Blizzards in SW Michigan

The Great Blizzard of January 26-27 1978

Storm Data Summary of the 1978 event

The **Great Blizzard of 1978** was a historic winter storm that struck the Ohio Valley and Great Lakes from Wednesday, January 25 through Friday, January 27, 1978. The 28.28 inches (958 millibars) barometric pressure measurement recorded in Cleveland, Ohio was the lowest non-tropical atmospheric pressure ever recorded in the mainland United States until the Upper Midwest Storm of October 26, 2010 (28.20" measured at 5:13PM CDT at Bigfork Municipal Airport, Bigfork, MN). The lowest central pressure for the 1978 blizzard was 28.05" (953 mb) measured in southern Ontario a few hours after the aforementioned record in Cleveland.[1] On rare occasions, extra-tropical cyclones with central pressures below 28 inches of mercury or about 95 kPa (950 mb) have been recorded in Wiscasset, Maine (27.9") and Newfoundland (27.76").[2]

A few Pictures from the Blizzard

Blizzards in SW Michigan

1978

The most extensive and very nearly the most severe blizzard in Michigan history raged January 26, 1978 and into part of Friday January 27. About 20 people died as a direct or indirect result of the storm, most due to heart attacks or traffic accidents. At least one person died of exposure in a stranded automobile. Many were hospitalized for exposure, mostly from homes that lost power and heat. About 100,000 cars were abandoned on Michigan highways, most of them in the southeast part of the state.[3]

C.R. Snider, National Weather Service Meteorologist in Ann Arbor, Michigan, said on January 30, 1978:

"A GREAT STORM IS UPON MICHIGAN" THE GREAT BLIZZARD OF 1978!

- *Written by: William R. Deedler, Weather Historian*
  National Weather Service Detroit/Pontiac, MI
  Updated January 4th, 2008
- As with the huge snowstorm of December 1974 another even more powerful (in terms of intensity/extent) storm is of strong interest to all meteorologists who have studied winter storms in the Great Lakes. This storm is also of interest and remembrance to many longtime residents of the Great Lakes, the Upper Ohio Valley and Ontario, Canada who had to deal with winter's full fury late in January of 1978. In addition, the storm certainly casts many memories for those of us who were on duty and worked during the storm...while being in awe of the development and subsequent immense strength of this great monster. With the 30th anniversary of this Great Blizzard at hand, it is worth taking a step back in time to re-live this monumental example of nature's fury.
- While there are several contenders for the worst blizzard ever to hit the Great Lakes in relatively modern times (since 1870 when records began in Detroit), the immense and intense Blizzard of January 26-27th 1978 must rank at or near the top along with the Great White Hurricane of 1913 with its similar track and powerfulness.
- The incredible Blizzard of January 26-27th, 1978 evolved out of a winter that was infamous for cold and storms. The Winter of 1977-78 thus far had been one the coldest, since records began, in many areas from the Rockies eastward to the Appalachians. Mammoth blizzards occurred late in January and early February from the Midwest to the East Coast as strong Arctic plunges dove south into the country and met up with the warmer winds from the deep south. The winter of 1977-78 was similar to its predecessor (1976-77) in terms of cold. The main difference between the two winters, however, came in February. In 1977, temperatures moderated rapidly during February, while in 1978, the cold actually worsened - with several locations reporting their coldest recorded February to date. The Winter of 1977-78 is written down in the record books as Detroit's seventh coldest winter, Flint's fifth coldest and Saginaw's sixth. West of the Rockies, it was a different story as a dominant upper ridge of high pressure provided a relatively mild winter, with some stations even reporting one of their warmest winters on record.

"A GREAT STORM IS UPON MICHIGAN" THE GREAT BLIZZARD OF 1978!

- **The Great Storm**
- Since there were some forecasted variances of the intensity and track of the storm, and considering the primitive model of the day (LFM - Limited Fine Mesh), forecasters did an admirable job in forecasting one of the most severe winter storms ever to hit the Great Lakes Region.
- A Winter Storm Watch was posted as early as Tuesday night, the 24th, for the southern half of the Lower Peninsula for Wednesday Night into Thursday. Gale Warnings for the Great Lakes were hoisted the following Wednesday morning, along with the Watch. A weaker system had moved through the region earlier during the day on Tuesday and already dropped some snow on the region (a Winter Storm Watch had been issued for this system as well, earlier on Monday, the 23rd). After Tuesday's snow, the headline on the Special Weather Statement that was issued by the NWS Tuesday evening read as follows: "Another Winter Storm Threatens Lower Michigan" and thus, a second Winter Storm Watch was officially posted.
- Meanwhile, the ingredients of what would later prove to be a truly fascinating yet vicious winter storm were coming together from different parts of the country. As with the "White Hurricane of 1913," the massive storm actually began as two smaller but distinct storms. A strong low pressure with an attending arctic airmass was entering the Northern Plains by way of Northern Minnesota on Tuesday evening (24th). At the same time, another developing low pressure system was taking shape over the eastern Texas/Louisiana area.

THE GREAT BLIZZARD OF 1978
Forecast from NWS

- Blizzard Warnings were hoisted across much of the Great Lakes and Upper Ohio Valley Region by daybreak Thursday. The center of the huge storm (surface | 500mb) continued to trek north northwest across Southwest Ontario (roughly between Chatham and London) while Detroit measured its lowest pressure reading at 28.34 inches at 650 AM EST. The incredibly deep center made its way north along the St. Clair River with Sarnia ON reporting the lowest pressure on land at 28.21 inches. Not only was the depth of this mammoth storm's center very impressive, so too was the extent of low pressure from its center. Even locations that were far removed from the storm's center also reported record low pressures. Stations such as Cincinnati OH, Rochester NY and Toronto ON and even as far east as Wilmington N.C., all recorded record low pressure readings from this monster. In fact, at Toronto, where records go back as far back as 1840, the lowest pressure reading of 28.40 inches broke the old record of 28.57 inches by 0.17 inches. In addition, dozens of other cities, with records going back a century, also recorded their lowest pressure reading of all time or, for at least the month of January. This massively intense storm was responsible for strong wind gusts as far away from the center as Boston /72 MPH/ and Chesapeake Bay Bridge /90 MPH/ with even damaging winds reported as far south as Tallahassee FL.

THE GREAT BLIZZARD OF 1978
Forecast from NWS

- As the Arctic air circulated throughout the storm while it made its way over Lake Huron, the lowest pressure was reached around 950 millibars or a hurricane-like 28.05 inches! "A Great Storm is Upon Michigan" read the headline of the 800 AM EST Special Weather Statement issued by the National Weather Service Forecast Office in Ann Arbor that Thursday /26th/ morning. Heavy snow and blizzard conditions were extensive as wind gusts in excess of 35 mph whipped the snow into huge drifts across much of Southeast Lower Michigan. Other areas of Eastern Michigan, Indiana and Ohio reported near hurricane-force winds, heavy snow and temperatures hovering between zero and 10 above, resulting in extreme blizzard conditions. These conditions later expanded further east into Pennsylvania and West Virginia and prevailed into the night (26-27th) across much of the Eastern Great Lakes, Southern Ontario and the Upper Ohio Valley. With the storm generating copious amounts of snow and very strong winds, whiteout conditions were widespread. All land and air traffic came to a stand still in the affected regions. Several major roads were closed for at least two to three days, if not longer, while clean up got underway. Numerous NWS employees were stranded at work, home, or on the road somewhere between the two. Several employees worked double shifts into at least Friday (some longer) because of the impassable roads with others simply unable to get to work.
- The Blizzard Warnings were allowed to die across Michigan during the forenoon hours of Friday, the 27th. Record 24 hour snowfall totals from the storm included, 16.1 inches at Grand Rapids, 15.4 inches at Houghton Lake and 12.2 at Dayton, OH. Snowfalls for the entire storm (25-27th) included a whopping 30.0 inches at Muskegon (some of which was Lake Michigan enhanced), 19.3 inches at Lansing and 19.2 at Grand Rapids. Snowfalls were less over Southeast Lower Michigan (mainly because of the rain that fell for a period) and included 9.9 inches at Flint and 8.2 inches at Detroit.

THE GREAT BLIZZARD OF 1978
Forecast from NWS

- The employees of the National Weather Service Forecast Office in Ann Arbor had just set up shop at the new quarters at the Ann Arbor Federal Building a WEEK before the storm hit. The forecast staff had transferred from the Detroit Metropolitan Airport Office while the observing and radar staff remained at the airport. The majority of employees still lived in and around the metro Detroit area and all major roads between Detroit and Ann Arbor were blocked for approximately 18 hours due to the storm. Several employees put forth efforts beyond the call of duty, stated Mr. Snider in his storm report.

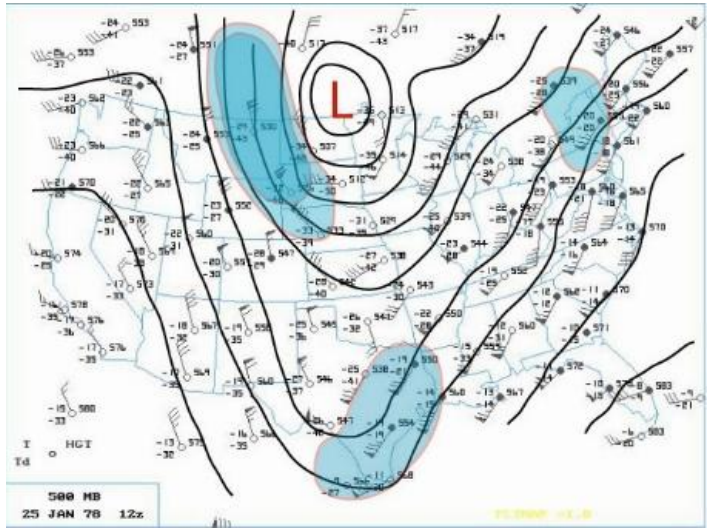
THE GREAT BLIZZARD OF 1978
Holland Impacts

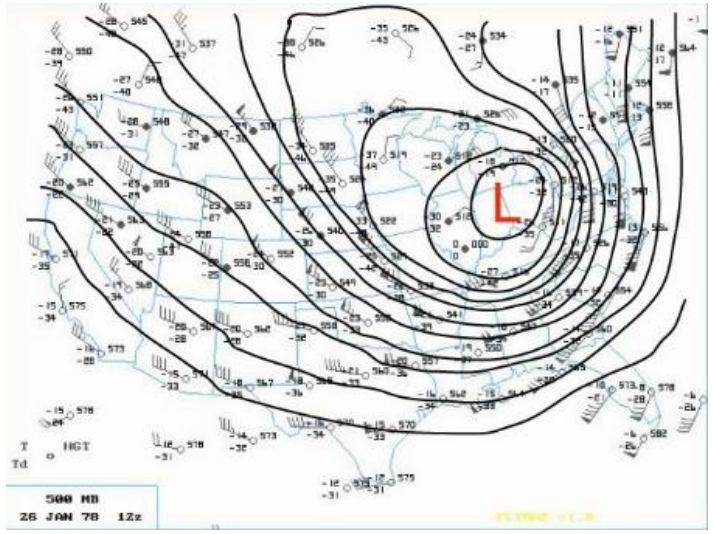
All roads in Allegan, Ottawa and Kent counties were closed by the Michigan State Police. The Holland Armory and the Municipal Center in Zeeland hosted stranded travelers, according to The Holland Sentinel. Power was out in northwest Allegan County and crews had to literally inch their way to the scene.

