

Was the October 26th storm record breaking??

After another full day of investigation regarding the potential for setting a CONUS record low pressure during the event on Tuesday 26 October 2010, which has involved contributions from staff at WFO Duluth, MN, WFO Twin Cities/Chanhassen, MN, NWS Central Region Headquarters, the NWS Communications Office, and the National Climatic Data Center, here is where we stand:

We still are confident in the 955.2 mb (28.21 inches of mercury) recorded at Bigfork, MN at 513 PM (2213 UTC) 26 October 2010 as the lowest pressure with this storm. This value/location also establishes a new record for the state of Minnesota.

As you are aware, there continues to be intense interest regarding this event and whether this value establishes a new continental lower 48 states record low pressure for a non-tropical weather system as recorded at a **land-based** observing station in the CONUS. After a long investigation, and with input from the National Climatic Data Center, the 955.2 mb value **does NOT set a new record low pressure for the lower 48 United States.**

NCDC has verified two east coast storms with lower pressure as published in their Climate Data Publication:

955.0 mb (28.20 inches of mercury) 13 January 1913 at Canton, New York
955.0 mb (28.20 inches of mercury) 7 March 1932 at Block Island, Rhode Island

NCDC has also verified this pressure reading:

956.3 mb (28.24 inches of mercury) 16 December 1916 at Eastport, Maine

Thus, it appears that the 26 October 2010 storm will have the second lowest recorded pressure at a land-based observation station for CONUS non-tropical low pressure system. It is, without question, the lowest recorded pressure for any storm of record in the central part of the United States (i.e. east of the Sierra Mountains and west of the Appalachians)

WFO Duluth has created a webpage regarding the pressure records that can be accessed here with more information:

The information below is from the following web address. It has been added here in case it is later removed from the internet!

http://www.crh.noaa.gov/dlh/?n=101026_pressurerecords

Here's What We Know About The Pressure Records From October 26, 2010

The low pressure rapidly deepened on October 26, 2010, leading to several pressure records being broken. Here are some facts about those pressure records:

Bigfork, MN (KFOZ) had a minimum sea level pressure of 955.2 millibars (28.21") at 5:13 pm CDT

This is recalculated slightly from the lowest altimeter reading of 28.20" that was initially reported for this storm. Both altimeter readings and sea level pressure are derived from the station pressure. Although the altimeter reading is a sea level reduction as well, it uses a US standard atmosphere assumption. The sea level pressure factors in observed temperatures. Therefore, the altimeter and sea level pressure readings are often very slightly different.

955.2 millibars is now the Minnesota state record for lowest observed sea level pressure. The previous record was 962.7 millibars (28.43"), set on November 10, 1998 at both Albert Lea, MN and Austin, MN.

Superior, WI had a minimum sea level pressure of 961.3 millibars (28.39") at 11:15 am CDT

This is now the Wisconsin state record for lowest observed sea level pressure. The previous record was 963.4 millibars (28.45"), set on April 3, 1982 at Green Bay, WI.

Our two climate reporting sites set low pressure records as well

Duluth, MN had a minimum sea level pressure of 960.2 millibars (28.35") at 11:15 am CDT. This broke the old record at Duluth which was 964.3 millibars (28.48"), set on November 10, 1998. International Falls, MN had a minimum sea level pressure of 956.0 millibars (28.23") at 3:45 pm CDT. This broke the old record which was 971.9 millibars (28.70"), set on October 10, 1949.

Was This Any Kind Of National Record For Lowest Pressure?

The bottom line, is that Bigfork, Minnesota did not set the CONUS record for lowest extratropical sea level pressure. Here are the details:

The lowest sea level pressure recorded at any United States certified observing station was 892 millibars (26.34"), recorded at Matecumbe Key, Florida on September 2, 1935 in the "Labor Day Hurricane". Therefore, the reading at Bigfork on October 26th was not the lowest pressure in the entire United States.

