

World and U.S. High Barometric Pressure Records

Christopher C. Burt, 9:18 PM GMT on November 26, 2011

This blog is a follow up to my previous post on world barometric pressure records. In this case the highest rather than the lowest such. This post completes my recent series on pressure records.

World's Highest Barometric Measurement

Believe it or not, this is a matter of some controversy. In fact, the WMO Extreme Weather Records Committee (chaired by Randy Cerveny of Arizona State University) is currently undertaking an investigation into this very topic.

The accepted figure for the world's highest measured barometric pressure reading is 1083.3 mb (32.01") at Agata, Russia (in Siberia) registered on December 31, 1968. Agata sits at an elevation of 855' (261 meters) at 66° 53'N, 93° 28'E) on the Central Siberian Plateau. The weather at the time was clear and calm with a temperature range that day of -40°F to -58°F.

Sometime in the late 1990s a small commercial airport was built in the town of Tonsontsengel, Mongolia (48°45'23"N, 98°16'17"E) in Dzavhkan Province at an altitude of 5328' (1624 meters). Like much of Mongolia the area has been experiencing a boom in natural resource extraction and a hydropower station was built on the banks of the Ider River that flows through this town of some 5,000 souls. Soon after the airport opened some remarkable barometric readings began to be reported from the airport, these pressure readings being, of course, for the sake of commercial aviation. On December 19, 2001 a reading of 1085.7 mb (32.06") was recorded and then on December 29, 2004 the even higher figure of 1092.1 mb (32.25") was apparently measured. Both of these figures, of course, would represent world records for high pressure. Furthermore, one may assume the figures were accurate since aircraft would not be able to use the airport in IFR conditions otherwise. The problem with the potential record pressure readings lies with the altitude of the site.



Tonsontsengel lies in a small basin in northern Mongolia at an altitude of 5328' (1624m). It is possible that this is the location of the highest pressure (1092.1 mb) yet measured on earth. Photographer unknown.

When converting atmospheric pressure to mean sea level (in order to have homogeneous readings regardless of elevation) a formula is used to calculate such. This formula assumes a standard lapse rate of 6.5°C for every kilometer of elevation. The greater a site's elevation the greater the potential for error in making the calculation. Hence, the 'official' cutoff for pressure records is at just 750 meters elevation. So, in essence, no pressure reading from a site above 750 meters (2460') is considered accurate enough for the purpose of record keeping or comparison to lower-level sites (for aviation this doesn't matter since it is just the actual real-time observation for altimeter calibration that is of concern).

Don't ask me why, given the above, why the prior to 1983 event reading from Helena, Montana (see below) was considered 'official' although the reporting site rests at about 1230 meters (3,700') elevation.

