

# STATE CLIMATE EXTREMES COMMITTEE MEMORANDUM

FROM: State Climate Extremes Committee (Wolf, Kearns, Timlin, Kerschner, Arndt)  
DATE: 5 March 2019  
SUBJ: Illinois State Record Minimum Temperature at Mt. Carroll

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## Summary

An Arctic outbreak in late January 2019 led to widespread bitterly cold temperatures across much of the Upper Midwest. The following observation was examined by the State Climate Extremes Committee (SCEC) to determine its validity and potential status of the lowest temperature directly observed at a weather station in Illinois:

- Location: **Mt. Carroll, Illinois**
- Date: **31 January 2019**
- Value: **-38°F**

After considering the observation and various surrounding factors, the ***SCEC determined the Mt. Carroll observation to be valid, and it now stands as the record minimum temperature for Illinois.*** This value supersedes the previous record of -36°F occurring 5 January 1999 near Congerville.

## About the SCEC

This State Climate Extremes Committee (SCEC) was composed of members representing five bodies: the National Weather Service (NWS) Weather Forecast Office in Davenport, Iowa (WFO Quad Cities), the NWS Central Region’s Cooperative Observer Program leadership, the Illinois State Climate Office, the Midwestern Regional Climate Center, and the National Centers for Environmental Information. It is convened to adjudicate potential records for validity. If validated, the observation is considered the state record for that record type. More details about the SCEC are available online at <https://www.ncdc.noaa.gov/extremes/scec/details>.

## About the Station and Observation

The [Mt. Carroll station](#) (Cooperative Observer ID 11-5901; GHCN-Daily ID USC00115901) is a traditional daily observing station located in Carroll County, in northwestern Illinois. It has been in service, with minor interruptions, since January 1890, and has been observing temperature since 1897. It is operated by the City of Mt. Carroll and attended by staff at the City's water treatment plant. It moved compatibly to this site in October 1972.

The site reports 24 hour maximum, minimum and at observation time temperature each day using a Liquid in Glass (LIG) minimum thermometer (-40°F to 110°F) and a mercury filled maximum thermometer (-20°F to 120°F). Both are housed within a Cotton Region Shelter.

The Mount Carroll COOP site is on an annual visitation/inspection cycle and was last inspected on 2 May 2018. During this visit the maximum and minimum thermometers were checked against a traveling standard and fell well within performance standards.

On 17 October 2016 the NWS COOP Focal Point made an unscheduled visit to the site when WFO Quad Cities meteorologist reported temperature readings too low when compared to surrounding locations. Upon arrival the COOP Focal Point discovered a separated LIG minimum thermometer and replaced it with a new thermometer. Since replacing the thermometer, reported temperatures were in line with surrounding stations and no further issues were found during subsequent annual visits. The current minimum thermometer has been in service since this visit and was inspected annually for accuracy.

The recorded observed minimum temperature of -38°F was observed on the morning of 31 January 2019, and likely occurred shortly before the 7:15 am (all times CST) observation time. At the time of observation, the temperature was -36°F.

## Meteorological Plausibility of the Observation

Meteorological conditions were optimal for very low temperatures: a relatively calm, relatively clear night following the recent passage of a strong Arctic cold front, with significant snow cover. The Mt. Carroll observation is supported by widespread observations of temperatures in the mid-to-low -30s across adjacent portions of Illinois and Iowa (Table 1)

The station rests in a relative depression, conducive to pooling of cold air, and observations slightly cooler than immediate neighbors are not an uncommon occurrence.

Personnel from WFO Quad Cities visited the site in the days following the observation. They found the site to be in proper working order, that standard observing practices were followed and that the station instruments successfully compared to a reference instrument.

The overall confidence in the appropriateness of practice and instrumentation was deemed to be high. See Appendix A for a more complete documentation of the station and station environment.

Nearby stations in Illinois	T <sub>min</sub> 31 Jan 2019
Mt. Carroll	-38°F
Elizabeth	-35°F
Aledo	-33°F
Quad City Airport 3 S	-33°F
Galena	-32°F
Freeport	-31°F
Rochelle	-30°F
Rochelle AWOS	-30°F
Freeport Airport 3 SE	-29°F
Rockford ASOS	-29°F
Sterling Airport 2 S	-28°F
Nearby stations in Iowa	T <sub>min</sub> 31 Jan 2019
Manchester	-35°F
Maquoketa 4 W	-35°F
Coggon	-34°F
Bellevue Lock & Dam 12	-31°F
Clinton Airport 6 SW	-28°F

**Table 1: Minimum temperatures observed at stations near Mt. Carroll, Illinois on the morning of 31 January 2019**

## Previous Record and Other Notable Observations

The previous record was -36°F, set on 5 January 1999 in the central Illinois community of Congerville. Notably, the coldest temperature in Illinois prior to the Congerville record, -35°F, was set at Mt. Carroll in January 1930 (and was later tied at near Elizabeth in February 1996). See Angel, et al., 2000 for more details on the Congerville event.

