

The Climate of Alaska for 2014

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This review of the climate of Alaska is predominantly based on the 19 first order climatological stations in Alaska, which are operated by NOAA's National Weather Service. Furthermore, the normals used in this analysis are based on the means of the 30-year time period from 1981-2010 and were calculated by NOAA's National Climate Data Center (NCDC). A convenient source for the NCDC normals of all stations for Alaska can be obtained at: <http://akclimate.org/Climate/Normals>

Temperature

The mean average annual temperature in 2014 for the first order stations was 35.6°F, a substantial positive departure of 3.0°F from the 30-year normal of 32.6°F. This is different to the previous years: in 2013 Alaska was slightly warmer than normal with a deviation of +0.7°F, while in 2012 Alaska was substantially below normal with a deviation of -2.9°F. A deviation of 3.0°F is very significant for an area as large as Alaska and a time period as long as a year. This value surpasses the amount of warming to be expected by climate change over a century. According to the National Weather Service it was the warmest year ever recorded in Alaska, surpassing 1926, which previously held the record.

All first order stations had a positive deviation. Kotzebue (+5.5°F), King Salmon (+5.2°F) and Homer (+5.0°F) showed the highest deviations. These stations, as well as McGrath, Nome, Bethel and Cold Bay reported record high temperatures for the year. The least, but still positive deviations, were found in Annette (+0.3°F), Yakutat and Gulkana (both 0.8°F) and Juneau (+0.9°F). An isopleth temperature presentation of Alaska is presented in Figure 1.

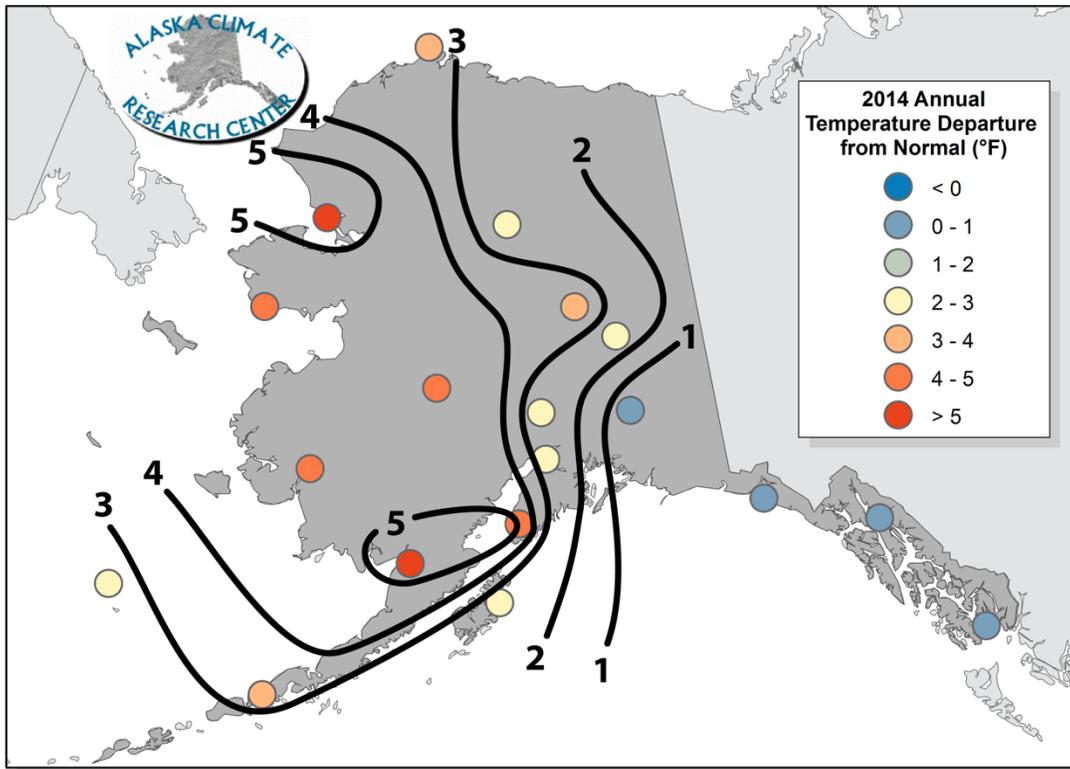


Figure 1: Isoplete presentation of the temperatures deviations from the normal (1981-2010) for 2014 based on all first order Alaskan meteorological stations.