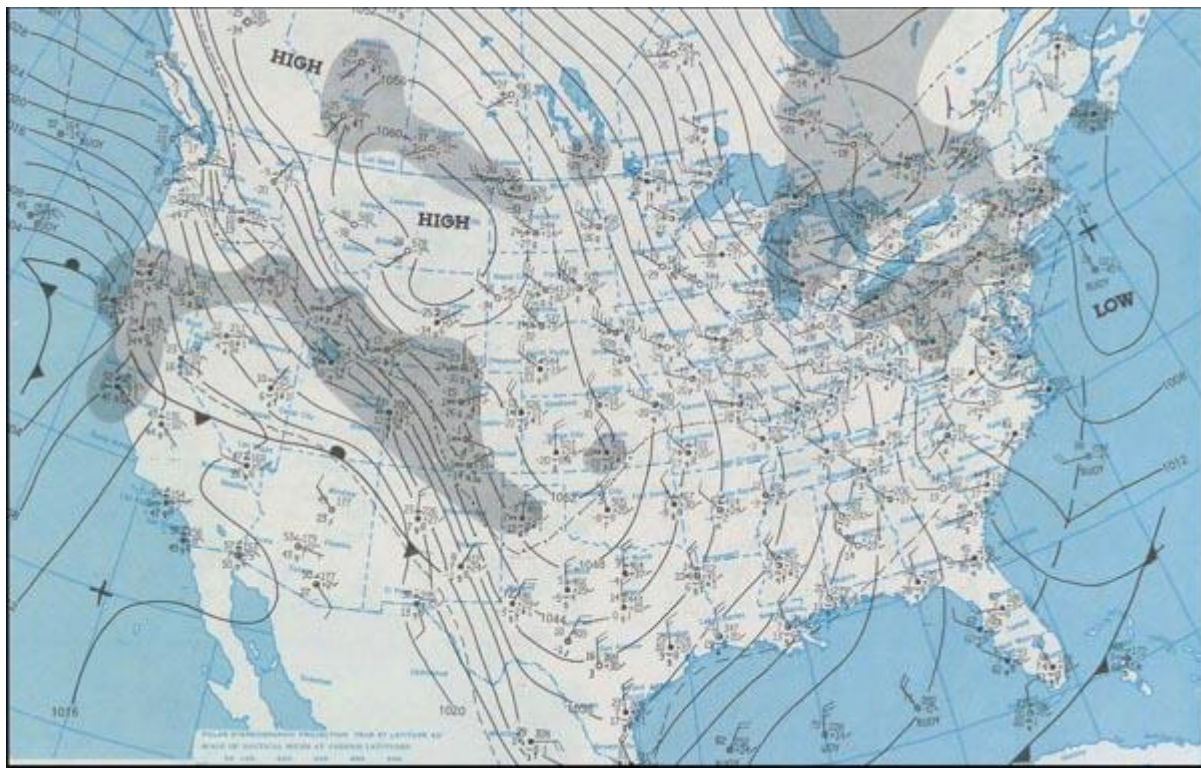
U.S. High Barometric Pressure Records

Alaska holds this honor with a reading of 1078.6 mb (31.85") on January 31, 1989 at Northway during one of the state's greatest cold waves. Temperatures fell below -70°F at several locations (-76°F at Tanana and -75°F at McGrath). Northway reached -62°F on January 31. Many 'bush' aircraft (a principal form of transportation in this region) were grounded in central Alaska since their

altimeters were not capable of calibrating to such an extreme pressure reading. That January was the coldest single month on record at Juneau with a 6.8°F average and Nome recorded its coldest temperature on record with -54° on January 27th and 28th.