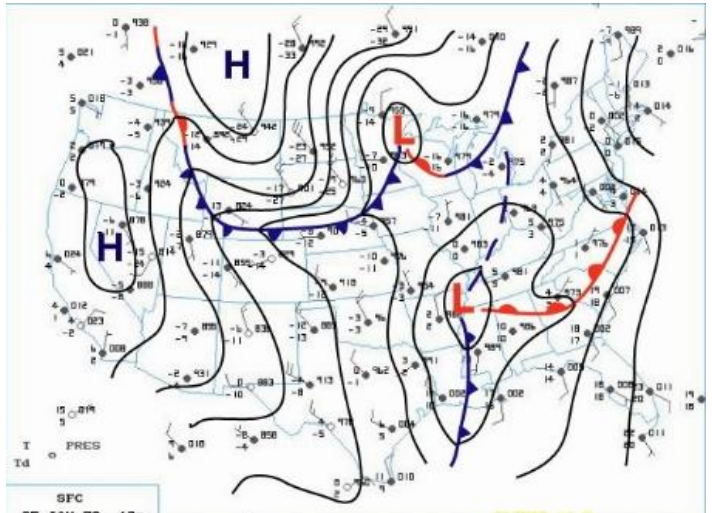
Zeeland Civil Defense snowmobilers made more than 80 emergency runs to bring food, fuel and medications to residents, The Sentinel reported.

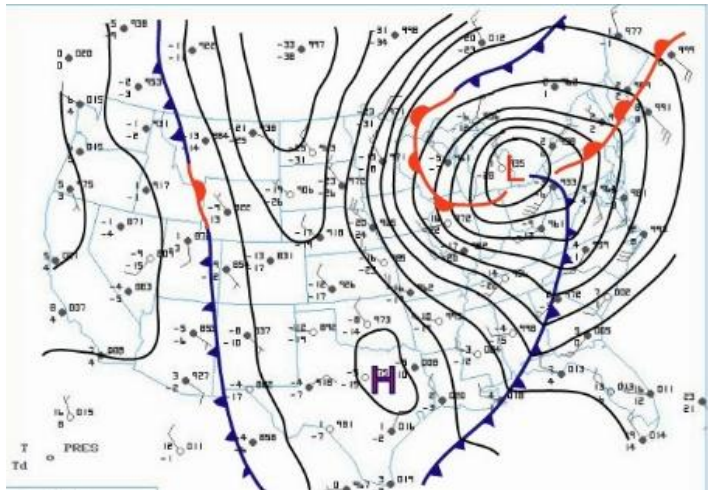
Holland received about 20.5 inches of snow in the storm. Strong winds made huge drifts and people abandoned their vehicles in the streets.