The lowest sea level pressure recorded in a non-tropical (*extratropical*) storm at any United States certified observing station was 927 millibars (27.35"), recorded at Dutch Harbor, Alaska on October 25, 1977. Therefore, the reading at Bigfork on October 26th was also not the lowest pressure in the entire United States for a non-tropical storm.

Many storms have been discussed as potential record holders for the lowest recorded sea level pressure in a non-tropical storm at a land-based observing station in the *Continental* United States (CONUS). The lowest that has been mentioned was 951.6 millibars at Bridgehampton, NY on March 3, 1914. However, this value cannot be confirmed by records held at the National Climatic Data Center (NCDC).

The lowest CONUS, land-based, non-tropical, sea level pressure that can be confirmed by NCDC is 955.0 millibars (28.20"). This occurred twice in United States history. The first time was on January 3, 1913 at Canton, NY. The second was on March 7, 1932 at Block Island, Rhode Island. These were verified by NCDC using archived climate data publications.

How Does This Rank Amongst Storms Away From The US Coasts?

If you only consider extratropical lows that tracked between the mountain ranges (*Rocky Mountains on the west, Appalachian Mountains on the east*) - the Central US - the lowest sea level pressure on record appears to be at Mount Clemens, Michigan at 13Z on January 26, 1978. A 956.0 millibar value was recorded there and is supported by NCDC data. This was related to the same storm that produced a 957.7 millibar sea level pressure at Cleveland, Ohio. The lowest value for the central US is sometimes reported as the reading in Cleveland, however, that was superseded by the value in Mount Clemens.

The January 26, 1978 storm later went on to produce lower sea level pressure readings in Ontario, Canada, including a 955.5 millibar reading at Sarnia. However, these are not in consideration as we are only discussing the United States.

Therefore, the 955.2 millibar value that was recorded in Bigfork, Minnesota on October 26, 2010 appears to be the lowest extratropical sea level pressure on the record books in the mainland United States, excluding the west and east coasts.

What Should I Take Away From This?

The bottom line is that the storm that struck the Upper Mississippi River Valley on October 26-27, 2010 was a very intense and rare storm, something that is not seen in this part of the country very often. While the minimum sea level pressure may not necessarily be the lowest on record, the storm was undoubtedly one of the most intense on record in the continental United States.

In fact, with the storms on January 3, 1913 and March 7, 1932 tied for first place at 955.0 millibars, the October 26, 2010 storm would be the second lowest recorded sea level pressure at 955.2 millibars. NCDC was also able to confirm a 956.3 millibar reading at Eastport, Maine on December 16, 1916.

It is also worth noting that lower pressures have likely been attained off the coast of the Pacific Northwest (Oregon and Washington) or perhaps even just off shore of the New England States (Maine, New Hampshire, Massachusetts). However, given that there are very few reliable observing stations offshore, especially dating back many decades, these low pressures may not have been sampled by our observing network.

Caveats About The Pressure Value At Bigfork

Bigfork (KFOZ) is an AWOS (*automated weather observing system*) station, which is completely automated. Unlike an ASOS (*automated surface observing system*), an AWOS does not automatically report a sea level pressure value. Therefore, it was necessary for us to calculate the sea level pressure from the reported station pressure. As we continue to evaluate these calculations, the lowest sea level pressure at Bigfork may fluctuate slightly. However, any slight calibrations in the equation and constants that we are using would not allow the Bigfork reading to break any other records.

Pressure Graphs

Here are a few pressure graphs. The procedure was to evaluate the lowest pressure at each individual time in the day across the Upper Midwest, and then to plot the data on a graph to assess the trends in the minimum pressure at the center of the low. The data was adapted from information provided by Daryl Herzmann.

