

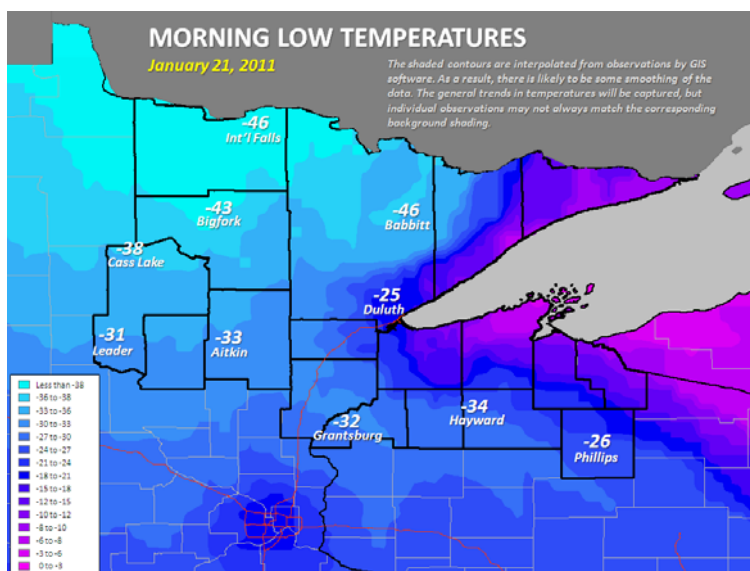
National Weather Service Weather Forecast Office Duluth, MN

January 21: Frigid Morning Low Temperatures (Update: 4 PM)



The above pictures are from Babbitt, Minnesota where a frigid morning low temperature of -46 degrees was recorded on January 21, 2011. The pictures were taken by observer Ryan Scharber. **The pictures show ice fog**, which is usually a shallow fog consisting of suspended ice crystals. Ice fog usually only occurs when temperatures fall below -22 degrees Fahrenheit (-30 Celsius) [according to the AMS Glossary](#). Normally, fog consists of tiny water droplets, or supercooled water droplets. However, when temperatures are as cold as they were this morning in parts of northern Minnesota, it becomes too cold for liquid water to exist, and small ice crystals can develop if the amount of water vapor in the air is sufficient.

Here is a map of a few notable low temperatures across the area. The contoured shading in the background was created by interpolating the observations using GIS software. Therefore, the contours may not necessarily match individual observations, but the overall trend in temperatures is pretty close. Areas near Lake Superior managed to stay much warmer than outlying areas, and you can even detect a hint of urban heat influences around the Twin Cities.



Fast Facts

- The lowest temperatures recorded in the NWS Duluth county warning area were **-46 degrees at both International Falls, MN (ASOS) and Babbitt, MN (COOP)**.
- The -46 degree low was tied for the 5th lowest on record at International Falls. Temperature records date back to 1897. The record is -55 degrees which was recorded on January 6, 1909.
- The -46 degree low was tied for the lowest on record at the International Falls Airport. The official observing station was moved to the airport in 1939. This is tied with the -46 degree reading from January 6, 1968.
- The -25 degree low at Duluth is tied for the 5th lowest minimum temperature in the last decade (since 2000). The lowest minimum temperature of the 2000s thus far has been -30 on January 29, 2004.
- The state record low temperature in Minnesota was recorded at Tower, Minnesota on February 2, 1996. The low was -60 degrees. That was also the coldest temperature ever recorded east of the Mississippi River.
- The state record low temperature in Wisconsin was recorded at Couderay on February 2nd and February 4th of 1996. The temperatures dipped down to -55 degrees both nights.

List Of Coldest Morning Lows

THE FOLLOWING ARE OBSERVED LOW TEMPERATURES THROUGH 900 AM FRIDAY JANUARY 21 2011. TEMPERATURES ARE IN DEGREES FAHRENHEIT.