The figure shows that the western part of Alaska has deviations above 3°F, the mean value calculated for Alaska, while the deviations in the eastern part of Alaska are smaller, especially in the Southeast, where deviations below 1°F were found.

In summary, all of Alaska was above normal for 2014. Actual values of the annual measured temperatures, the normal temperatures and the deviation from normal can be seen from Table A.

Station	Temperature		
	Observed (°F)	Normal (°F)	Delta (°F)
Anchorage	39.6	37.1	2.5
Annette	46.9	46.6	0.3

Barrow	14.9	11.8	3.1
Bethel	34.9	30.7	4.2
Bettles	26.1	23.5	2.6
Cold Bay	42.5	38.8	3.7
Delta Junction	31.7	29.0	2.7
Fairbanks	30.9	27.7	3.2
Gulkana	29.0	28.2	0.8
Homer	43.7	38.7	5.0
Juneau	43.0	42.1	0.9
King Salmon	40.4	35.2	5.2
Kodiak	43.7	40.9	2.8
Kotzebue	28.4	22.9	5.5
McGrath	31.7	27.4	4.3
Nome	31.6	27.4	4.2
St. Paul Island	38.2	35.4	2.8
Talkeetna	38.4	36.0	2.4
Yakutat	41.1	40.3	0.8

Table A: Mean temperature for 2014, normal temperature (1981-2010) and deviations from the mean for the 19 first order meteorological stations in Alaska.

For the 19 first order stations the mean deviation of temperatures by month is presented in Figure 2. The figure shows that substantially above normal temperatures occurred in winter; in decreasing order they are January (+12.8°F), December (+7.5°F) and November (+7.0°F). Such magnitude in deviations can be easily observed for a single station; however, they are very substantial for the mean of 19 stations over an area the size of Alaska. June (-1.3°F) and February (-0.7°F), were the only two months that were colder than normal, but the deviations were minor compared to the highly positive winter deviations.