The Blizzard of 1978
500 mb and surface maps

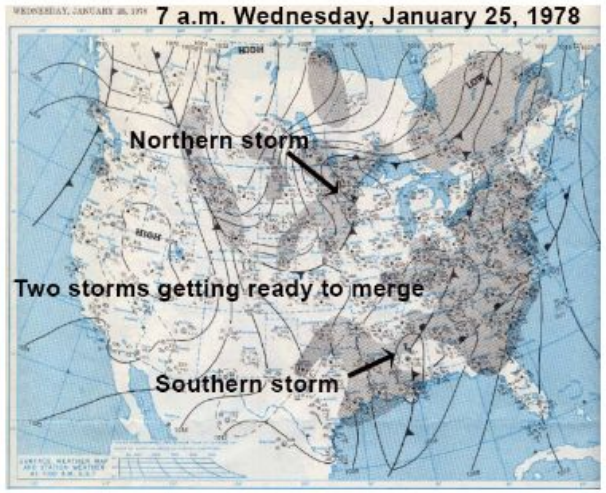


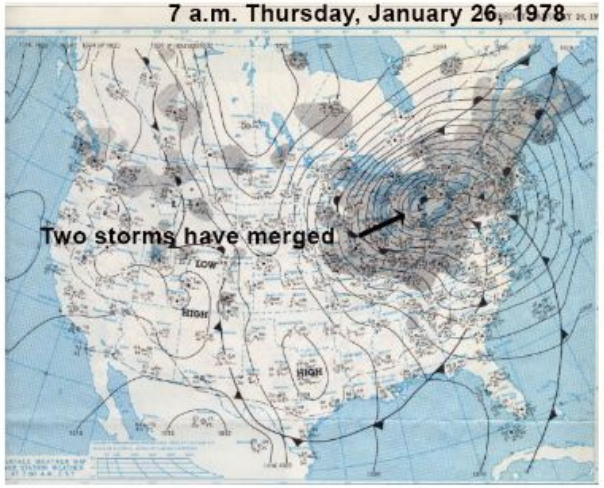


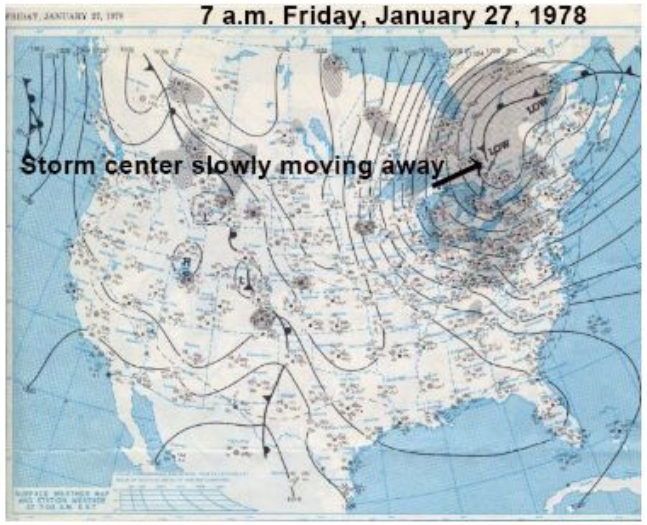




Surface Weather Maps
from Jan 25 1978 through Jan 27th 1978

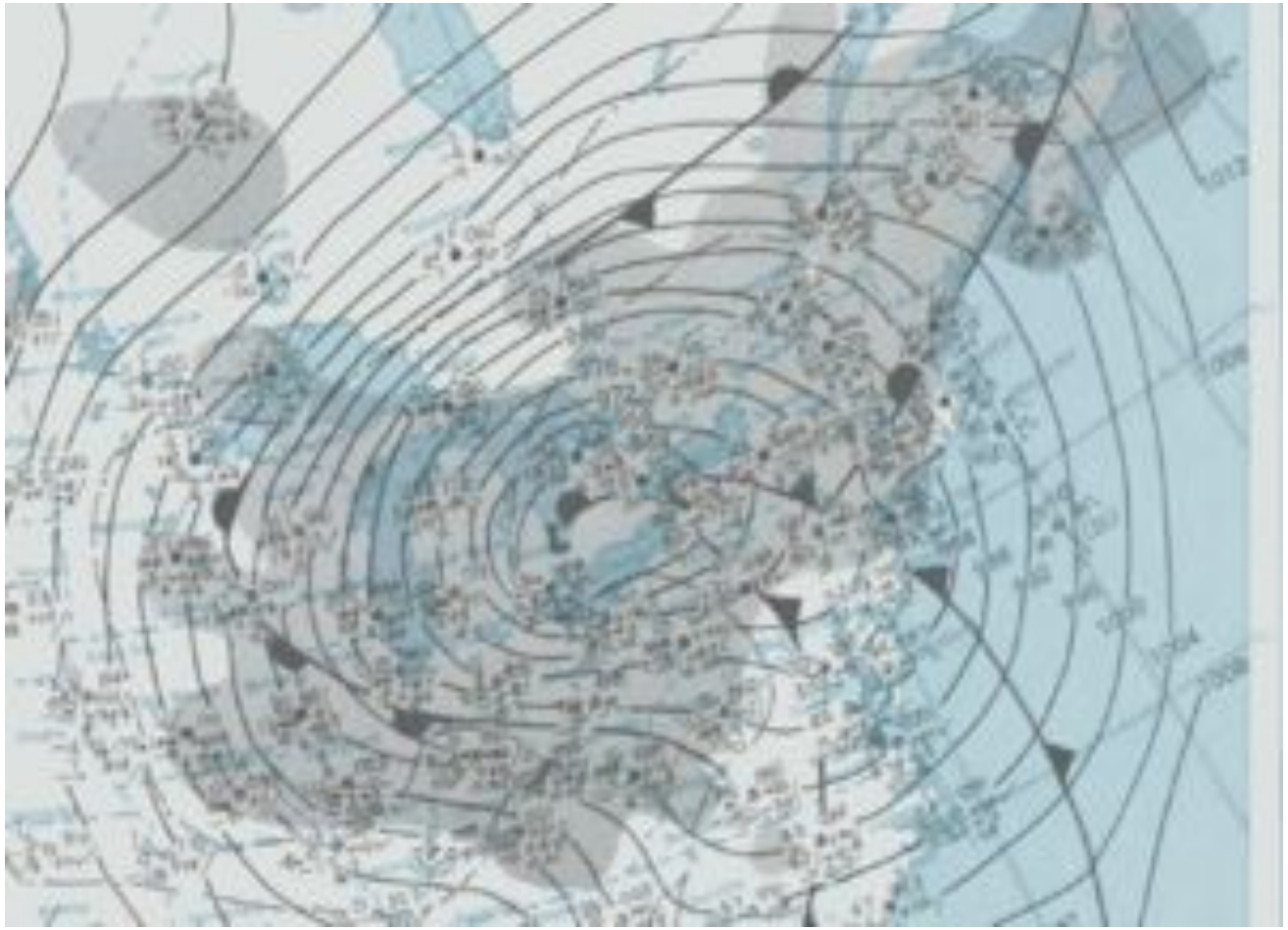




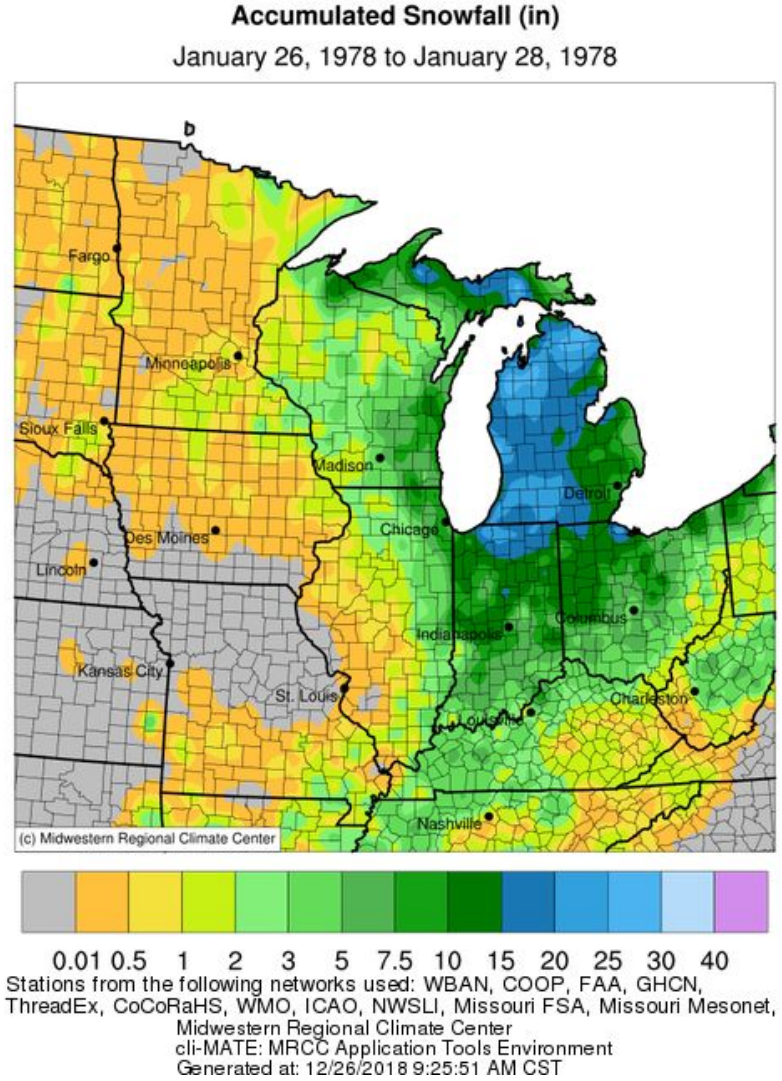


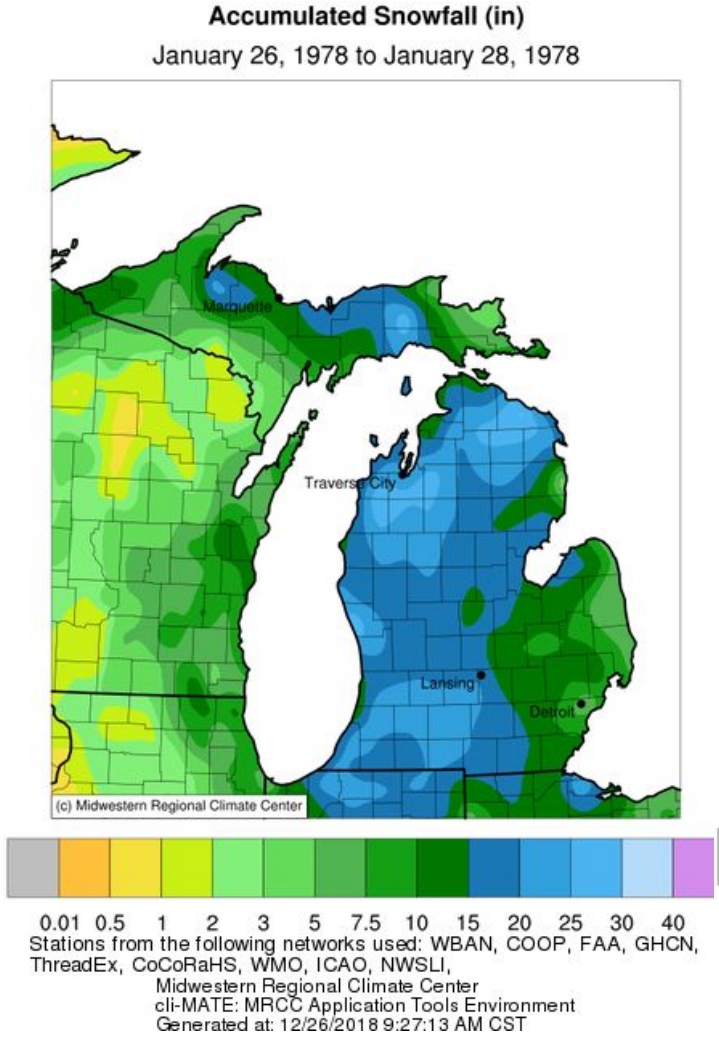
By Mark Torregrossa, mtorregr@mlive.com

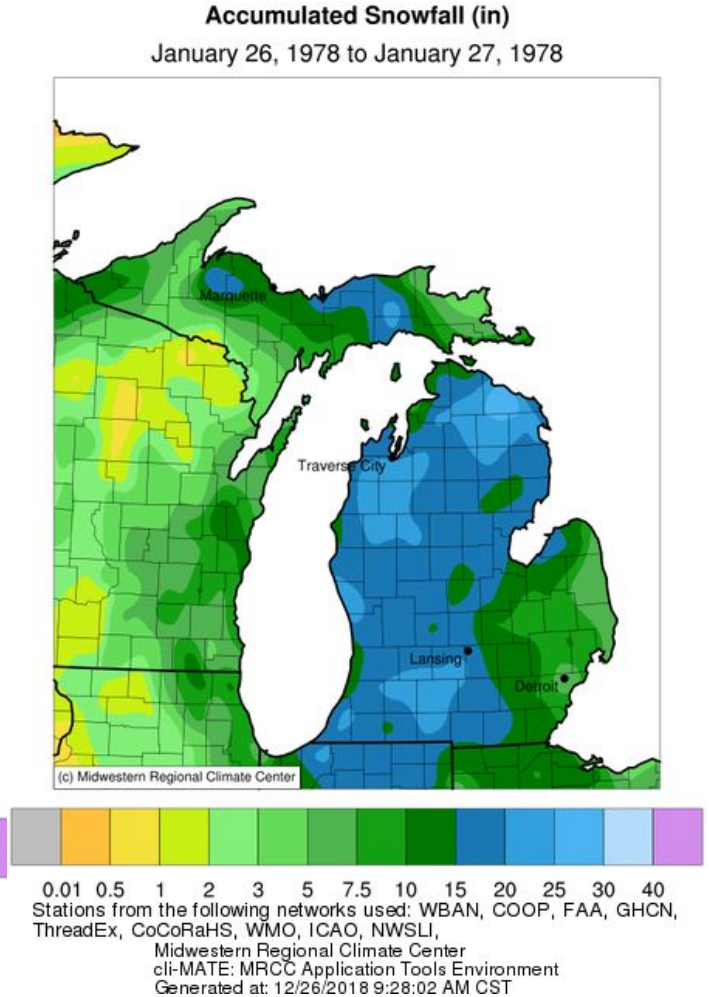
Surface map on the morning of January 26, 1978.



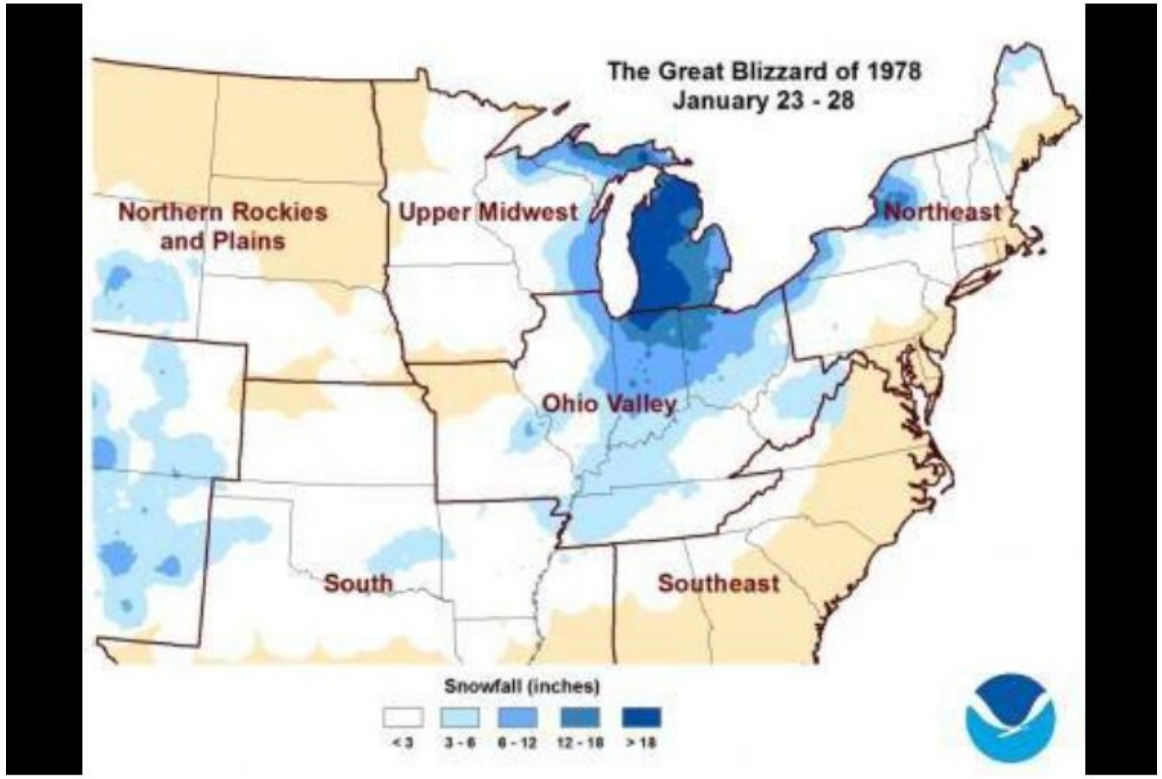
Snowfall Maps for the Blizzard of January 26, 1978 from the MWC.





