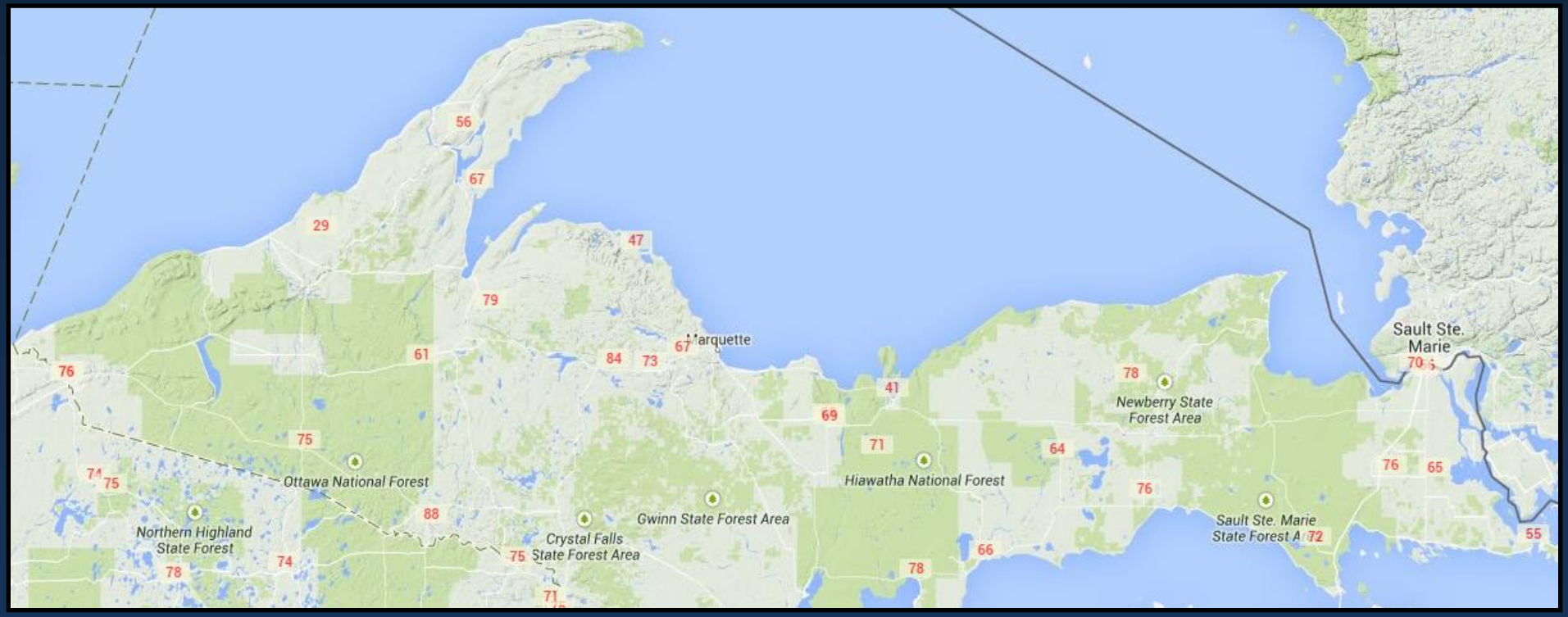
1976-77 Number of Days Below 0°F



Coldest 2013-14 Temperatures

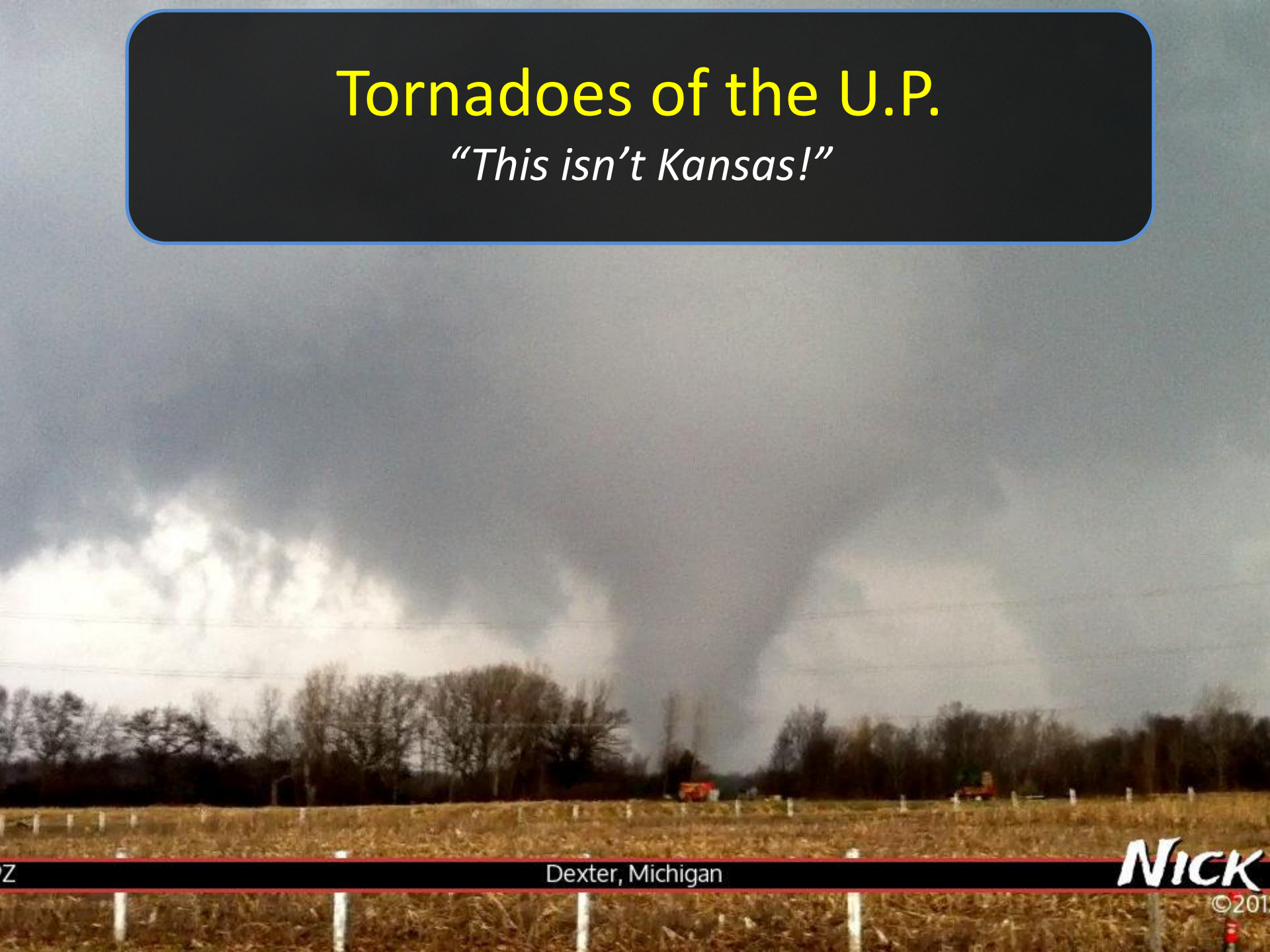


2013-14 Number of Days Below 0°F



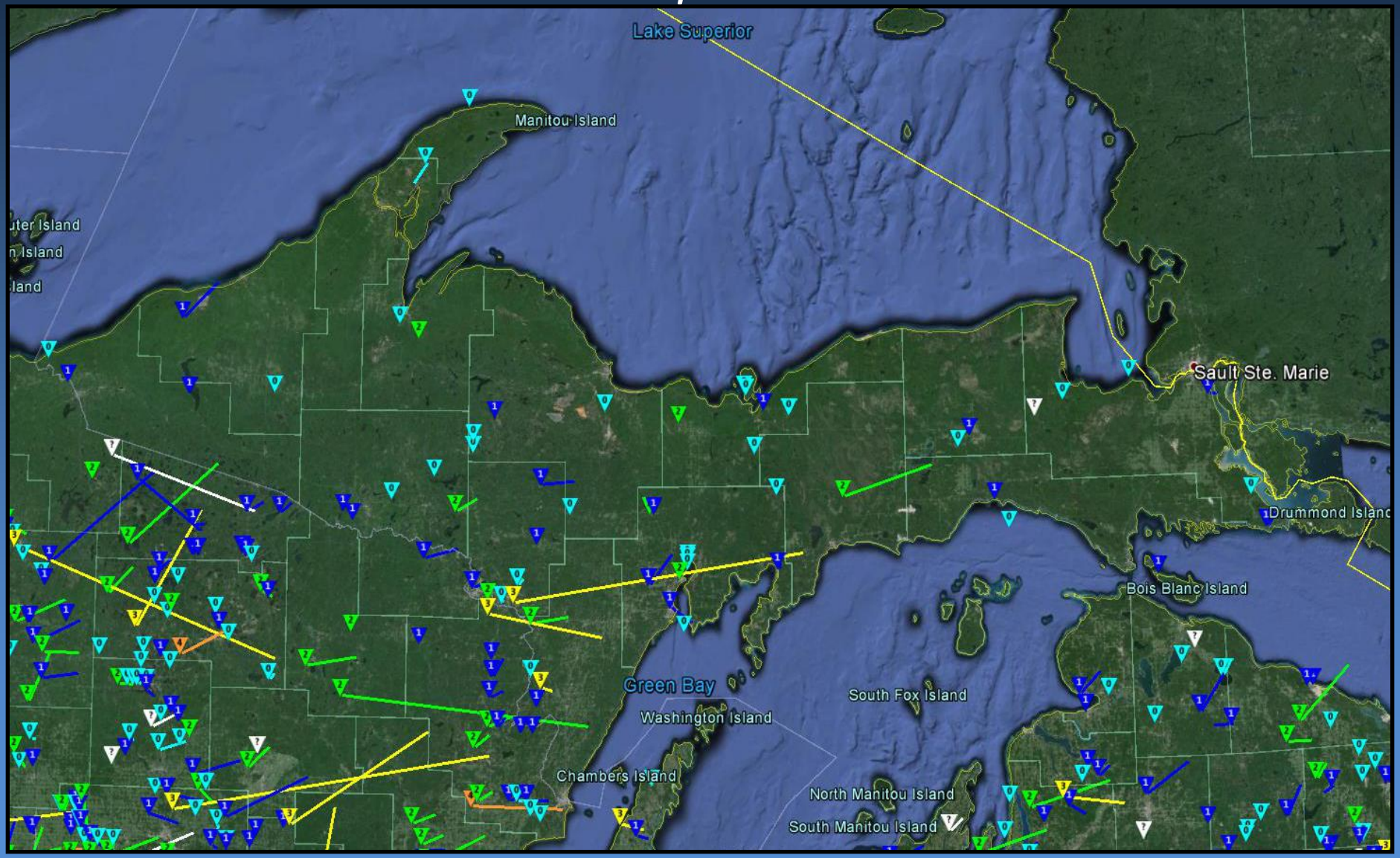
Tornadoes of the U.P.

“This isn’t Kansas!”



Tornadoes of the U.P.

60 tornadoes reported since 1950



July 20, 1992 Gladstone Tornado

MINOR INJURIES REPORTED AS APPARENT TORN

AP, Associated Press

Jul. 20, 1992 9:28 AM

GLADSTONE, MI his Upper Peninsula city, cutt

The storm hit Sund er Jim Richardson said.

"Apparently, two t dstone Public Safety dispatcher J

"Several business s flipped over all over."

National Weather S irm the storm that hit Gladstone was

Harris said damag hospitalization. Among the injured

An uprooted tree c ver Co. did repairs, Harris said. He cou

The tornado picked valve broke on the second tank, spillin

Crews from severa scene this morning.

