



The Climate of Alaska for 2012

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This review of the climate of Alaska is predominantly based on the 20 first order climatological stations in Alaska, which are operated by NOAA's National Weather Service. These stations are all of high quality, operated by professional meteorologists with identical or similar meteorological instrumentation and observational practices. However, this should not be taken as a sign that other stations, which might be operated by other agencies, industries or private individuals, are of unsuitable quality. The normals used in this analysis are based on 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://ggweather.com/normals/AK.html>

Temperature

The mean average annual temperature in 2012 for the twenty stations was 30.0°F, a substantial negative departure of 2.9°F from the 30-year normal of 32.9°F. This is in stark contrast to the lower 48 states where record high temperatures were observed. There was only one station with a positive deviation, specifically Barrow in Northern Alaska with a deviation of +1.3°F, continuing the trend of warming observed on the North Slope over the last decades (Wendler, Shulski and Moore 2010). All other stations were below normal, continuing the cooling trend of Alaska seen in the 21st century (Wendler, Chen and Moore 2012). The largest negative deviations were observed in the Bering Sea area, with both Bethel and King Salmon reporting a deviation of -5.0°F, a very substantial value for the extent an entire year.

Figure 1 presents the temperature deviation data, and it can be seen that solely northwestern Alaska was above normal, while all the rest of Alaska was too cold when compared to the normal. It is interesting to note that a new minimum in the sea ice extent in the Arctic Ocean was observed in September. The lack of sea ice affected Barrow's temperatures, and in October the temperature deviation from the 30 year normal was a very substantial +10.3°F. The greatest negative deviations were found in the Bering Sea area, which is understandable after noting that the sea ice extent for the Bering Sea recorded a new maximum in April for the time period since

microwave satellite measurements became available. (Microwave instruments provide for observations of the sea ice though clouds and darkness.) This is, of course, in direct opposition to the above noted sea ice minimum observed in the Arctic Ocean.

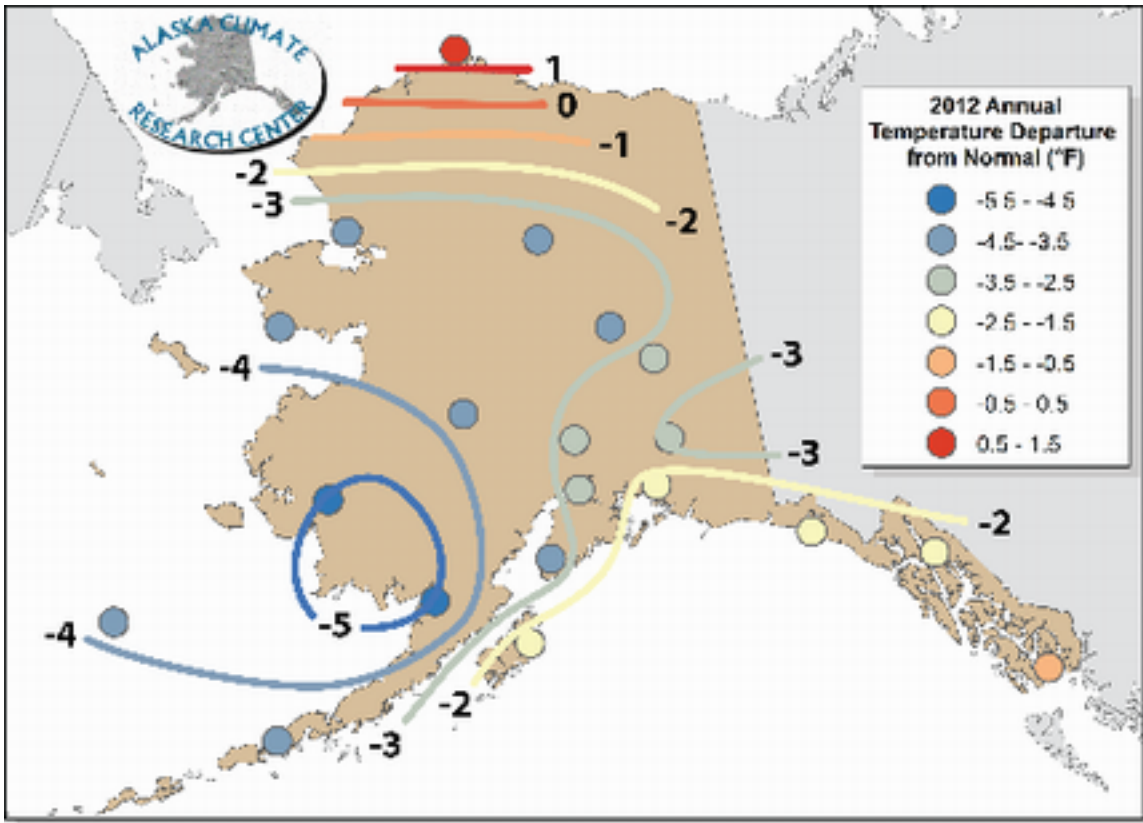


Figure 1: Isoplete presentation of the temperatures deviations from the normal (1981-2010) for 2012 based on all first order Alaskan meteorological stations.