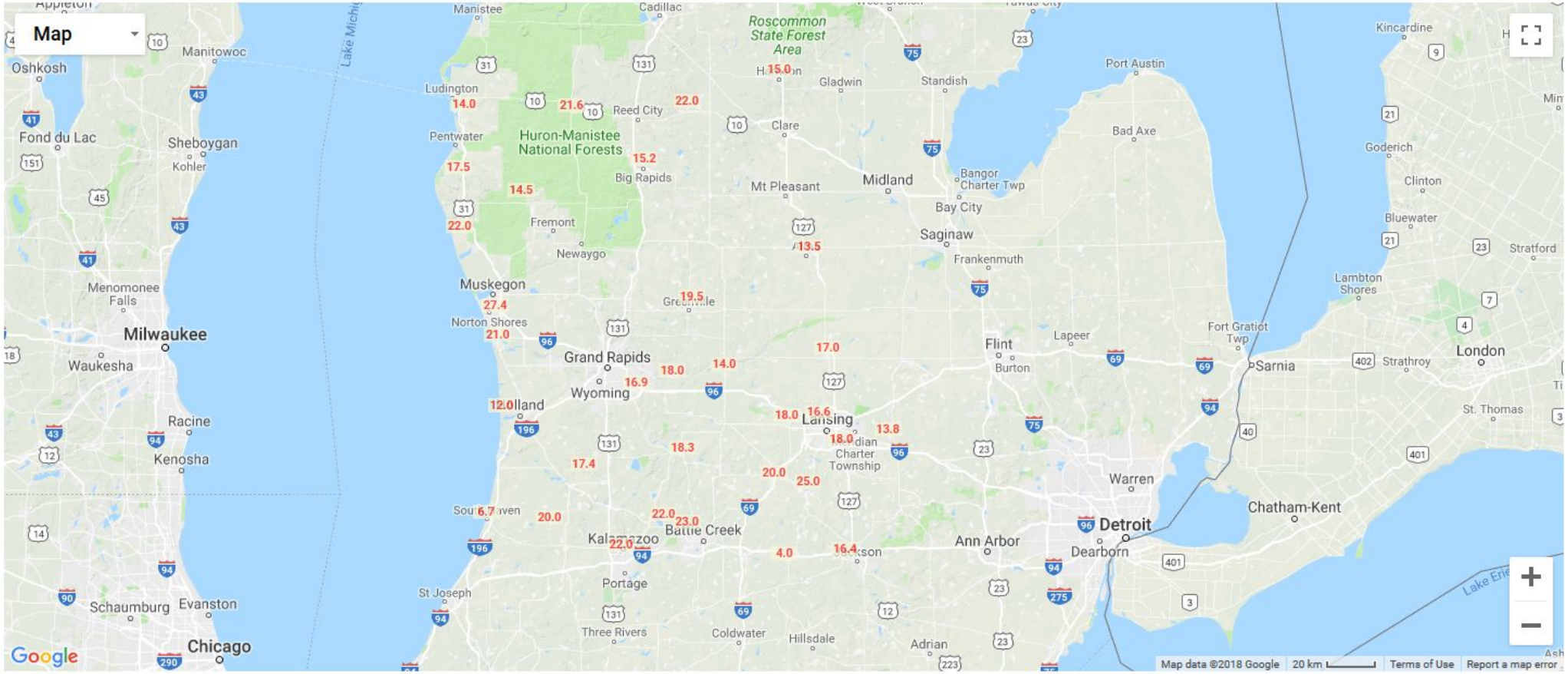


Snowfall Map for the Blizzard of 1978.



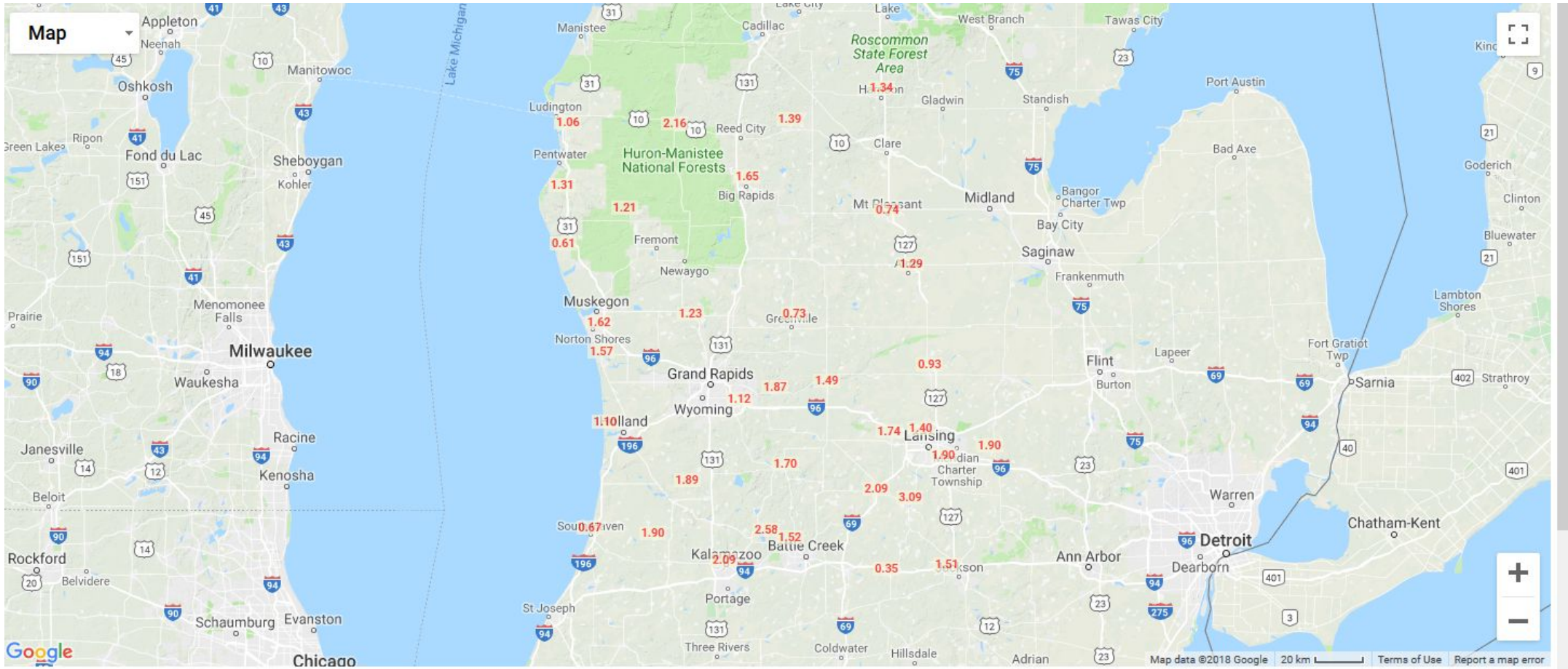
The Great Blizzard of 1978 shut down all roads in Allegan and Ottawa counties. Contributed/NOAA

Storm Total Snowfall from xmACIS



Data for January 26, 1978 through January 27, 1978

Storm Total Precipitation from xmACIS2



Data for January 26, 1978 through January 27, 1978

Total Snowfall/Precipitation from Observations

Note the ratio of precipitation to snow is close to 10/1

Data for January 25, 1978 through January 27, 1978

Click column heading to sort ascending, click again to sort descending.

	Name	Station Type	Total Snowfall
	MUSKEGON COUNTY AP	WBAN	30.0
	EATON RAPIDS	COOP	26.0
	BATTLE CREEK 5NW	COOP	23.5
	EVART	COOP	23.0
	GULL LAKE BIOLOGICAL STATION	COOP	22.9
MI	BALDWIN	COOP	22.8
MI	KALAMAZOO STATE HOSPITAL	COOP	22.0
MI	MONTAGUE 4 NW	COOP	22.0
MI	GRAND HAVEN FIRE DEPT	COOP	21.0
MI	CHARLOTTE	COOP	20.5
MI	GREENVILLE 2 NNE	COOP	20.3
MI	BLOOMINGDALE	COOP	20.0
MI	ALBION	COOP	20.0
MI	JACKSON REYNOLDS FIELD	WBAN	19.4
MI	LANSING CAPITAL CITY AP	WBAN	19.3
MI	GRAND RAPIDS GERALD R FORD INTL AP	WBAN	19.2
MI	HART 3 WSW	COOP	19.0
MI	HASTINGS	COOP	19.0
MI	GRAND LEDGE 1 NW	COOP	18.4
MI	LOWELL	COOP	18.3
MI	EAST LANSING 4 S	COOP	18.3
MI	ALLEGAN 5NE	COOP	17.6
MI	SAINT JOHNS	COOP	17.5
MI	BIG RAPIDS WATERWORKS	COOP	16.6
MI	LUDINGTON 4 SE	WBAN	16.0
MI	HARRISON 1 NNW	COOP	16.0
MI	HESPERIA 4 WNW	COOP	15.1
MI	IONIA 2SSW	COOP	14.8
MI	ALMA	COOP	14.5
MI	WILLIAMSTON 3NE	COOP	14.3
MI	HOLLAND WTP	COOP	12.5
MI	SOUTH HAVEN	COOP	7.2

Data for January 25, 1978 through January 28, 1978

Click column heading to sort ascending, click again to sort descending.

State	Name	Station Type	Total Snowfall
MI	MUSKEGON COUNTY AP	WBAN	33.8
MI	EATON RAPIDS	COOP	27.0
MI	GULL LAKE BIOLOGICAL STATION	COOP	25.9
MI	EVART	COOP	25.0
MI	MONTAGUE 4 NW	COOP	24.1
MI	BLOOMINGDALE	COOP	24.0
MI	GRAND HAVEN FIRE DEPT	COOP	24.0
MI	KALAMAZOO STATE HOSPITAL	COOP	24.0
MI	BATTLE CREEK 5NW	COOP	24.0
MI	BALDWIN	COOP	22.8
MI	ALBION	COOP	22.0
MI	CHARLOTTE	COOP	21.5
MI	HART 3 WSW	COOP	21.0
MI	HASTINGS	COOP	21.0
MI	GREENVILLE 2 NNE	COOP	20.8
MI	ALLEGAN 5NE	COOP	20.7
MI	JACKSON REYNOLDS FIELD	WBAN	20.4
MI	LOWELL	COOP	19.6
MI	LANSING CAPITAL CITY AP	WBAN	19.6
MI	GRAND LEDGE 1 NW	COOP	19.6
MI	GRAND RAPIDS GERALD R FORD INTL AP	WBAN	19.5
MI	EAST LANSING 4 S	COOP	18.3
MI	SAINT JOHNS	COOP	17.5
MI	BIG RAPIDS WATERWORKS	COOP	17.1
MI	LUDINGTON 4 SE	WBAN	17.0
MI	HARRISON 1 NNW	COOP	16.0
MI	HESPERIA 4 WNW	COOP	15.5
MI	IONIA 2SSW	COOP	15.0
MI	ALMA	COOP	14.5
MI	WILLIAMSTON 3NE	COOP	14.3
MI	HOLLAND WTP	COOP	14.0
MI	SOUTH HAVEN	COOP	7.5