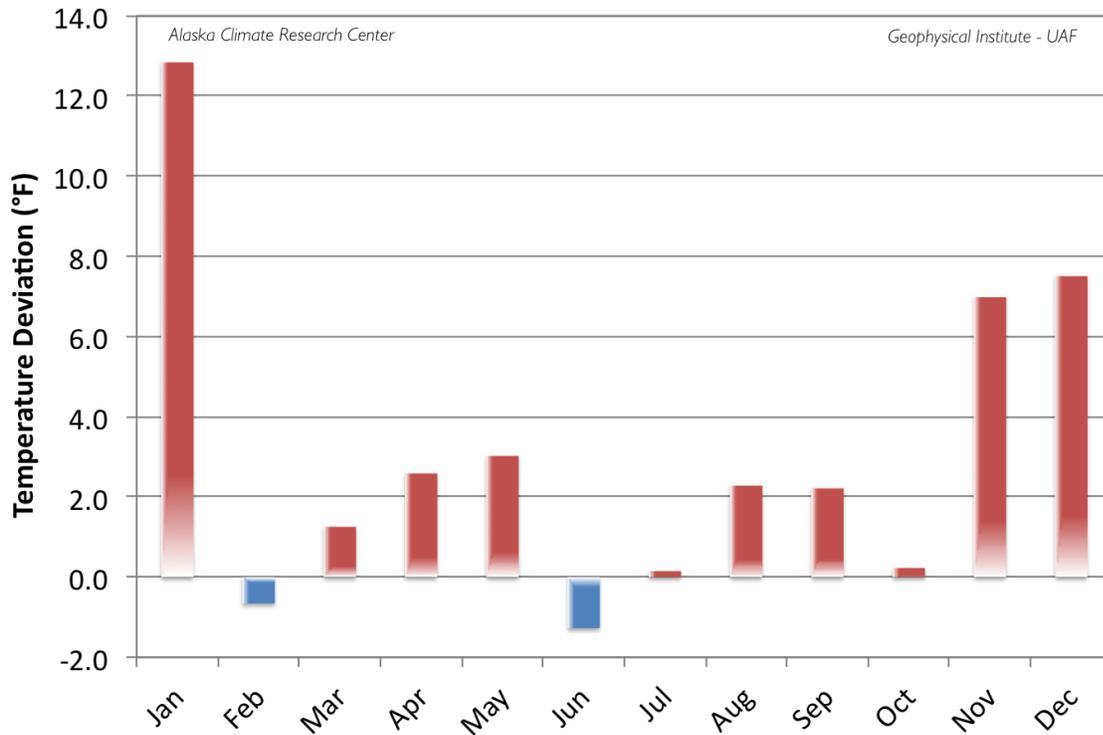


Figure 2: Mean monthly temperature deviation for the 19 first order stations in Alaska by month for 2014.

The highest temperature of all stations for the year was measured in Fairbanks at 87°F on the 6th of July 2014, relatively close to the summer solstice with over 21.5 hours of sunlight. However, as the 2014 summer in the Interior was very wet, there were only four days with temperatures at or above 80°F. The long-term mean for Fairbanks is twelve days and in 2013, 30 such warm days were observed. On the same day the highest temperature of Alaska for 2014 was measured in Fairbanks, the highest daily average, at 76.0°F, also occurred. The highest monthly temperature for the state was also Fairbanks, in July with 61.0°F, however not far behind were the July temperatures for Anchorage (59.8°F), Talkeetna (59.4°F) and McGrath (59.1°F).

On the 13th of January the coldest temperature of 2014 occurred at -47°F in Bettles, located in northeastern Alaska, and on the day before, the lowest daily mean of -37.5°F was measured also in Bettles. However, the coldest monthly temperature is normally always found in Barrow, the most northerly station in Alaska. For 2014 a monthly mean temperature of -7.0°F was calculated for Barrow for February. On the other side of the coin, the highest winter (December, January, February) monthly temperature occurred in Southeast Alaska at Annette (41.7°F) in December, followed by Homer (38.6°F) in January and Kodiak (38.2°F) in December.

As could be seen from Figure 2, January reported the highest deviation from the normal at +12.8°F. All First Order Stations reported positive deviations. The only three days with a negative divergence occurred around the 12th. Outside of those three days, temperatures stayed above normal, with the peak deviation (23.7°F) coinciding with the storm that impacted the Southcentral and Interior regions on the 23rd. This is an absolutely amazing departure for an area as large as the State of Alaska. On the 22nd the National Weather Service calculated that Alaska, at an average temperature of 24°F, was warmer than the Lower 48 states with an average of 22°F. Gulkana held the highest positive deviation from normal at an astounding 21.5°F over its long-term mean of -2.9°F. Following Gulkana with positive deviations exceeding 15°F were: McGrath (20.0°F), Bethel (19.4°F), King

Salmon (18.6°F), Kotzebue (17.1°F), Delta Junction (16.5°F), Nome (16.1°F) and Fairbanks (15.5°F). It is worth noting that most of these stations were located in the Western and Interior portions of Alaska.

It was the warmest January on record for Homer, McGrath, and Cold Bay, while Talkeetna tied with 1981 for the warmest. It was the second warmest for Gulkana after 1981 and Juneau (1985). This was the third warmest January for Bethel after 1937 and 1929, Kotzebue (1985 and 1981), King Salmon (1985 and 1981). Talkeetna tied with 1981 for third warmest after 1905 and 1985. Anchorage also tied for third with 1985, after 1977 and 1981. It was the fourth warmest for Delta Junction and fifth for Bettles and Nome. Fairbanks had its fifth warmest January in 106 years.