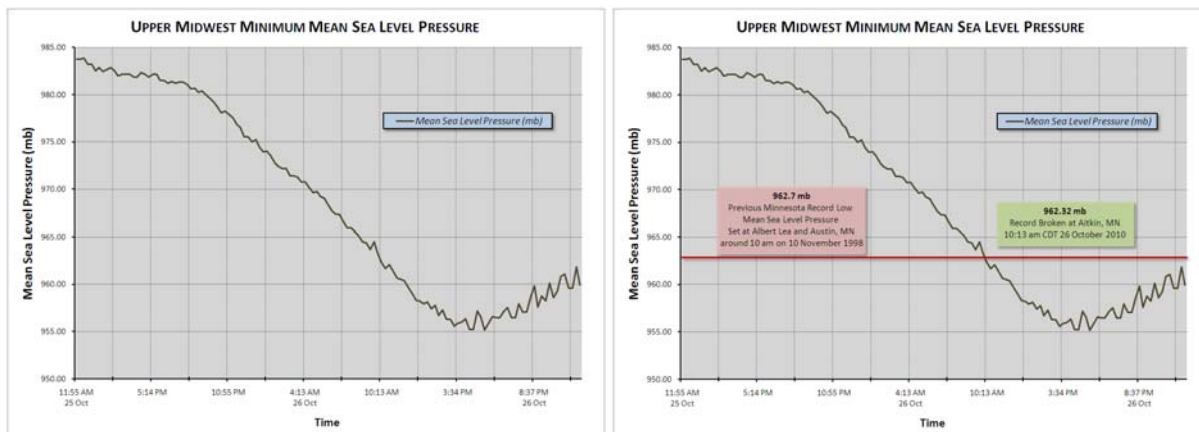


Fig. 1: minimum observed sea level pressure on October 26, 2010 across the Upper Midwest.

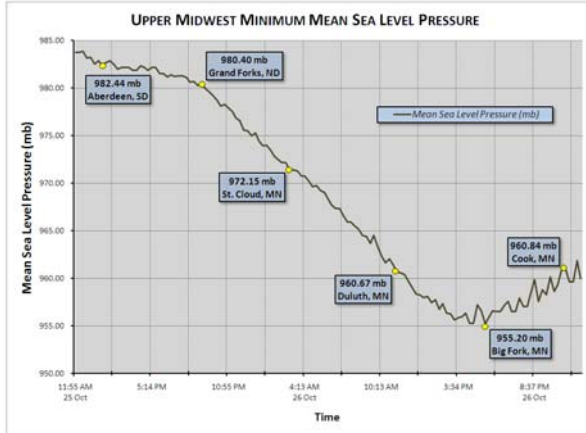


Fig. 3: as in fig. 1, except individual sea level pressure values are annotated on the graph.

Fig. 2: as in fig. 1, except the previous Minnesota state low pressure record is annotate in a horizontal red line.

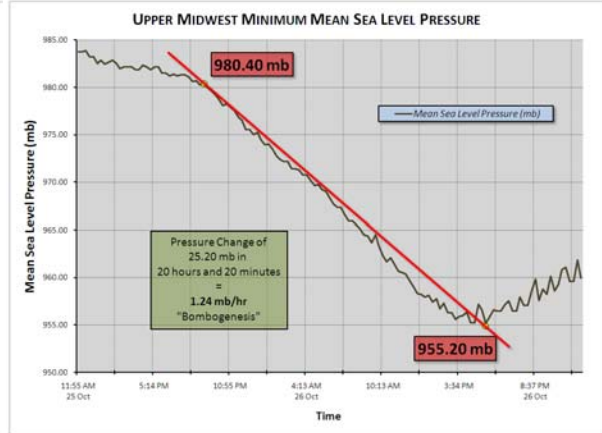


Fig. 4: as in fig. 1, except with a trend line showing the rapid deepening of the low on October 26th.

Finally, here is a graph with different sea level pressure trends plotted at different observation sites across the NWS Duluth county warning area. The data from Hibbing and Duluth are 1 minute data downloaded from the ASOS.