State	Name	Station Type	Total Precipitation
MI	EATON RAPIDS	COOP	3.09
MI	GULL LAKE BIOLOGICAL STATION	COOP	2.58
MI	BALDWIN	COOP	2.16
MI	KALAMAZOO STATE HOSPITAL	COOP	2.09
MI	CHARLOTTE	COOP	2.09
MI	BLOOMINGDALE	COOP	1.90
MI	EAST LANSING 4 S	COOP	1.90
MI	WILLIAMSTON 3NE	COOP	1.90
MI	ALLEGAN 5NE	COOP	1.89
MI	LOWELL	COOP	1.87
MI	GRAND LEDGE 1 NW	COOP	1.74
MI	HASTINGS	COOP	1.70
MI	BIG RAPIDS WATERWORKS	COOP	1.65
MI	MUSKEGON COUNTY AP	WBAN	1.62
MI	GRAND HAVEN FIRE DEPT	COOP	1.57
MI	BATTLE CREEK 5NW	COOP	1.52
MI	JACKSON REYNOLDS FIELD	WBAN	1.51
MI	IONIA 2SSW	COOP	1.49
MI	LANSING CAPITAL CITY AP	WBAN	1.40
MI	EVART	COOP	1.39
MI	HARRISON 1 NNW	COOP	1.34
MI	HART 3 WSW	COOP	1.31
MI	ALMA	COOP	1.29
MI	KENT CITY 2 SW	COOP	1.23
MI	HESPERIA 4 WNW	COOP	1.21
MI	GRAND RAPIDS GERALD R FORD INTL AP	WBAN	1.12
MI	HOLLAND WTP	COOP	1.10
MI	LUDINGTON 4 SE	WBAN	1.06
MI	SAINT JOHNS	COOP	0.93
MI	CENTRAL MICHIGAN UNIVERSITY	COOP	0.74
MI	GREENVILLE 2 NNE	COOP	0.73
MI	SOUTH HAVEN	COOP	0.67
MI	MONTAGUE 4 NW	COOP	0.61
MI	ALBION	COOP	0.35
MI	SCOTTVILLE 1 NE	COOP	M

Grand Rapids Surface Observation during the storm

Date	Time	Temp (F)	RH (%)	Wind Spd (mph	Wind Dire	Wind Gust	Low Clouc	Med Clou	High Clou	Visibility (	Atm Press	Sea Lev Pr	Altimeter	Precip (in
1/25/1978	15:00	29	81	11	60		50	1480	m	1	970.6	1000.2	999.3	0
1/25/1978	16:00	28	84	13	70		50	1180	M	1	970.2	1000	999	0
1/25/1978	17:00	28	84	14	60		50	980	m	1	969.6	999.2	998.3	0.01
1/25/1978	18:00	27	88	13	50		50	980	m	1	967.9	997.5	996.6	0.01
1/25/1978	19:00	27	88	13	50		50	980	M	3	966.1	995.7	994.9	0.01
1/25/1978	20:00	27	88	10	40		50	980	m	2	963.6	993	992.2	0.01
1/25/1978	21:00	28	88	11	30		50	1080	m	2	962	991.3	990.5	0
1/25/1978	22:00	28	88	12	10		490	M	M	0	959.7	989	988.2	0.06
1/25/1978	23:00	28	88	11	350		980	m	m	1	957.3	986.6	985.8	m
1/26/1978	0:00	28	92	16	360		490	m	m	1	955	984.1	983.4	m
1/26/1978	1:00	28	88	20	360		490	M	M	1	952.6	981.7	981	0.04
1/26/1978	2:00	26	92	23	360		300	m	m	0	949.4	978.4	977.7	0.06
1/26/1978	3:00	26	92	23	350	31	200	m	m	0	947.1	975.9	975.3	0.06
1/26/1978	4:00	26	92	23	350	29	100	M	M	0	944.8	973.6	972.9	0.07
1/26/1978	5:00	27	92	21	340	30	200	m	m	0	942.8	971.6	970.9	0.10
1/26/1978	6:00	27	92	21	330	28	100	m	m	0	942.5	971.2	970.5	0.11
1/26/1978	7:00	26	92	25	310	31	100	M	M	0	943.1	971.9	971.2	0.14
1/26/1978	8:00	26	84	24	310	36	50	m	m	0	943.1	971.9	971.2	m
1/26/1978	9:00	25	87	29	310	44	50	m	m	0	944.1	973	972.2	0.09
1/26/1978	10:00	25	87	29	310	41	50	M	M	0	945.1	974.1	973.3	0.04
1/26/1978	11:00	24	87	30	310	37	50	m	m	0	946.1	975.1	974.3	0.06
1/26/1978	12:00	24	87	24	310	44	50	m	m	0	946.4	975.5	974.6	0.04
1/26/1978	13:00	24	83	26	310	37	200	M	M	0	946.8	975.8	974.9	0.02
1/26/1978	14:00	25	77	30	300	45	200	m	m	0	947.7	976.9	976	0.02
1/26/1978	16:00	24	80	26	290	37	200	M	M	0	951.6	980.5	979.7	0.03
1/26/1978	17:00	23	80	33	290	46	50	1870	m	0	953.4	982.5	981.7	0.02
1/26/1978	18:00	22	88	18	290	33	100	m	m	0	955.3	984.6	983.7	0.00
1/26/1978	19:00	22	84	29	290	m	50	1480	M	0	957	986.4	985.4	0.02
1/26/1978	20:00	21	80	29	290	41	50	1770	m	1	958.7	988.2	987.1	m
1/26/1978	21:00	21	80	30	290	40	50	1870	m	1	959.6	989.2	988.2	0
1/26/1978	22:00	21	77	29	290	41	50	1870	6890	1	961	990.4	989.5	m
1/26/1978	23:00	21	77	26	300	39	50	1870	6890	1	962.3	991.8	990.9	0.01
1/27/1978	0:00	21	77	25	290	32	50	1870	6890	5	963.6	993	992.2	m

Muskegon Surface Observation during the storm

Date	Time	Temp (F	RH (%	Dewpt (F)	Wind Spd (mph)	Wind Direction (deg)	ak Wind Gust(m	Low Cloud Ht (f	Med Cloud Ht (f	High Cloud	Hsibility (m	Atm Pre	Sea Lev	Altimete	Precip (in)
1/25/1978	16:00	29	74	22	14	70	m	1970	M	M	5	976.6	1000.2	999.3	0
1/25/1978	17:00	29	74	22	11	80	m	5910	m	m	6	976.3	999.9	999	m
1/25/1978	18:00	27	88	24	9	30	m	490	m	m	1	975.3	998.8	998	m
1/25/1978	19:00	27	92	25	12	30	m	490	M	M	1	973.9	997.2	996.3	0.01
1/25/1978	20:00	27	92	25	14	360	m	790	m	m	1	971.3	994.6	993.9	m
1/25/1978	21:00	26	95	25	11	360	m	790	m	m	1	970	993.4	992.6	0.02
1/25/1978	22:00	26	95	25	14	350	m	490	m	m	1	968	991.5	990.5	m
1/25/1978	23:00	26	95	25	18	360	m	490	m	m	1	966	989.2	988.5	0.03
1/26/1978	0:00	26	95	25	16	350	23	490	m	m	1	964	987.2	986.5	0.06
1/26/1978	1:00	26	95	25	20	360	28	490	M	M	0	961.7	984.8	984.1	0.05
1/26/1978	2:00	25	96	24	18	340	31	490	m	m	1	959	981.8	981.4	0.04
1/26/1978	3:00	25	96	24	19	340	28	490	m	m	0	956.7	979.8	979	0.08
1/26/1978	4:00	26	95	25	19	350	31	390	m	m	0	954.3	977.3	976.6	m
1/26/1978	5:00	26	95	25	24	340	33	300	m	m	0	953	975.9	975.3	m
1/26/1978	6:00	25	96	24	26	340	33	300	m	m	0	952.3	975.5	974.6	0.12
1/26/1978	7:00	25	96	24	26	340	34	300	M	M	0	952.6	975.5	974.6	0.15
1/26/1978	8:00	25	96	24	29	340	36	300	m	m	0	953.3	976.3	975.6	m
1/26/1978	9:00	25	100	25	37	340	45	200	m	m	0	953.7	976.8	976	0.14
1/26/1978	10:00	24	100	24	32	340	39	100	m	m	0	954.7	977.7	977	m
28516	0.46	24	91	22	28	330	39	100	m	m	0	955	978	977.3	0.09
28516	0.5	24	95	23	38	330	51	200	m	m	0	955.3	978.3	977.7	m
28516	0.54	24	95	23	32	330	47	200	M	M	0	955.6	978.7	978	0.01
28516	0.58	23	95	22	38	320	49	200	m	m	0	957	980.1	979.3	0.03
28516	0.63	23	95	22	36	330	45	200	m	m	0	959	982	981.4	0.03
28516	0.67	22	100	22	36	320	47	50	m	m	0	960.3	983.5	982.7	m
28516	0.71	21	100	21	41	320	51	50	m	m	0	962.3	985.5	984.8	0.02
28516	0.75	21	100	21	31	310	40	1280	m	m	0	964	987.2	986.5	m
28516	0.79	20	100	20	36	320	47	300	M	M	0	965.8	989	988.2	0.05
28516	0.83	20	96	19	36	310	51	300	m	m	0	967	990.5	989.5	0
28516	0.88	20	100	20	33	320	45	300	m	m	0	968	991.5	990.5	0.01
28516	0.92	20	100	20	31	310	44	300	M	M	0	969.5	992.9	991.9	0.05
28516	0.96	19	100	19	29	310	42	390	m	m	0	970.6	994.3	993.2	0.02
28517	0	19	100	19	29	320	37	390	m	m	0	971.6	995.3	994.2	0.02
28517	0.04	20	96	19	31	310	38	390	1280	M	0	972.6	996.3	995.3	0.02
28517	0.08	19	95	18	32	310	42	50	1670	3540	0	973.9	997.5	996.6	m
28517	0.13	19	91	17	29	310	34	980	m	m	0	975.3	999	998	0.01
28517	0.17	19	91	17	29	310	40	2070	2850	M	1	976.3	1000	999	0.01
28517	0.21	19	91	17	28	310	41	1870	2850	m	1	976.9	1000.7	999.7	0
28517	0.25	19	91	17	25	310	39	1870	2950	m	1	977.9	1001.8	1000.7	m
28517	0.29	19	91	17	25	310	33	1670	2950	M	1	979	1002.7	1001.7	0.01
28517	0.33	19	91	17	22	310	28	980	m	m	1	979.9	1003.7	1002.7	0.01
28517	0.38	20	88	17	17	310	24	50	1569	m	1	980.9	1004.7	1003.7	m
28517	0.42	20	96	19	15	310	26	790	m	m	1	982.3	1006	1005.1	m
28517	0.46	20	91	18	22	310	29	390	m	m	0	983.3	1007.1	1006.1	m
28517	0.5	20	91	18	19	290	28	390	m	m	0	983.6	1007.4	1006.4	0.01
28517	0.54	20	88	17	23	310	30	50	790	M	1	983.7	1007.5	1006.4	0.02
28517	0.58	20	88	17	23	300	32	50	790	m	1	983.9	1008.2	1006.8	0
28517	0.63	19	91	17	23	290	29	50	1380	m	1	984.9	1008.9	1007.8	0
28517	0.67	19	87	16	21	290	30	50	1280	M	1	985.8	1009.6	1008.5	0
28517	0.71	19	84	15	24	300	32	50	1569	m	1	986.6	1010.6	1009.5	m
28517	0.75	19	87	16	28	300	33	50	1380	m	1	987.2	1011.2	1010.2	m
28517	0.79	19	91	17	22	290		50	1480	M	1	987.5	1011.5	1010.5	0
28517	0.83	20	91	18	21	300	28	50	1569	m	1	987.9	1012	1010.8	0.01
28517	0.88	21	87	18	16	330		1870	3440	m	4	988.2	1012.1	1011.2	0
28517	0.92	21	87	18	13	300		3540	M	M	6	988.1	1012.2	1011.2	0
28517	0.96	22	81	17	15	310		3940	m	m	4	988.6	1012.7	1011.5	0