Precipitation

The mean annual precipitation of the 19 stations was 34.82", which is 4% above the long-term mean. As reported previously (Shulski and Wendler 2007), there is a very large variation in the precipitation totals, when traversing from the southeast, e.g. Yakutat reported for 2014 a total of 134.96", then to the north to Barrow which recorded a total value of just 7.04". It is even more remarkable that for 2014 Barrow reported 163% of normal precipitation, a value that is, when expressed as a percentage, not surpassed by any other first order station in Alaska for 2014. This large gradient in precipitation explains the fact that the most glaciers are found in southern Alaska, with many calving in the ocean, while in the Brooks Range, in Northern Alaska, with much colder temperatures, glaciers are less common and smaller in size. In Figure 3 the precipitation values are presented across Alaska, however, isolines are not provided, as large variations can occur over short distances especially in mountainous terrain and in the summer due to localized shower activities. The figure shows that most of Alaska is close to normal in precipitation, while Barrow (163%) and Fairbanks (159%) had an abundance of precipitation. More details can be seen in Table B, in which the actual deviation values by station are presented.

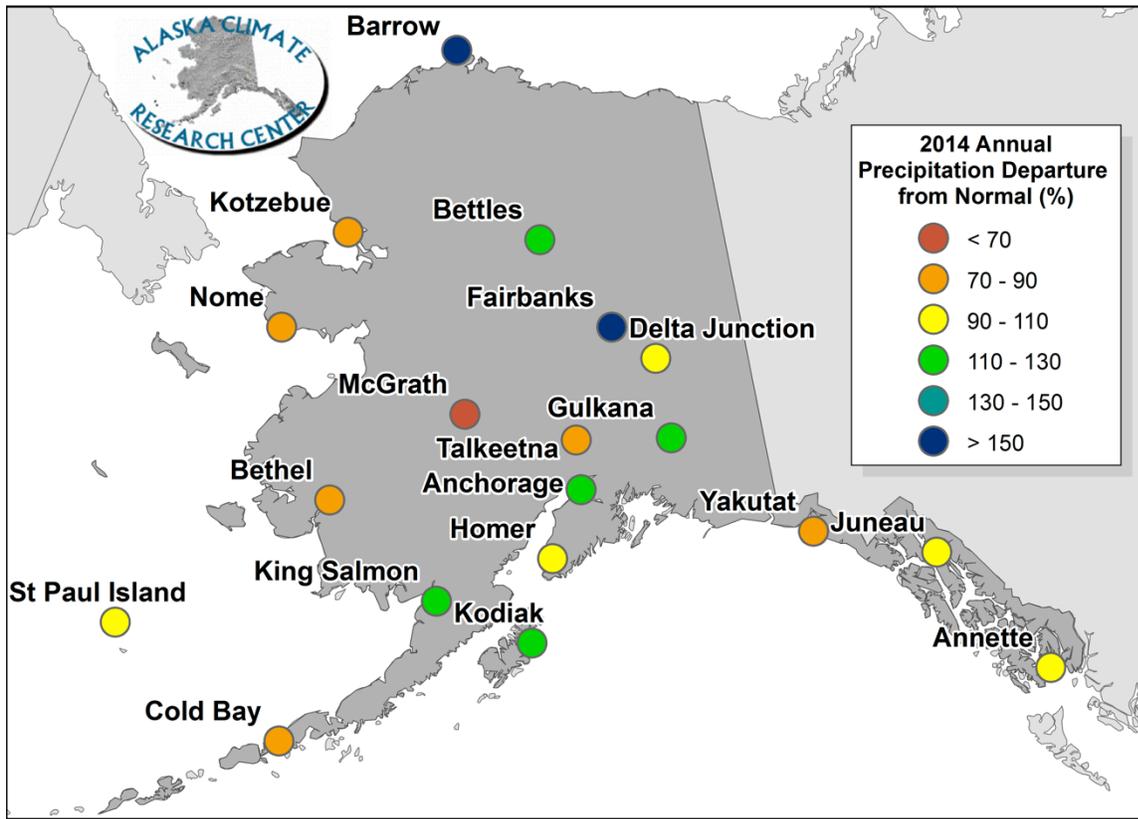


Figure 3: Precipitation deviations (%) from the normal (1981-2010) for 2014 based on all twenty first order stations in Alaska.