A review of data in the archives of the Midwestern Regional Climate Center and the National Centers for Environmental Information revealed no other “hidden” candidates in the historical record. A previous observation of -37°F reported in Rochelle on 15 January 2009 was not considered valid, due to concerns with siting and instrumentation. A [brief description of that event](#), and other notable extreme Illinois observations, is available via the Illinois State Climatologist Office within the Illinois State Water Survey.

## Finding of committee

After considering the observation, the state and condition of the observing equipment, and the meteorological environment in which the observation was recorded, **the SCEC has determined, unanimously, that the -38°F observed at Mt. Carroll is indeed valid, and constitutes a new record minimum temperature value for Illinois.** The SCEC made this final determination on 21 February 2019.

### Committee Members:

- Ray Wolf, Science and Operations Officer, NWS WFO Quad Cities
- Tim Kearns, NWS Central Region Cooperative Observer Program Lead
- Michael Timlin, Regional Climatologist, Midwestern Regional Climate Center
- Brian Kerschner, Office of the Illinois State Climatologist, Illinois State Water Survey
- Deke Arndt, Chief, Monitoring Section, National Centers for Environmental Information

### Additional Participant:

- Tami Houston, National Partnership Liaison, National Centers for Environmental Information

## Acknowledgments

The SCEC thanks retired Illinois State Climatologist Jim Angel for his dedication to thorough documentation of previous Illinois state climate extremes.

## References

Angel, J., B. Ousley, and T.W. Schmidlin (2000): A New Minimum Temperature Record for Illinois. *Bulletin of the American Meteorological Society*, **81**(4), pp 824-25.

# Appendix 1: Additional Mt. Carroll, Illinois COOP site information

Compiled by Quad Cities WFO

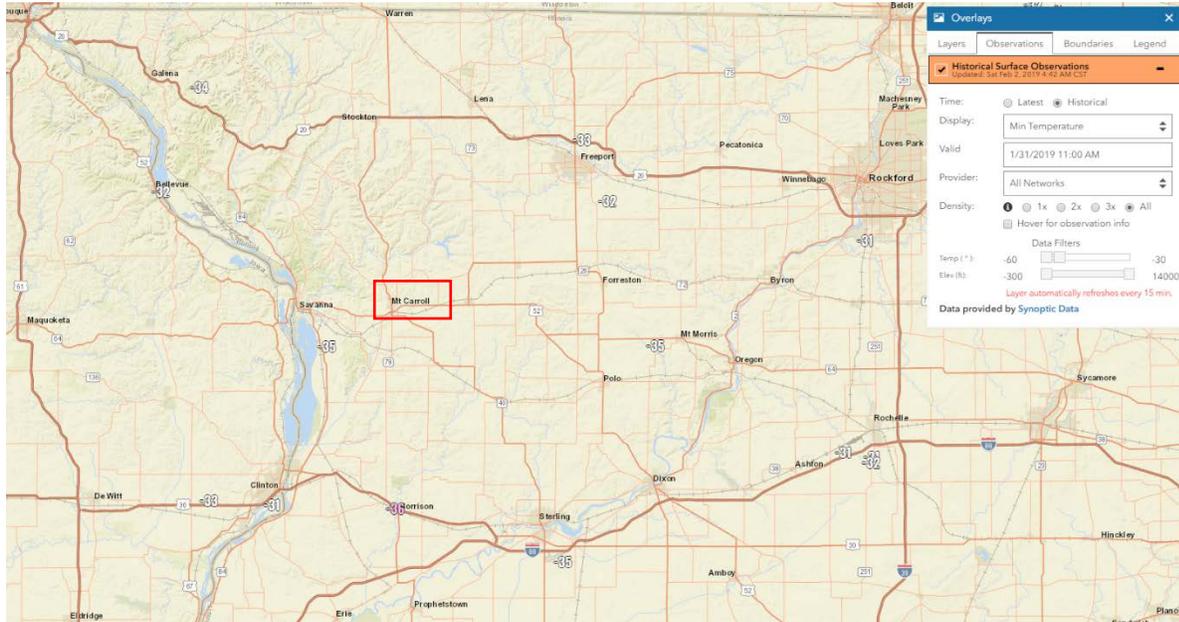


Figure A1: Location of Mt. Carroll, Illinois.