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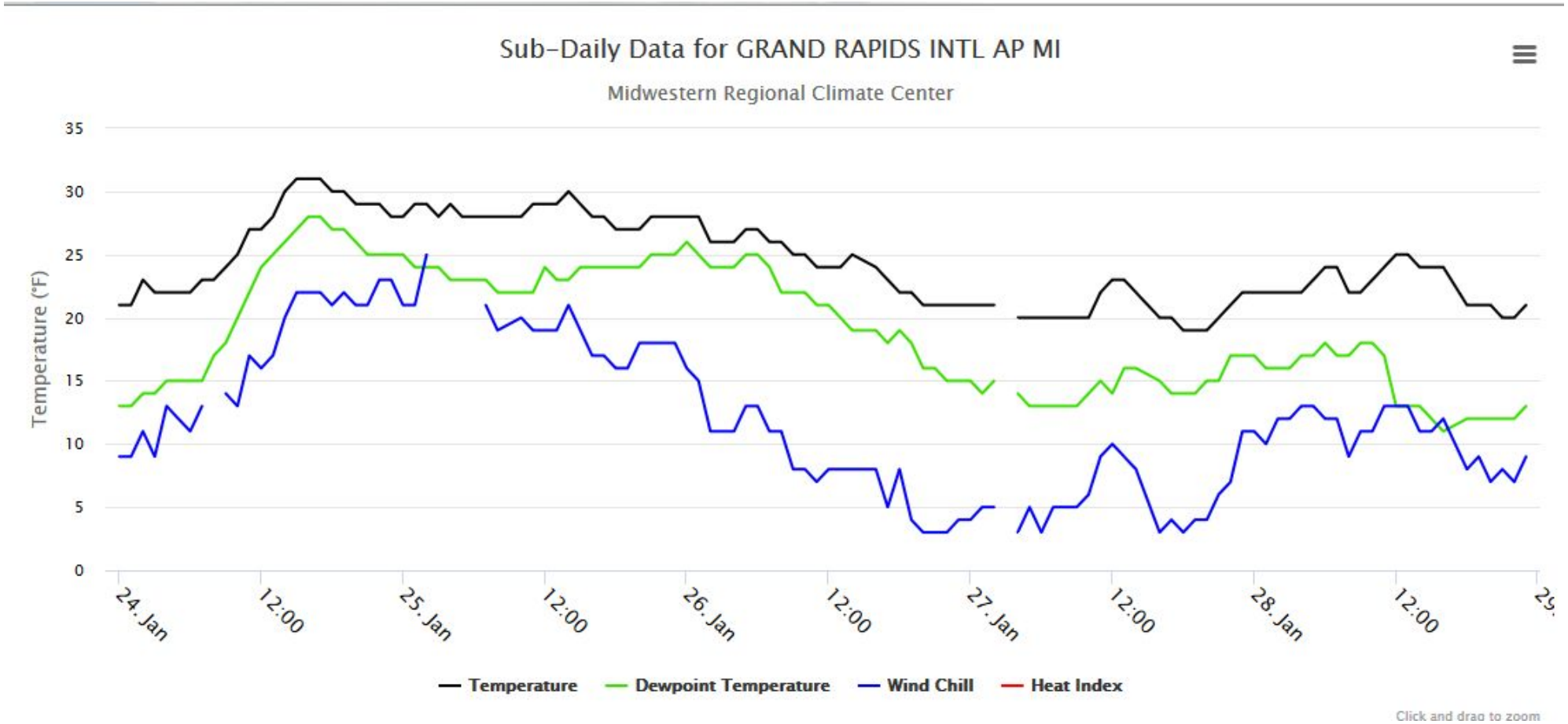

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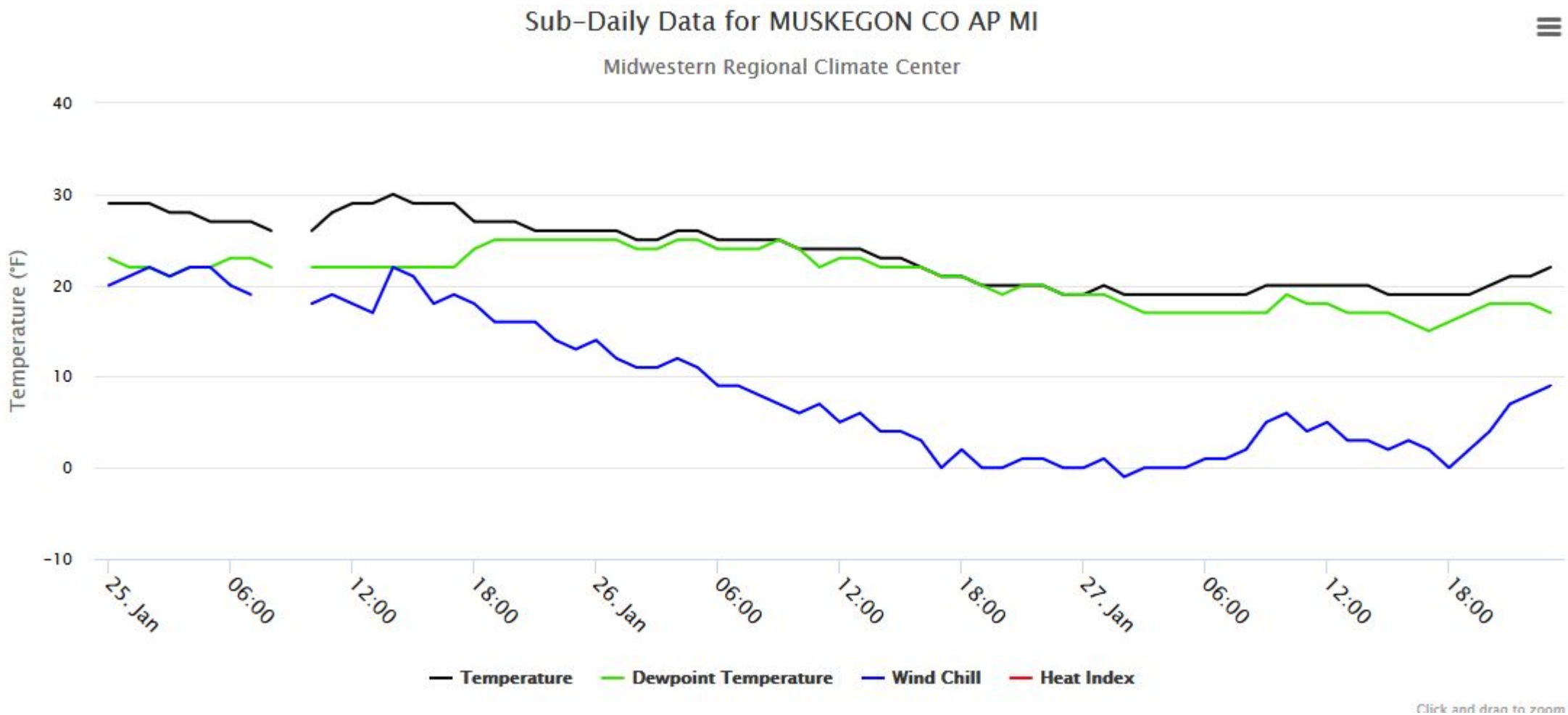

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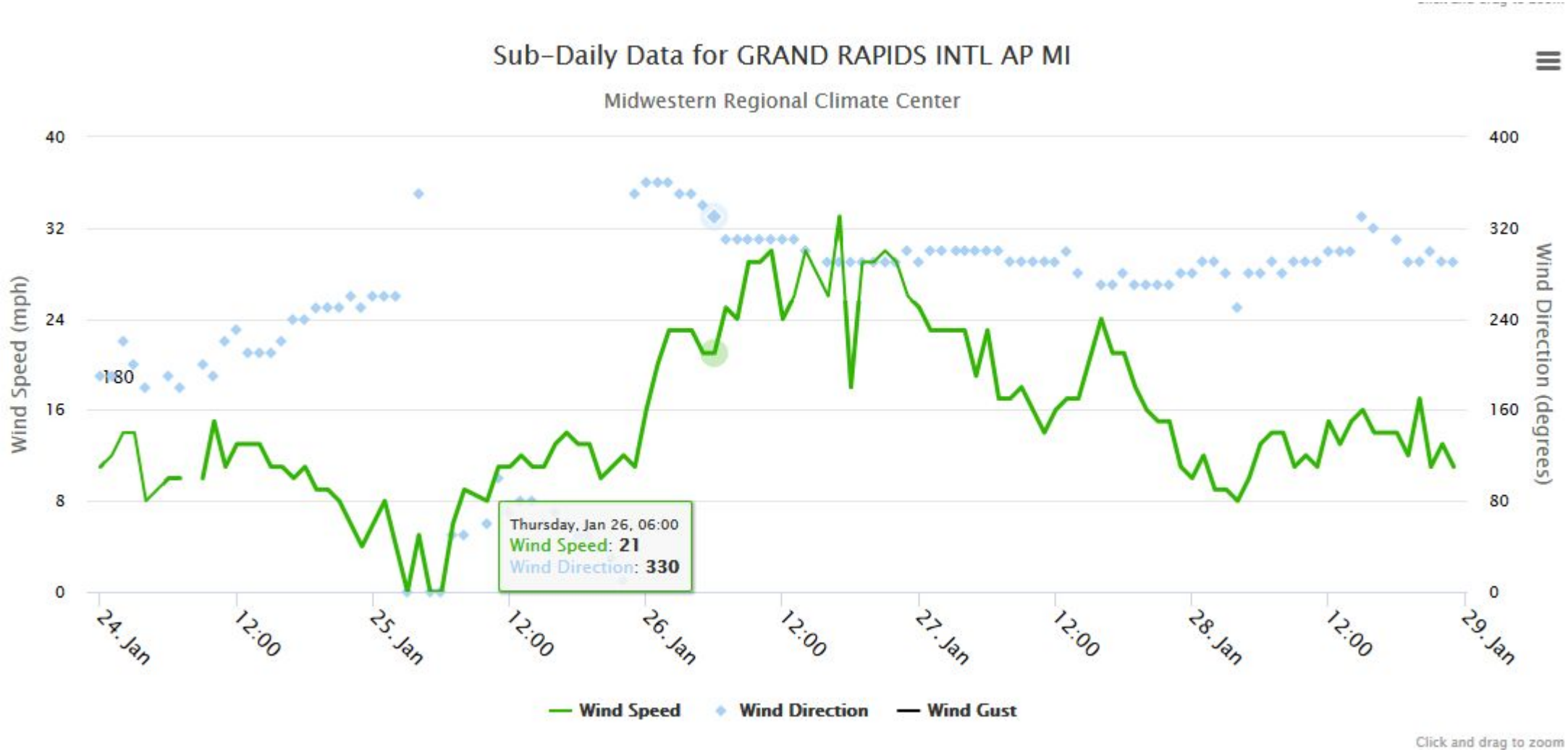