Station	Precipitation				
	Observed (in)	Normal (in)	Delta (in)	Delta (%)	(%)
Anchorage	18.87	16.58	2.29	14%	114%
Annette	108.94	101.63	7.31	7%	107%
Barrow	7.40	4.53	2.87	63%	163%
Bethel	15.82	18.54	-2.72	-15%	85%
Bettles	16.50	14.90	1.60	11%	111%

Cold Bay	33.81	41.67	-7.86	-19%	81%
Delta Junction	11.08	11.62	-0.54	-5%	95%
Fairbanks	17.16	10.81	6.35	59%	159%
Gulkana	14.31	11.26	3.05	27%	127%
Homer	22.62	24.34	-1.72	-7%	93%
Juneau	68.69	62.27	6.42	10%	110%
King Salmon	22.41	19.49	2.92	15%	115%
Kodiak	89.44	78.00	11.44	15%	115%
Kotzebue	9.61	11.00	-1.39	-13%	87%
McGrath	11.80	18.00	-6.20	-34%	66%
Nome	14.21	16.81	-2.60	-15%	85%
St. Paul Island	23.62	23.67	-0.05	0%	100%
Talkeetna	20.24	27.97	-7.73	-28%	72%
Yakutat	134.96	155.12	-20.16	-13%	87%

Table B: Observed precipitation for 2014, normal precipitation (1981-2010) and deviations from the mean for the 19 first order stations in Alaska.

The table clearly shows that most observations are relatively close to the expected values. The mean of the 19 stations is 104%, or 4% above the long-term mean. The largest positive deviations are found for Barrow at 163% of normal. This is not surprising as the temperature of the North Slope has increased more than any other area in Alaska, and more open water is observed in the both, for the Beaufort and Chukchi Seas, supplying a ready source of water vapor (Wendler et al. 2014).

The second highest value was found in Fairbanks and the result of extremely high summer precipitation. In June precipitation was 260% of normal, with 3.56" observed, 2.19" above the normal of 1.37", which also set the record for wettest June for Fairbanks, very narrowly beating the 1949 record of 3.55". The crest of the Salcha River was the 3rd highest on record. The river had not been that high since 1986. The gates of the Moose Creek Dam were activated to avoid flooding Fairbanks. Minor flooding was reported in the North Pole area. Residents of the Goodpaster River area reported water levels not seen since the 1950s. An observation site 40 miles East of Fairbanks reported the incredible amount of 10.90" of precipitation for June. In July 5.78" of precipitation was observed for Fairbanks, 268% of the normal of 2.16". It was the second wettest July on record for Fairbanks, just below the 5.96" from 2003. In August the precipitation was measured as 2.29", 0.41" above normal. This helped break the

summer record from 1930, with 11.63" measured, just 0.04" above the previous value. On an interesting note, on the first day of the three months in a row Fairbanks set new daily precipitation records (1.92" on July 1st, 0.89" on August 1st, and 1.43" on September 1st). Juneau set a monthly precipitation record in January with 10.15", just beating the 1985 record of 10.13". Juneau also set another record in June with 7.48", topping the old record of 6.69" from just two years before. May was the wettest on record in Barrow with 0.90", 0.09" above the 1933 record. In June Barrow set another record with 1.47", breaking the 1955 record of 1.15". On the other side of the coin, the two relatively driest stations annually were McGrath at 66% and Talkeetna at 72% of normal. King Salmon had the driest February on record with just 0.08", under the old 1973 record of 0.11".

The precipitation deviations by month are presented in Figure 4 for the mean of the 19 stations. The figure displays that January received far above normal precipitation than normal, as did June and July, the latter ones strongly influenced by the heavy precipitation in the Interior. The early spring months (February, March, April) as well as the autumn months of October and November were drier than normal, while the rest of the months were close to normal.