The stations in southeastern Alaska reported all deviation between -1°F and -2°F, rather typical for a maritime climate where deviations are less prominent. In summary, nearly all of Alaska was below normal for 2012, and this was even more pronounced than what had been observed in 2011. Actual temperature deviations by station can be seen from Table A, with nineteen of the twenty stations recorded negative temperature deviation values, and an overall mean deviation of -2.9°F.

| Station | Temperature | | |
|-----------|---------------|-------------|------------|
| | Observed (°F) | Normal (°F) | Delta (°F) |
| Anchorage | 34.4 | 37.1 | -2.7 |
| Annette | 45.2 | 46.6 | -1.4 |
| Barrow | 13.1 | 11.8 | 1.3 |

| | | | |
|-----------------|-------------|-------------|-------------|
| Bethel | 25.7 | 30.7 | -5.0 |
| Bettles | 20.0 | 23.5 | -3.5 |
| Cold Bay | 35.2 | 38.8 | -3.6 |
| Delta Junction | 26.2 | 29.0 | -2.8 |
| Fairbanks | 24.1 | 27.7 | -3.6 |
| Gulkana | 24.8 | 28.2 | -3.4 |
| Homer | 35.2 | 38.7 | -3.5 |
| Juneau | 40.2 | 42.1 | -1.9 |
| King Salmon | 30.2 | 35.2 | -5.0 |
| Kodiak | 39.0 | 40.9 | -1.9 |
| Kotzebue | 19.2 | 22.9 | -3.7 |
| McGrath | 23.7 | 27.4 | -3.7 |
| Nome | 23.6 | 27.4 | -3.8 |
| St. Paul Island | 31.3 | 35.4 | -4.1 |
| Talkeetna | 33.2 | 36.0 | -2.8 |
| Valdez | 37.2 | 39.0 | -1.8 |
| Yakutat | 38.4 | 40.3 | -1.9 |

Table A: Mean temperature for 2012, normal temperature (1981-2010) and deviations from the mean for the twenty first order meteorological stations in Alaska.

The mean deviation of temperatures by month is presented in Figure 2 for the first order stations. The figure shows that only February and April were warmer than normal with positive deviations of above 2°F. All other months were too cold when compared to the normal. Especially remarkable was January, with a mean deviation for all stations exceeding -14°F. For one station it would be a very large deviation, however for the mean value of twenty stations, fairly well distributed over such a large area as Alaska, it is astounding. Many new record low temperatures were observed. For example, Bettles, in the northern Interior, recorded temperatures at or below -60°F for the last 3 days of the month, and the monthly deviation exceeded -25°F, making it the coldest January on record. In addition, January was also the coldest on record for Bethel, Homer and Nome, and tied for the coldest at Cold Bay. It was the second coldest January for Kotzebue since 1929 and third coldest January for Kodiak and St. Paul Island (with 99 years of data to draw on). In general Figure 2 shows that the winter months were much too cold across Alaska, while the summer deviations, though still negative, were much smaller in magnitude. This is also reflected in the record events reports, where new record lows outnumbered new highs by a ratio of about nine new lows to five new highs for the first order stations.