"We're in the proce

Gladstone is about 10 miles north of Escanaba.

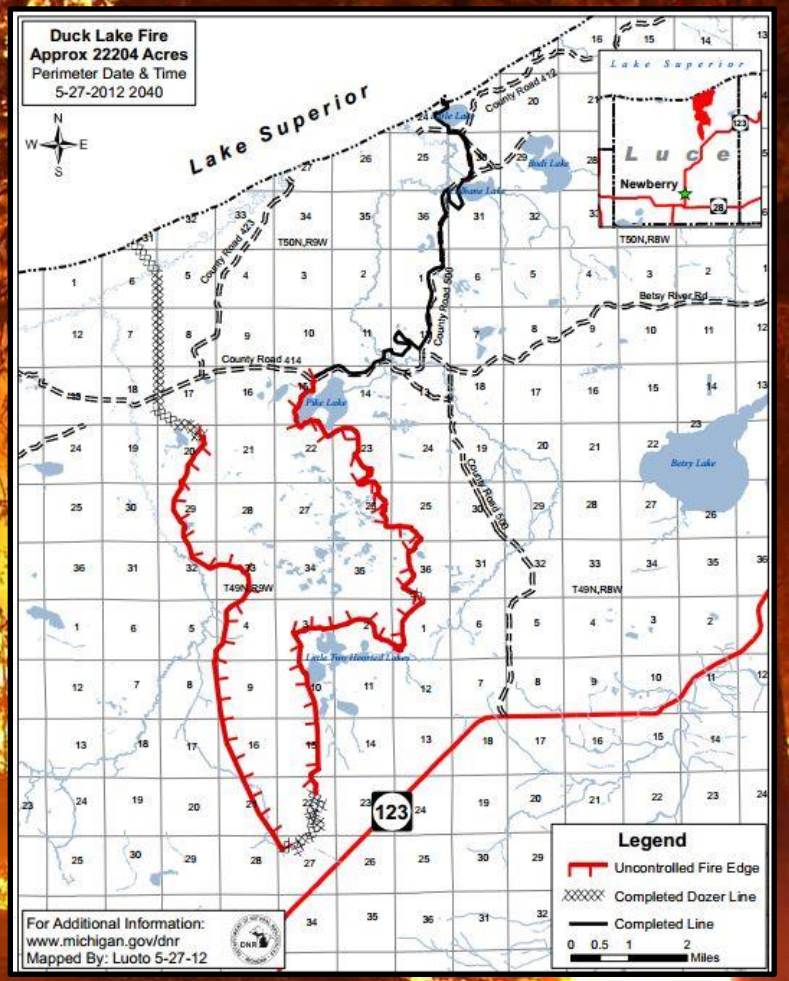
A rare photograph of an Upper Michigan tornado. (Photo by Helen Micheau)

Major Michigan Fires

Fire	Date	Location	Notes
Great Michigan Fires	October 8, 1871	multiple locations	gan, and the cities of Holland, Manistee and
Port Huron Fire of 1871	October 8, 1871	The Thumb	fire
Peshtigo Fire	October 8, 1871	Menominee County, Michigan	fire
Thumb Fire	September 5, 1881	The Thumb	
Metz Fire	October 15, 1908	Metz	rescue train derailed in a burning lumber siding
Ontonagon Fire	August 1896	Ontanogan	
Seney Fire	August - October, 1976	Seney National Wildl Refuge	nd in peat
Ishpeming fire	October 1896	Ishpeming	
Mack Lake fire	May 5, 1980	Mio	
Duck Lake fire	May-June 2012	Luce County	
Sleeper Lake Fire	August, 2007	Luce County	
Au Sable-Oscoda Fire	July 11, 1911	Oscoda County	use of numerous fires burning the area that

2012 Duck Lake Fire

- Lightning induced
- Burned from May 23 – June 15, 2012
- 3rd largest wildfire in Michigan since 1881
- 21,135 total burned acres
- 136 structures lost



Thank You!

Any Questions?