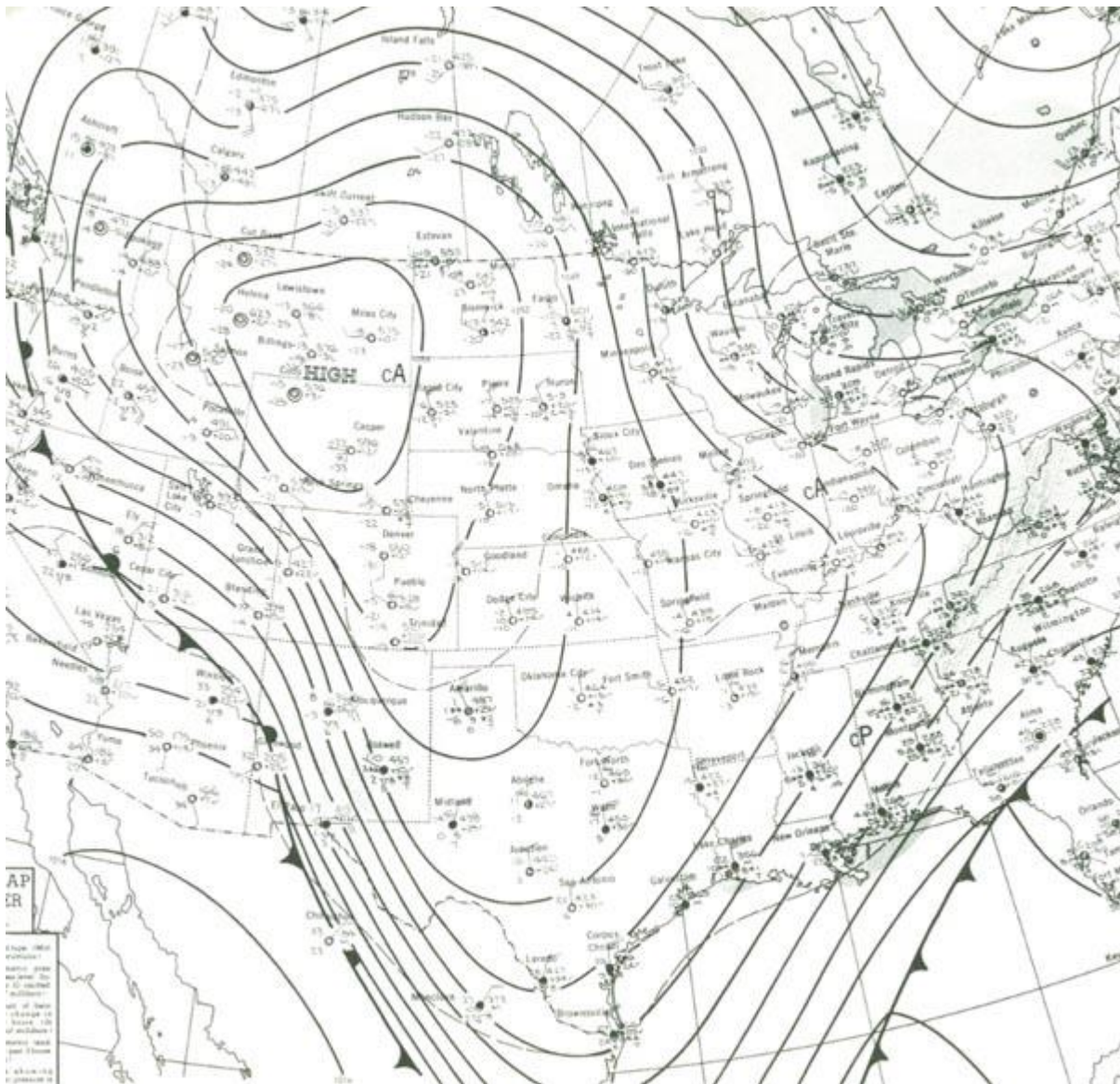
This high-pressure figure is often erroneously referred to as the highest ever measured in North America. In fact, this is not true since at Dawson City, Yukon, next door to Alaska, but in Canada a higher reading of 1079.6 mb (31.88") was measured a few days later on February 2, 1989.

In the contiguous United States, the highest-pressure reading yet measured is 1064 mb (31.42") at Miles City, Montana on December 24, 1983. Many people may remember this as the coldest Christmas in modern U.S. history (at least for almost everywhere east of the Rockies).



Surface weather map for 7 a.m. EST on December 24, 1983 when the highest pressure measured in the contiguous U.S. was recorded at Miles City, Montana. Several locations in Montana recorded temperatures below -50°F including Chester (-52°F), Wisdom (-52°) and Havre (-50°). Chicago temperatures fell to -25° with winds gusting to 41 mph. The lowest wind chill ever measured in the city occurred: -57° (new method of calculation—at the time the wind chill was reported as -82° using the former method of calculation).

The second highest pressure was also recorded in Montana, this time at Helena on January 10, 1962 with a reading of 1063.3 mb (31.40"). The cold wave associated with this event was just as extreme as that of 1989. The January 1962 event is considered the greatest anti-cyclone ever observed in the United States although its point maximum is just shy of that of in 1983. Many cities registered their highest-pressure readings during this event.