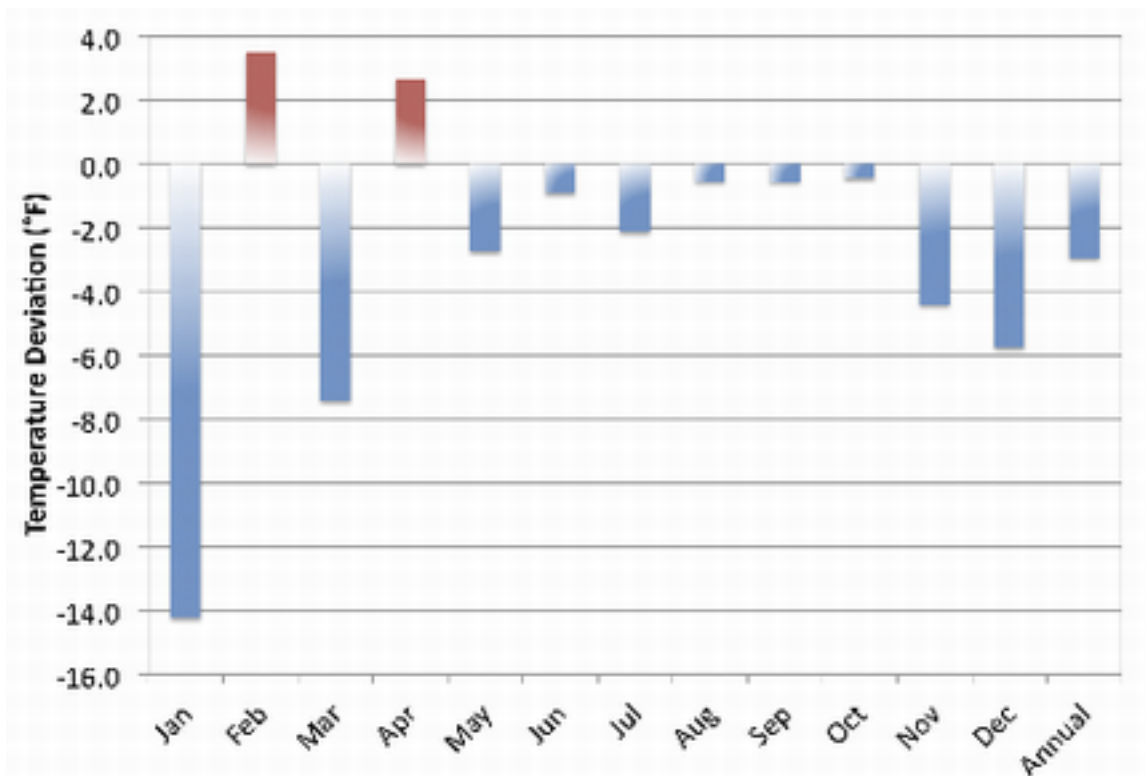


Figure 2: Mean monthly temperature deviation for the twenty first order stations in Alaska by month for 2012.

Precipitation

The mean annual precipitation of the twenty stations was 35.86", which is close to the long-term mean of 36.86". 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 in 2012 a total of 107.94", then to the north with Barrow recording a total value of just 6.27". It is even more remarkable that for 2012 Barrow reported 138% of normal precipitation, a value that is, when expressed as a percentage, not surpassed by any other first order station in Alaska for 2012. 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 the summer due to localized shower activities. The figure shows that most of Interior Alaska had deficits in precipitation, while the coastal areas were somewhat above the expected values. However, altogether the deviations were relatively small. More details can be seen in Table B, in which the actual deviation values by station are presented.