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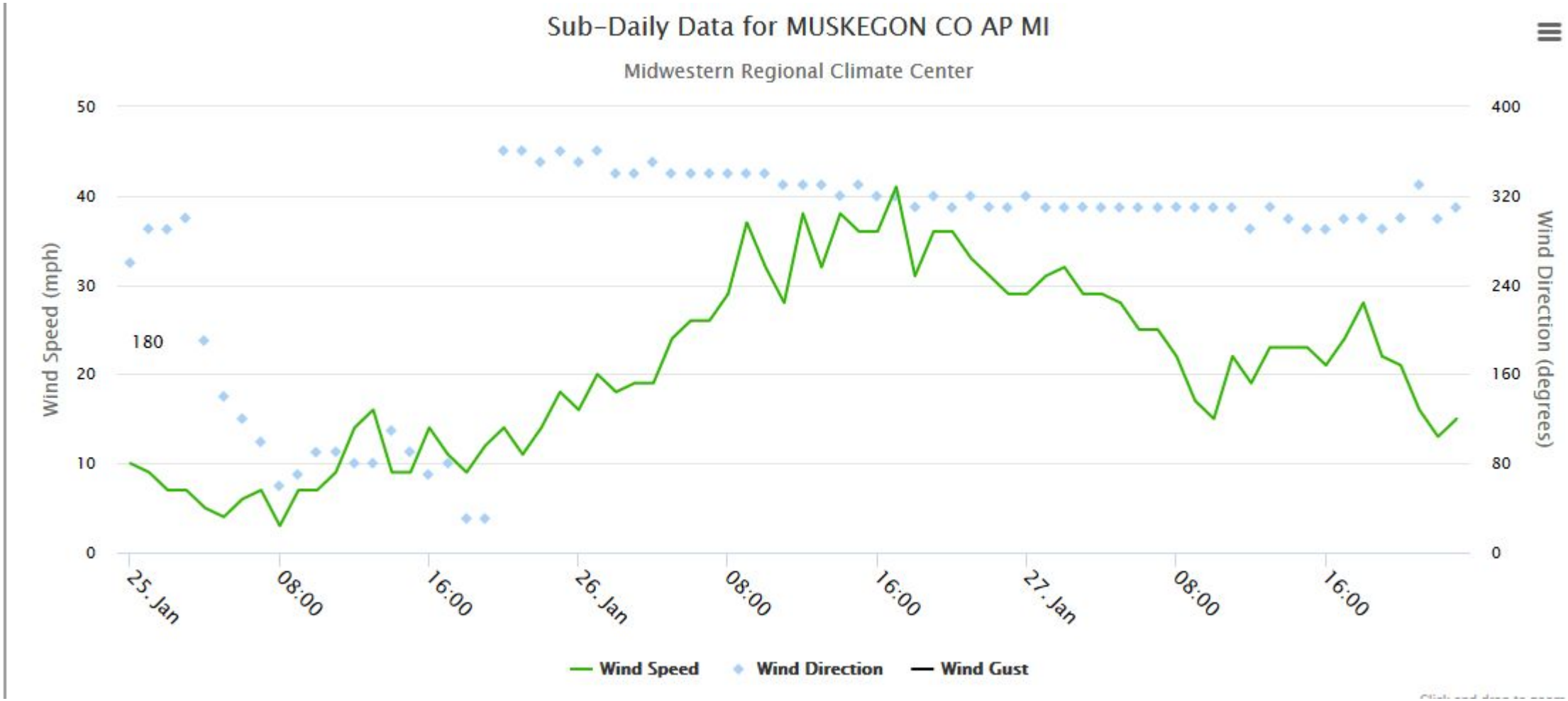

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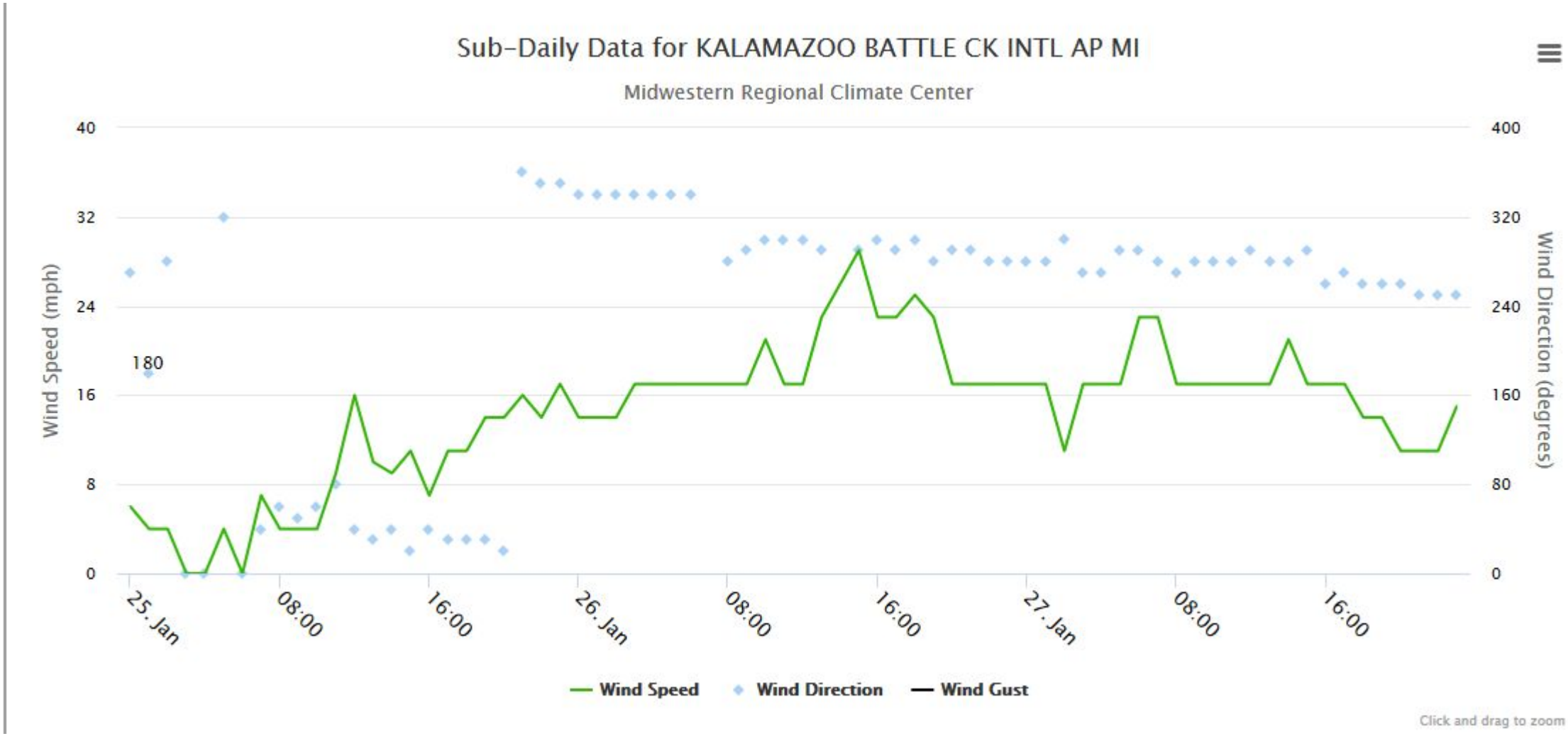

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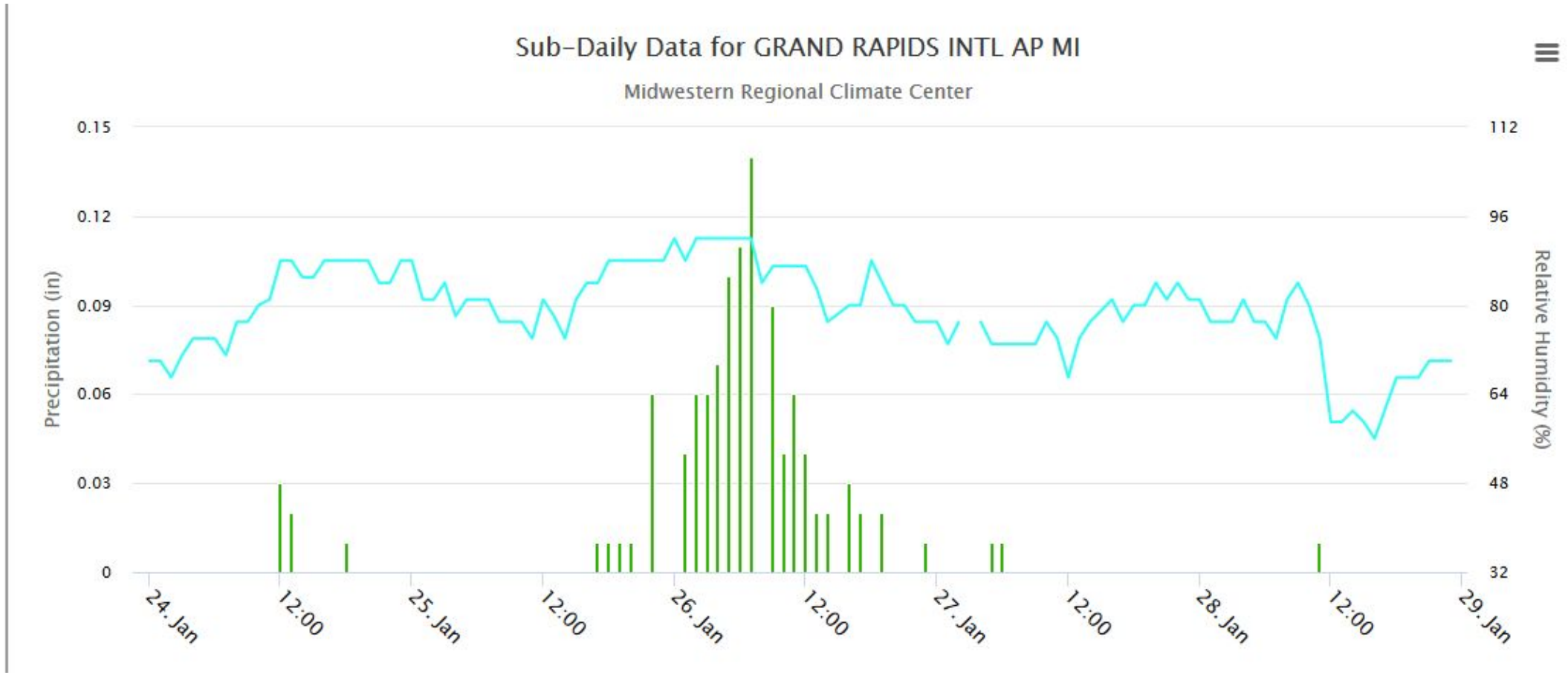