TEMP	LOCATION	ST	COUNTY	SOURCE
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-46	INTERNATIONAL FALLS	MN	KOOCHICHING	ASOS
-46	BABBITT	MN	ST LOUIS	COOP
-43	EMBARRASS	MN	ST LOUIS	COOP
-43	BIGFORK	MN	ITASCA	RAWS
-43	ASH LAKE	MN	ST LOUIS	MNDOT
-43	EFFIE	MN	ITASCA	RAWS
-40	LITTLEFORK	MN	KOOCHICHING	COOP
-40	BIRCHDALE	MN	KOOCHICHING	MNDOT
TEMP	LOCATION	ST	COUNTY	SOURCE

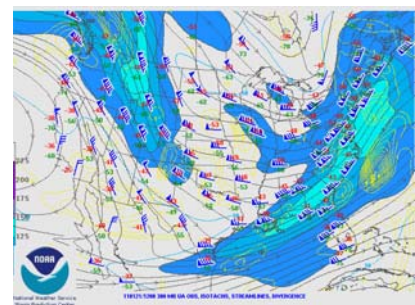
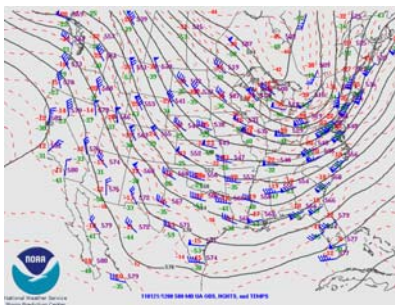
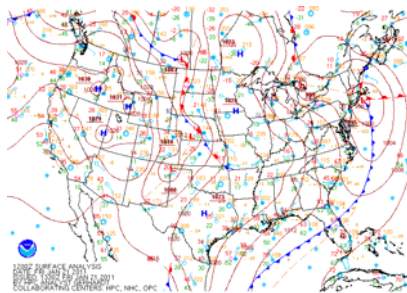
-39	ORR	MN	ST LOUIS	RAWS
-38	MINONG	WI	WASHBURN	RAWS
-38	CASS LAKE	MN	CASS	RAWS
-38	SQUAW LAKE	MN	ITASCA	MNDOT
-38	CUTFOOT	MN	ITASCA	RAWS
-38	BOVEY	MN	ITASCA	PRIVATE
-38	KABETOGAMA	MN	ST LOUIS	COOP
-38	CRANE LAKE	MN	ST LOUIS	AWOS
-37	MARGIE	MN	KOOCHICHING	MNDOT
-37	HILL CITY	MN	ITASCA	RAWS
-37	ELY	MN	ST LOUIS	RAWS
-37	RICE LAKE	MN	AITKIN	RAWS
-36	LONG LAKE	MN	ITASCA	PRIVATE
-36	JACOBSON	MN	AITKIN	MNDOT
-36	BARNES	WI	BAYFIELD	RAWS
-36	COTTON	MN	ST LOUIS	MNDOT
-36	MAKINEN	MN	ST LOUIS	PRIVATE
-36	LONGVILLE	MN	CASS	AWOS
-36	PINE RIVER	MN	CASS	AWOS
-36	SEAGULL LAKE	MN	COOK	RAWS
-36	WRIGHT	MN	ST LOUIS	COOP
-35	LAKE VERMILION	MN	ST LOUIS	PRIVATE
-35	KABETOGAMA	MN	ST LOUIS	RAWS

TEMP	LOCATION	ST	COUNTY	SOURCE
-34	MCGRATH	MN	AITKIN	MNDOT
-34	ASH RIVER	MN	ST LOUIS	PRIVATE
-34	GUNFLINT LAKE	MN	COOK	COOP
-34	HAYWARD	WI	SAWYER	RAWS
-34	LIND	WI	BURNETT	RAWS
-34	MOOSE LAKE	MN	CARLTON	RAWS
-33	GRAND RAPIDS	MN	ITASCA	AWOS
-33	SAGINAW	MN	ST LOUIS	MNDOT
-33	COHASSET	MN	ITASCA	PRIVATE
-33	MCGREGOR	MN	AITKIN	AWOS
-33	AITKIN	MN	AITKIN	AWOS
-33	HIBBING	MN	ST LOUIS	RAWS
-33	JENKINS	MN	CROW WING	PRIVATE
-33	EMILY	MN	CROW WING	MNDOT
-33	BRAINERD	MN	CROW WING	ASOS
-33	MOOSE LAKE	MN	CARLTON	AWOS
-33	SOUTH RANGE	WI	DOUGLAS	PRIVATE
-32	GRANTSBURG	WI	BURNETT	PRIVATE
-31	SILVER BAY	MN	LAKE	AWOS
-31	TWO HARBORS	MN	LAKE	AWOS
-31	LEADER	MN	CASS	PRIVATE
-31	DEER RIVER	MN	ITASCA	PRIVATE
-31	SIREN	WI	BURNETT	AWOS
-31	GRANTSBURG	WI	BURNETT	WIDOT
-31	HINCKLEY	MN	PINE	PRIVATE
-30	BREEZY POINT	MN	CROW WING	PRIVATE
-30	TUCKER LAKE	MN	COOK	PRIVATE
-30	GLIDDEN	WI	ASHLAND	RAWS
-30	GORDON	WI	DOUGLAS	RAWS