Weather map for January 10, 1962 at 1 a.m. EST. Note the barometric pressure reading at Helena, Montana at this hour standing at 1062.3 mb. West Yellowstone, Montana reported a temperature of -55° and Eagle Nest, New Mexico fell to -47° . Minneapolis endured 108 consecutive hours below zero during the ensuing cold wave and Galveston Bay at Texas City froze outwards 100 yards from shore. Note the 13° temperature with snow falling at Jackson, Mississippi!...and 22° with snow at Lake Charles, Louisiana on the Gulf Coast!

Here (again, I linked this chart also in my previous blog) are pressure records for selected U.S. cities. You can see that several of the city the high pressure records were set during the 1962 event.

What is the lowest high barometric pressure recording the United States? This would be in Hawaii where the highest reading yet measured has been just 1027 mb (30.32") at Honolulu (February 10, 1919) and Lihue (January 27, 1955). For the contiguous U.S., it is 1034 mb (30.53") at San Diego, California back on February 17, 1883.

High Pressure Records Elsewhere in the world

In the **United Kingdom** the highest pressure yet measured was 1053.6 mb (31.11") at Aberdeen, Scotland on January 31, 1902.

For **Europe** the highest reading I am aware of was 1067.1 mb (31.51") at Parnu, Estonia (at the time part of Russia) on January 22, 1907 and Riga, Latvia the following day.

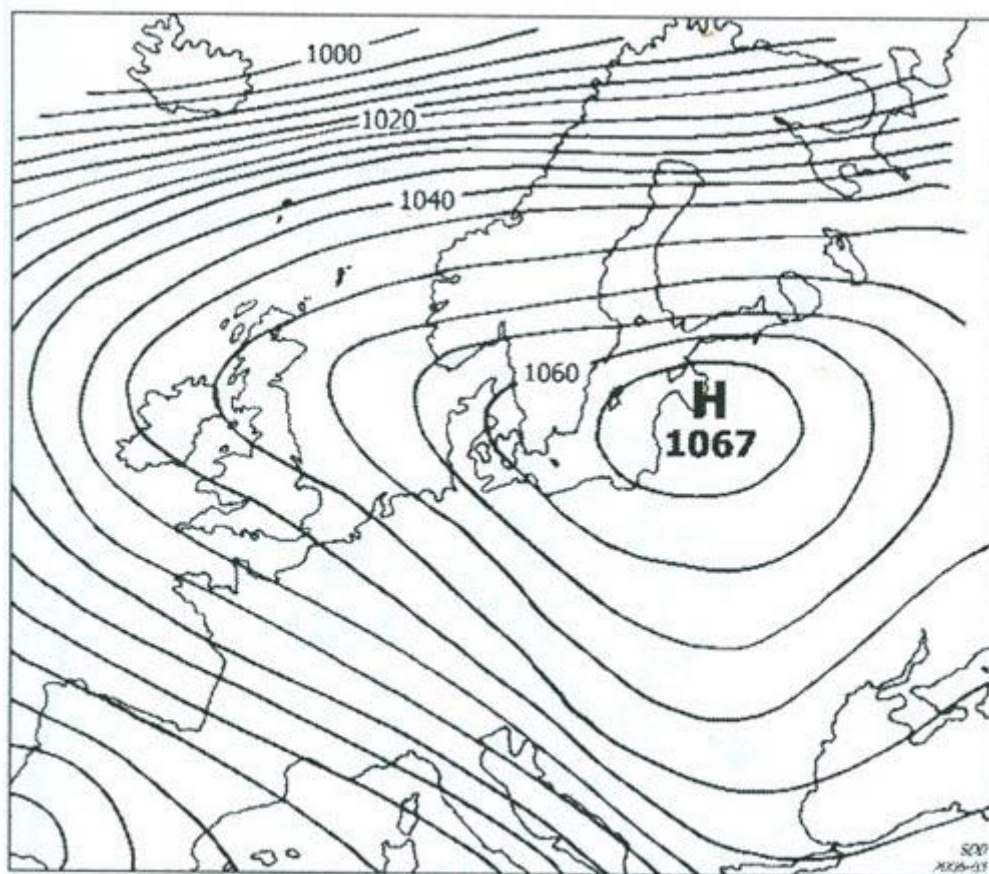
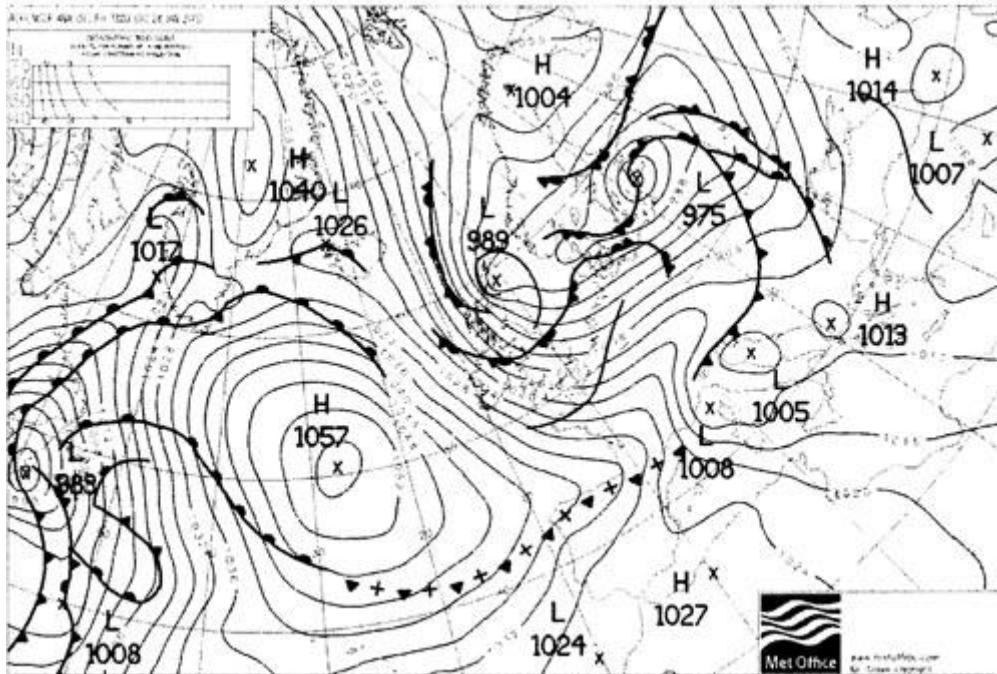