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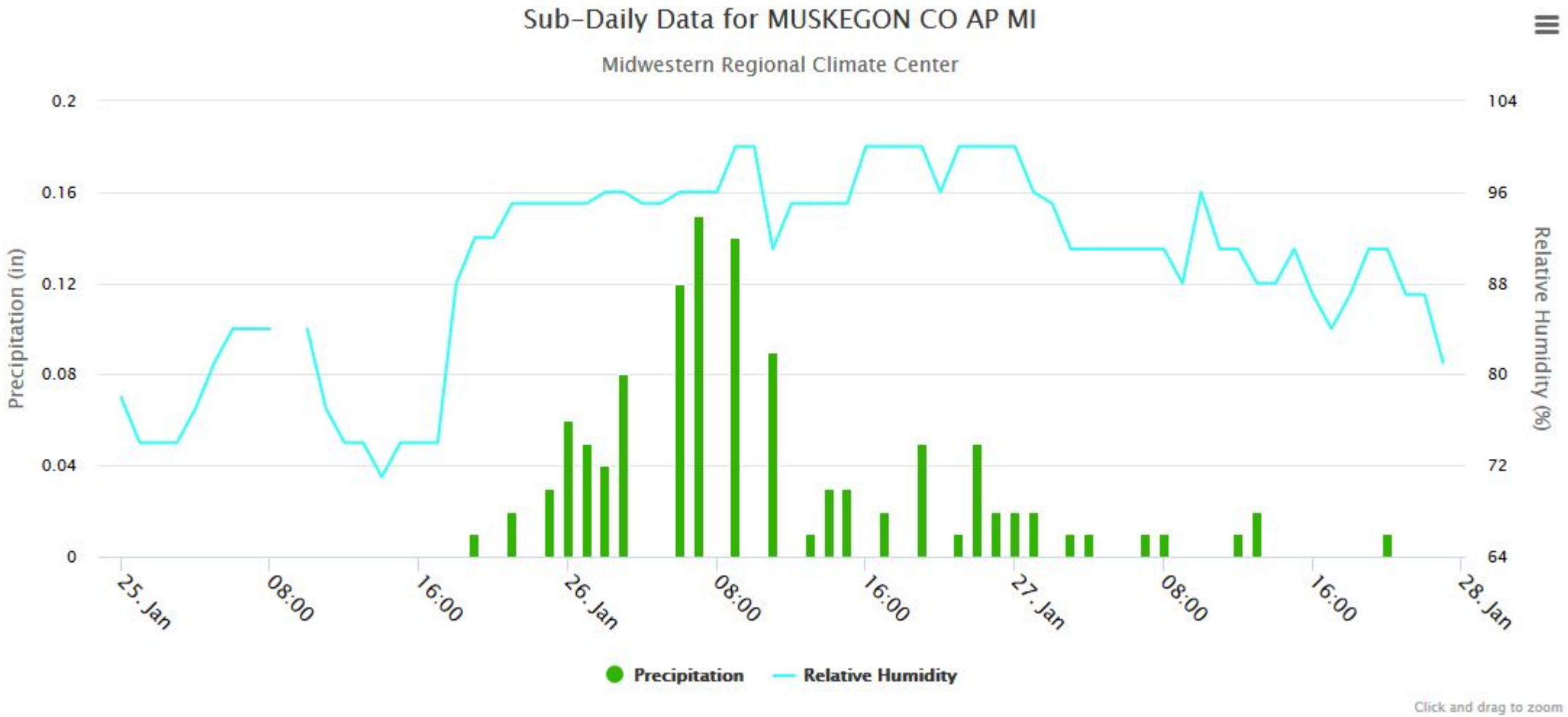

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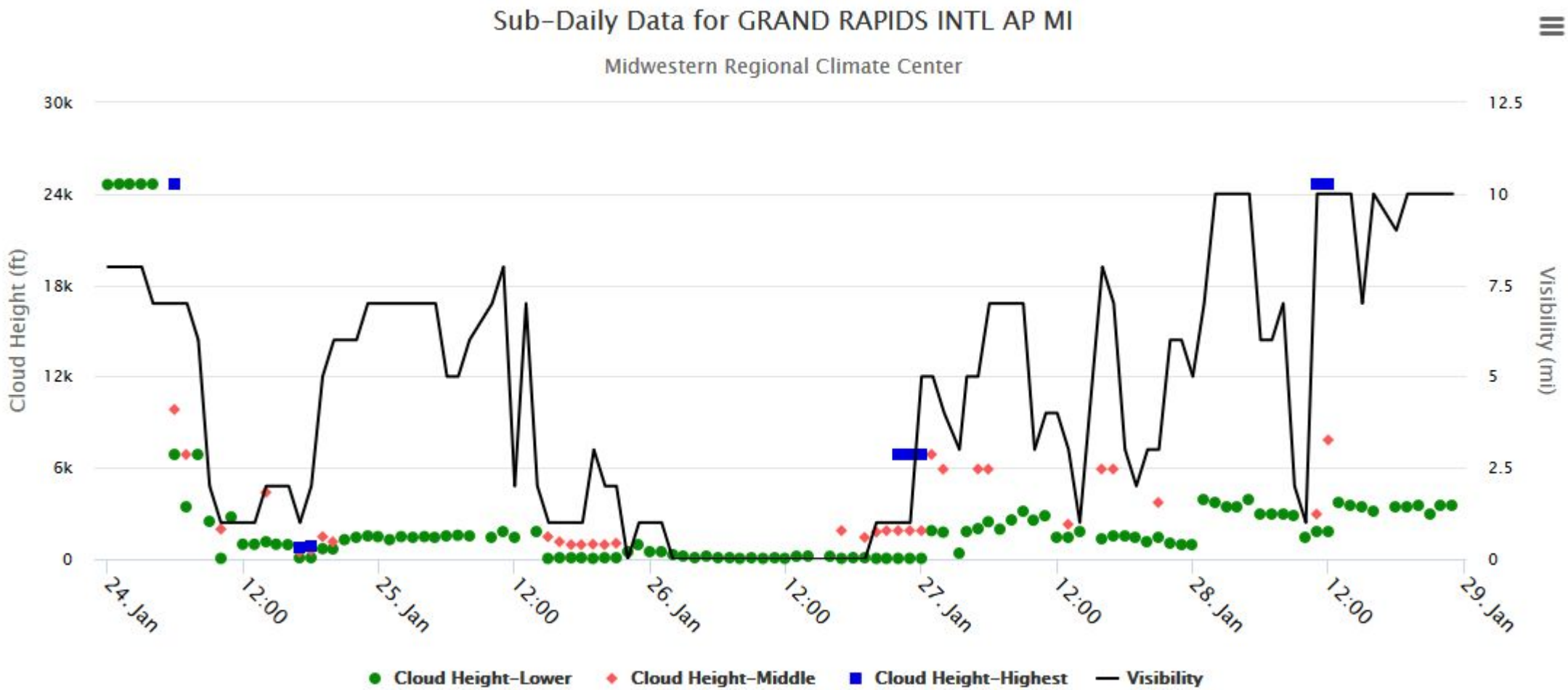

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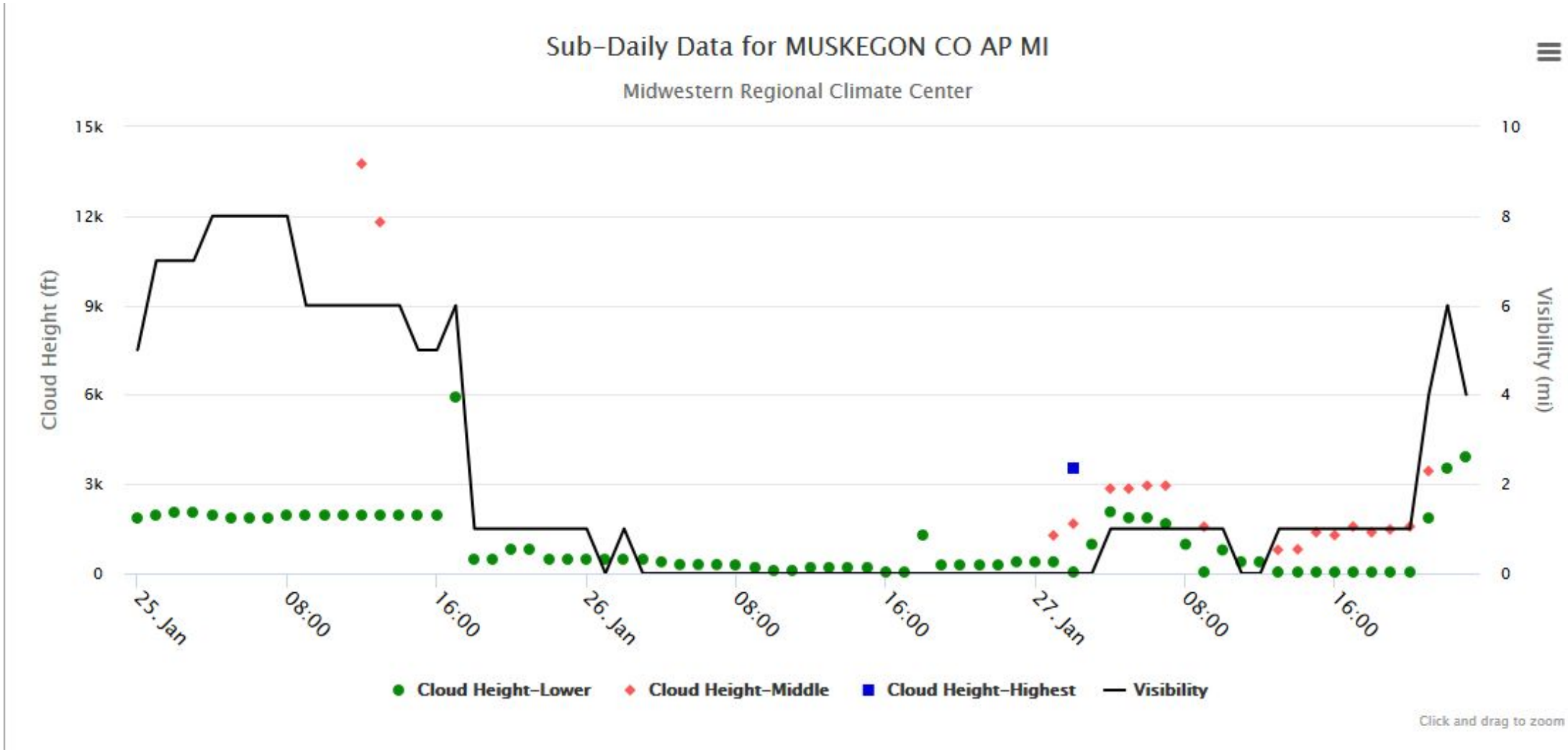

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