TEMP	LOCATION	ST	COUNTY	SOURCE
-29	I-35 MILE 198	MN	PINE	MNDOT
-29	SEELEY	WI	SAWYER	PRIVATE
-29	4W CLAM LAKE	WI	BAYFIELD	PRIVATE
-29	CANOSIA TOWNSHIP	MN	ST LOUIS	PRIVATE
-29	GILBERT	MN	ST LOUIS	PRIVATE
-29	ISABELLA	MN	LAKE	RAWS
-28	10 NE DULUTH	MN	ST LOUIS	SCHOOL
-28	AURORA	MN	ST LOUIS	PRIVATE
-28	NISSWA	MN	CROW WING	PRIVATE
-28	MERRIFIELD	MN	CROW WING	PRIVATE
-27	SPOONER	WI	WASHBURN	SCHOOL
-27	HERMANTOWN MIDDLE SCHOOL	MN	ST LOUIS	SCHOOL
-27	HAUGEN	WI	WASHBURN	WIDOT
-26	DRUMMOND	WI	BAYFIELD	SCHOOL
-26	SUPERIOR	WI	DOUGLAS	AWOS
-26	PHILLIPS	WI	PRICE	AWOS
-25	FERNBERG	MN	LAKE	RAWS
-25	WASHBURN	WI	BAYFIELD	RAWS
-25	PINE CITY	MN	PINE	SCHOOL
-25	DULUTH	MN	ST LOUIS	ASOS
-24	DULUTH THOMPSON HILL	MN	ST LOUIS	MNDOT
-24	I-35 MILE 181	MN	PINE	MNDOT
-22	HIGH BRIDGE	WI	ASHLAND	PRIVATE
-22	MAPLE	WI	DOUGLAS	PRIVATE
-22	BLATNIK BRIDGE	MN	ST LOUIS	MNDOT
-21	LESTER PARK / DULUTH	MN	ST LOUIS	PRIVATE
-21	SILVER CREEK	MN	LAKE	PRIVATE
-20	CHESTER PARK / DULUTH	MN	ST LOUIS	PRIVATE

Weather Maps

Below are a series of weather maps related to this Arctic outbreak. The image on the left is a surface weather map from 6 AM January 21st that has been analyzed by the [Hydrometeorological Prediction Center](#) for fronts and high and low pressures. The Arctic high pressure is clearly centered over parts of the Upper Midwest. The image in the middle shows observations in the middle layers of the atmosphere (500mb) at the same time. The expansive trough over the central and eastern United States reflects a large scale pattern that is conducive to Arctic outbreaks. The image on the right shows observations at the same time from the upper levels of the atmosphere (300mb). The shaded contours are for higher wind speeds and help indicate the jet stream location.



Next is the 1km resolution MODIS infrared (IR) satellite image from 2:41 AM CST January 21st. The color scale used is shown in the upper left hand side of the image. Gray colors are generally where the IR temperatures are -30 Celsius or lower. White colors generally indicate -40C or lower, and light blue -45C or lower. **Be careful to note that the infrared temperatures that are sampled by satellites are not necessarily equal to the surface air temperatures.** These satellite images are intended to show the patterns and trends in the overall temperature distribution. An infrared satellite will sample the temperature of the radiating surface, whether it happens to be clouds or the Earth. The image on the left is not annotated, while the image on the right points out some major geographic features that stand out. You can see the relatively warmer peaks on the Iron Range, as the dense cold air drained into the surrounding valleys. Lake Mille Lacs stands out as a warm spot, while several river valleys feature multiple localized cold spots. The image illustrates the very localized nature of the very coldest spots, and highlights the difficulty of sampling this with