Figure A2: Overview of Mount Carroll coop site. Shelter is inside the red box. (photo: Quad Cities WFO)



Figure A3. Instrumentation is a standard Cotton Region shelter with two glass thermometers, alcohol in glass for minimum temperatures and mercury in glass for maximum temperatures. Bill Zink, plant superintendent, was the observer and has been serving for one year. The time of observation was 7:15 am CST. (Photos: Quad Cities WFO)

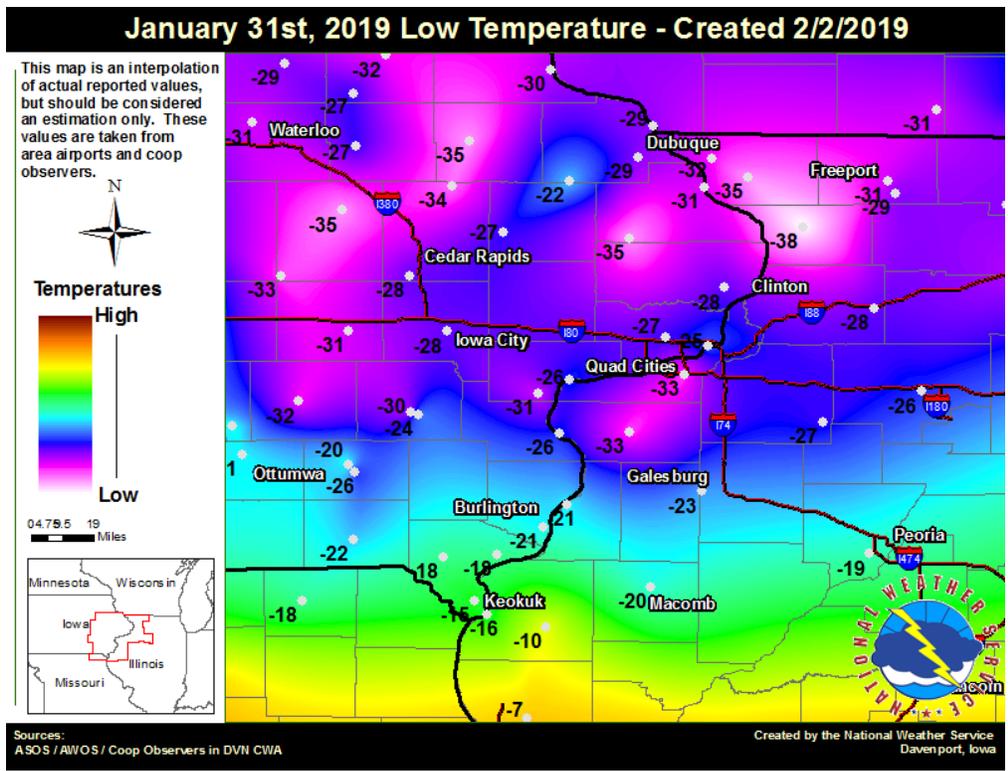


Figure A4. Area minimum temperatures on Jan. 31, 2019 (graphic from Quad Cities WFO)

## All-time Low Temperature Records Broken on January 31<sup>st</sup>, 2019

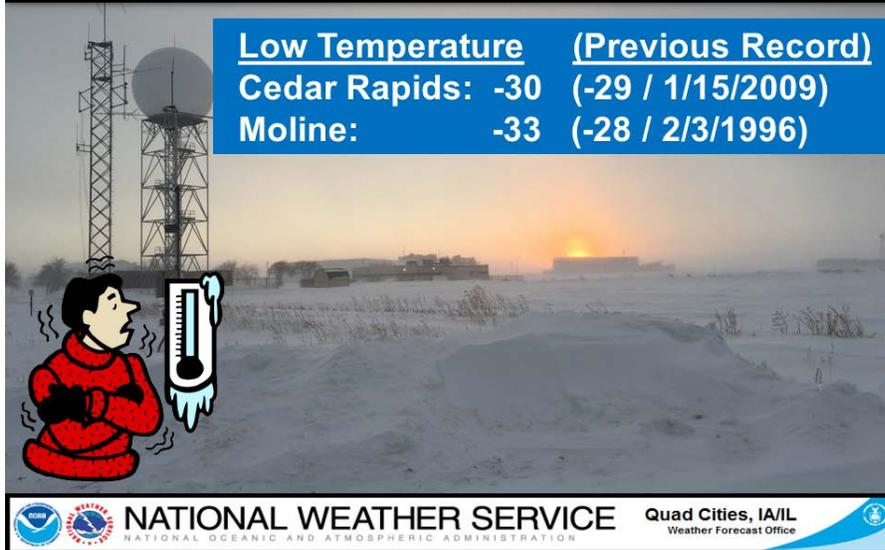


Figure A5. All-time records broken on the morning of Jan. 31, 2019 (Graphic from Quad Cities WFO)