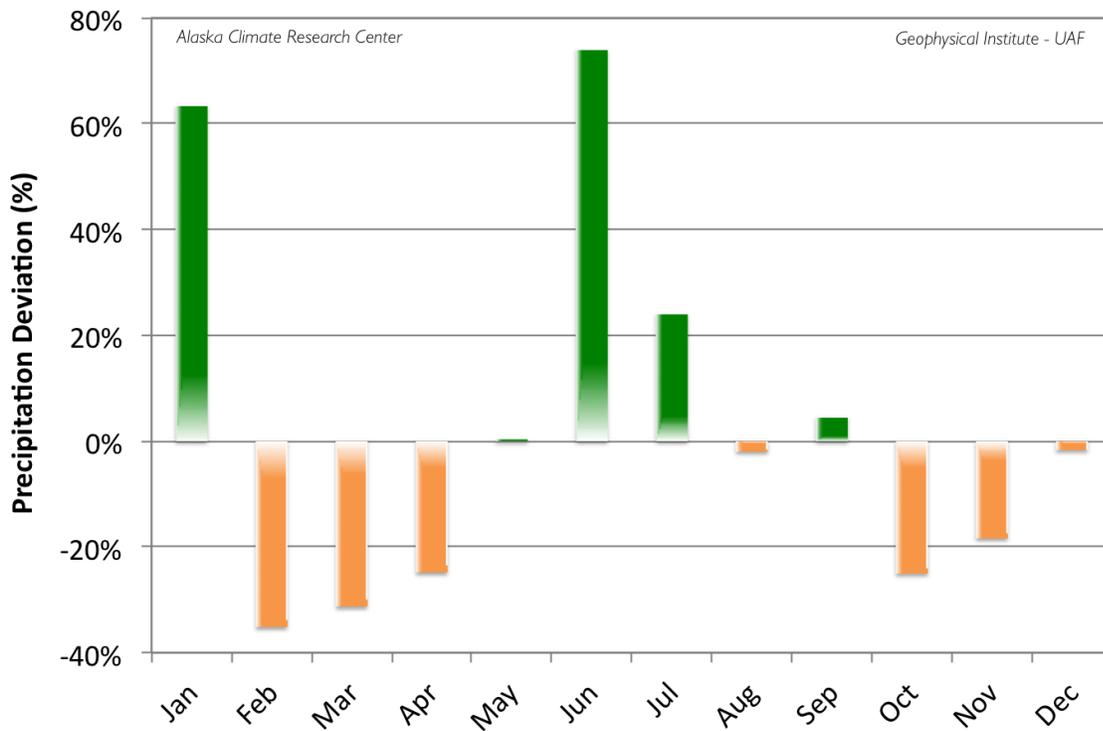


Figure 4: Precipitation deviation for the mean of the 19 first order stations in Alaska by month for 2014.

The highest annual precipitation total was observed in Yakutat with 134.96" followed by Annette (108.94"). Both are located in Southeast Alaska, well known for its heavy rains. Yakutat held also the monthly record at 24.98", observed in January 2014. No totally dry month was observed, but the lowest monthly values were observed in Delta Junction at 0.02", both in March and April. Looking at daily values, the highest observed value was again found at Yakutat with 5.07" at the 9th September 2014.

Snowfall

Precipitation falls in summer as rain, but in winter as snow. "Winter" is, of course, much longer in Northern Alaska, e.g. Barrow, then in the Southeast, e.g. Annette. In Figure 5 the annual snowfall for the stations is presented. It should be pointed out that four stations did not report snowfall amounts (Delta Junction, Gulkana, Homer and Talkeetna).