Figure 8. Synoptic situation on the morning of 23 January 1907, based upon Lempfert (1907)

Isobaric map of Western Europe for January 22, 1907. The isobars are in 5 mb increments. Map courtesy of Stephen Burt.

Australia's highest pressure on record was 1044.3 mb (30.84") at Launceston, Tasmania on June 7, 1967.

Extreme anti-cyclones are not unique to land masses. Stephen Burt points out that a mid-Atlantic anti-cyclone resulted in a pressure of 1057 mb (31.21") at a location around 51°N 27°W on January 28, 2003.



Intense anti-cyclones sometimes form over the mid-Atlantic as this map illustrates from January 28, 2003. Chart courtesy of Stephen Burt.

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KUDOS: Thanks to Stephen Burt for U.K. and European records, Blair Trewin (Australian Bureau of Meteorology) for Australia records, and Randy Cerveny (Arizona State University) for explanation of problem with high-altitude pressure measurements.

REFERENCES: For U.K. and European high-pressure records see *The Highest of the Highs: Extremes of Barometric Pressure in the British Isles* by Stephen Burt, *Weather* magazine Vol. 62, No. 2., February 2007.

For Agata, Russia pressure details see *Weather and Climate Extremes* by Dr. Paul Kraus and Kathleen Flood, U.S. Army Corps of Engineers, TEC-0099 document, p. 52, September 1997.