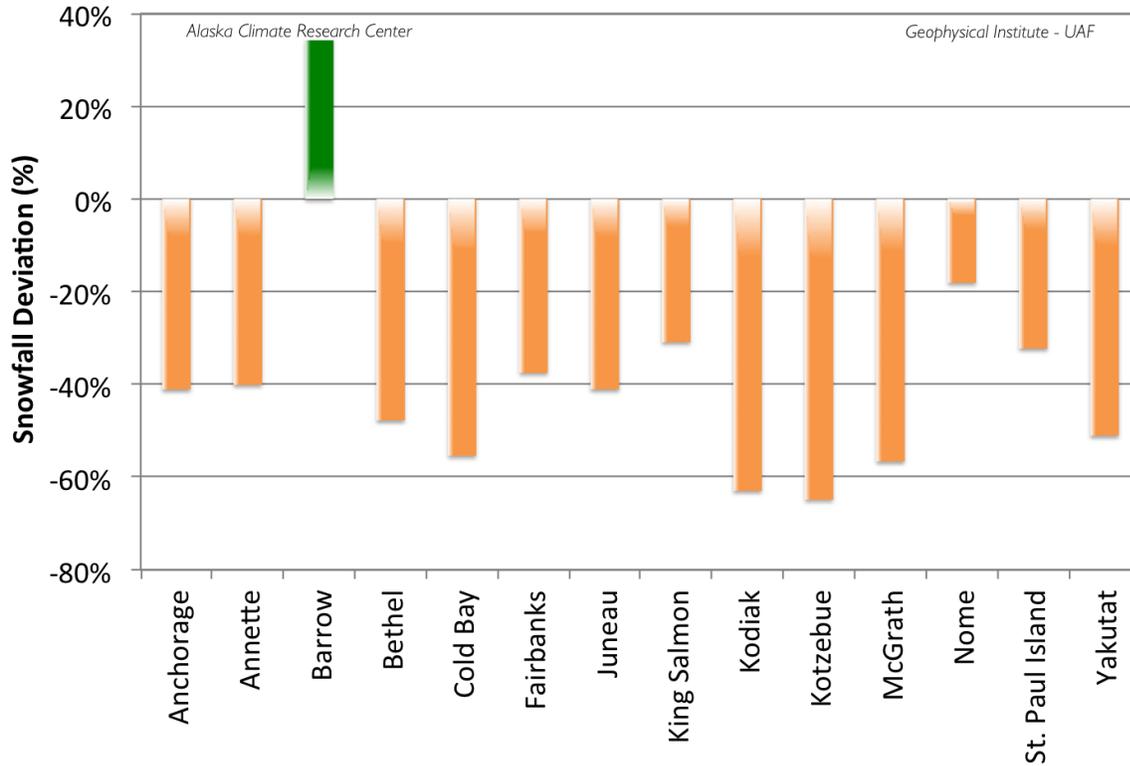


Figure 5: Mean annual snowfall deviations for fifteen of the first order stations in Alaska for 2014.

It can be seen that only one station, Barrow, reported a value substantially above normal, which is understandable, as it had also the highest percentage deviation in precipitation. Furthermore, at Barrow most of the precipitation falls as snow. All other stations show a deficit in snowfall, heavily influenced by the high temperatures observed in 2014, which caused the increase of the percentage of rain of the total precipitation. The highest daily snowfall was observed at Yakutat on the 13th of February 2014 at 10.2" and Yakutat reported the highest annual total of 70.2", although this is less than half its normal total. The most snow on the ground was observed in Bettles on the 25th January at 32".

Extreme values of different meteorological parameters measured in the State in 2014 are summarized in Table C:

Element	Date	Station	Value
Highest Temperature	7/6/2014	Fairbanks	87°F
Lowest Temperature	1/13/2014	Bettles	-47°F
Highest Daily Average	7/6/2014	Fairbanks	76°F
Lowest Daily Average	1/12/2014	Bettles	-37.5°F
Most Daily Precipitation	9/5/2014	Yakutat	5.07"
Most Daily Snowfall	2/13/2014	Yakutat	10.2"
Most Snow on the Ground	1/25/2014	Bettles	32"

Table C: Some notable facts for 2014 for the 19 first order stations in Alaska.

Forest Fires

Forest fires are a common summer occurrence in Alaska, and most of the acreage burned is normally located in the Interior during the summer. A combination of above normal temperatures and below normal precipitation values in summer help promote the creation and growth of wildfires. In 2004, the year with the highest temperature in Fairbanks in over 100 years, 6.4 million acres burned. The long-term average is about 1 million acres per year across the State. Summer 2014 was extremely wet in Interior Alaska. A grand total of 0.23 million acres were consumed by fires for all of Alaska, indeed a very low value for the State. As can be seen from Figure 6, most of the acreage burned occurred in the Kenai Peninsula (some 86%), while Interior Alaska avoided widespread fires due to persistent wet weather.

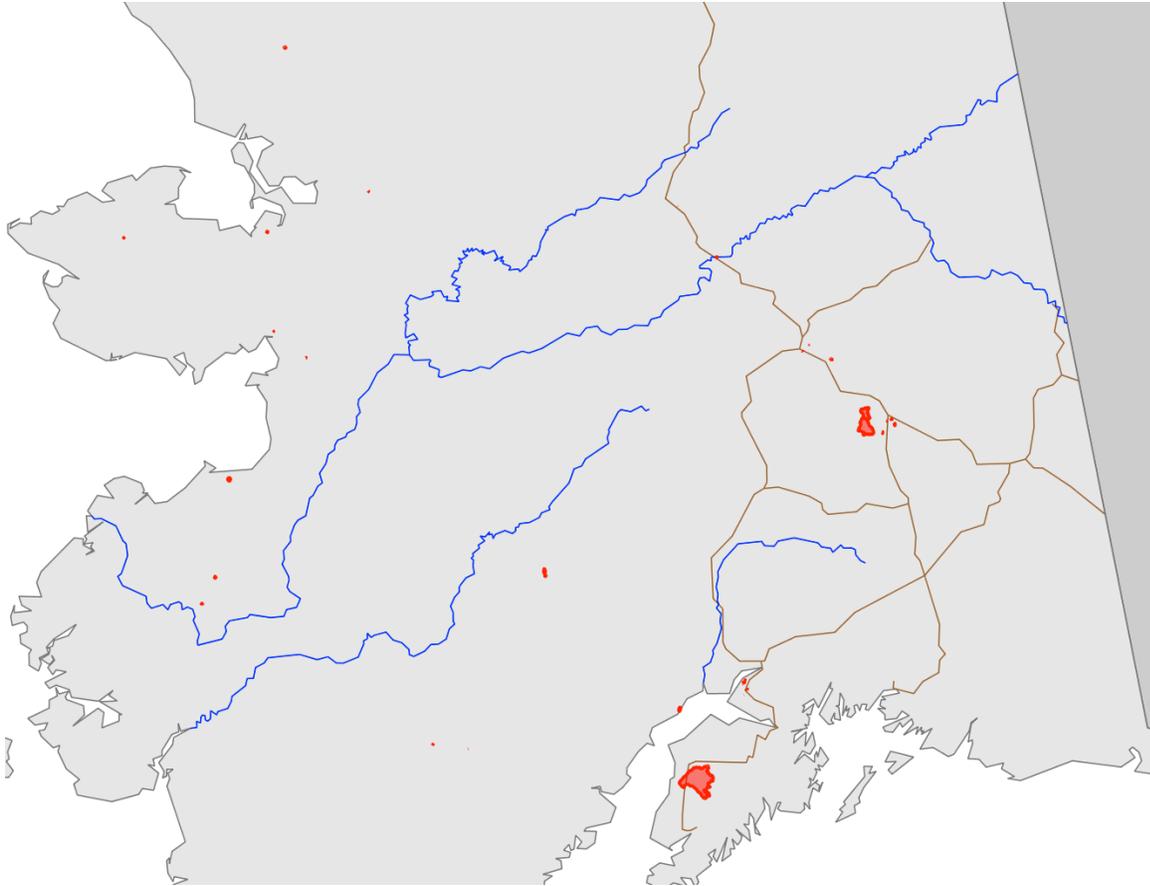


Figure 5: Mean annual snowfall deviations for sixteen of the first order stations in Alaska for 2014

For more exhaustive monthly statewide summaries as well as some select station summaries, including more detail on record events, please visit the ACRC website at: <http://akclimate.org>. For seasonal values visit ACCAP's website for the Alaska's Climate Dispatch at: <http://ine.uaf.edu/accap/>. In addition, the papers referenced below can be accessed from the ACRC's website at: <http://akclimate.org>.

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This information consists of preliminary climatological data compiled by the Alaska Climate Research Center, Geophysical Institute, University of Alaska Fairbanks. For more information on weather and climatology, contact the center at 474-7885 or visit the center web site at <http://akclimate.org>. Please report any errors to webmaster@akclimate.org.