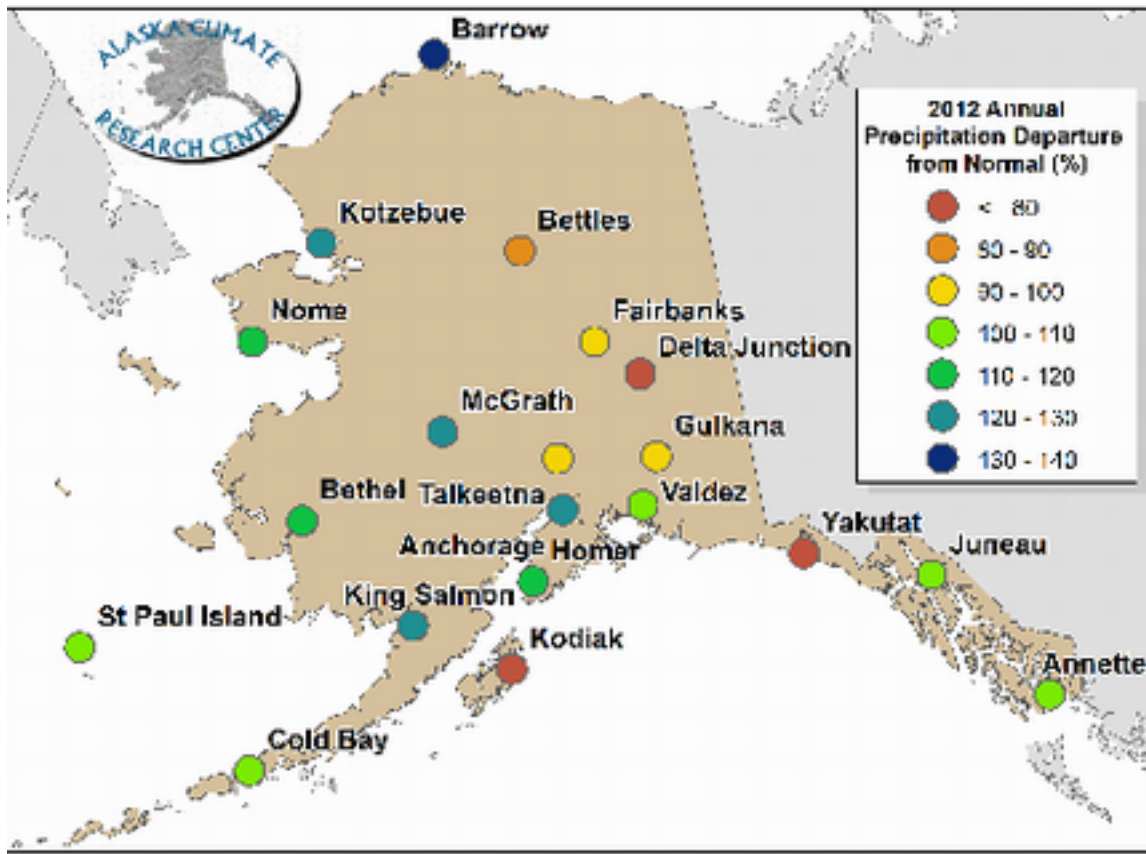


Figure 3: Precipitation deviations (%) from the normal (1981-2010) for 2012 based on all twenty first order stations in Alaska.

| Station | Precipitation | | | | |
|----------------|---------------|-------------|------------|-----------|------|
| | Observed (in) | Normal (in) | Delta (in) | Delta (%) | (%) |
| Anchorage | 21.48 | 16.58 | 4.90 | 30% | 130% |
| Annette | 103.23 | 101.63 | 1.60 | 2% | 102% |
| Barrow | 6.27 | 4.53 | 1.74 | 38% | 138% |
| Bethel | 21.27 | 18.54 | 2.73 | 15% | 115% |
| Bettles | 12.86 | 14.90 | -2.04 | -14% | 86% |
| Cold Bay | 44.01 | 41.67 | 2.34 | 6% | 106% |
| Delta Junction | 8.94 | 11.62 | -2.68 | -23% | 77% |
| Fairbanks | 10.60 | 10.81 | -0.21 | -2% | 98% |
| Gulkana | 11.19 | 11.26 | -0.07 | -1% | 99% |
| Homer | 28.88 | 24.34 | 4.54 | 19% | 119% |
| Juneau | 63.44 | 62.27 | 1.17 | 2% | 102% |
| King Salmon | 25.31 | 19.49 | 5.82 | 30% | 130% |
| Kodiak | 57.94 | 78.00 | -20.06 | -26% | 74% |
| Kotzebue | 13.27 | 11.00 | 2.27 | 21% | 121% |

| | | | | | |
|-----------------|--------|--------|--------|------|------|
| McGrath | 22.99 | 18.00 | 4.99 | 28% | 128% |
| Nome | 18.78 | 16.81 | 1.97 | 12% | 112% |
| St. Paul Island | 25.90 | 23.67 | 2.23 | 9% | 109% |
| Talkeetna | 27.07 | 27.97 | -0.90 | -3% | 97% |
| Valdez | 74.05 | 69.03 | 5.02 | 7% | 107% |
| Yakutat | 107.94 | 155.12 | -47.18 | -30% | 70% |

Table B: Observed precipitation for 2012, normal precipitation (1981-2010) and deviations from the mean for the 20 first order stations in Alaska.

The precipitation deviations by month are presented in Figure 4 for the mean of the twenty stations. The figure displays that the first three months of the year observed above normal precipitation, while April was much too dry. The dry April was a bad start with respect to wildfires, however, the following three months reported above normal rainfall, and it became a "good" year as far as acreage was burned. Less than 300,000 acres were consumed by wildfires, less than 1/3rd of the normal value. May 16th witnessed 0.84" of rain in Nome, a record of any day May with data stretching back to 1907. August was a bit dry; September was quite wet, with Valdez setting a new daily record of 4.27", more than double the 1993 record of 2.01". There was little snow in November and December, allowing for the frost to penetrate deeper into the ground than normal. The low precipitation in November was exemplified by Nome, with just 0.02" total precipitation equivalent, tying the record low for Nome for November. All together, the precipitation came out at 18% above normal.

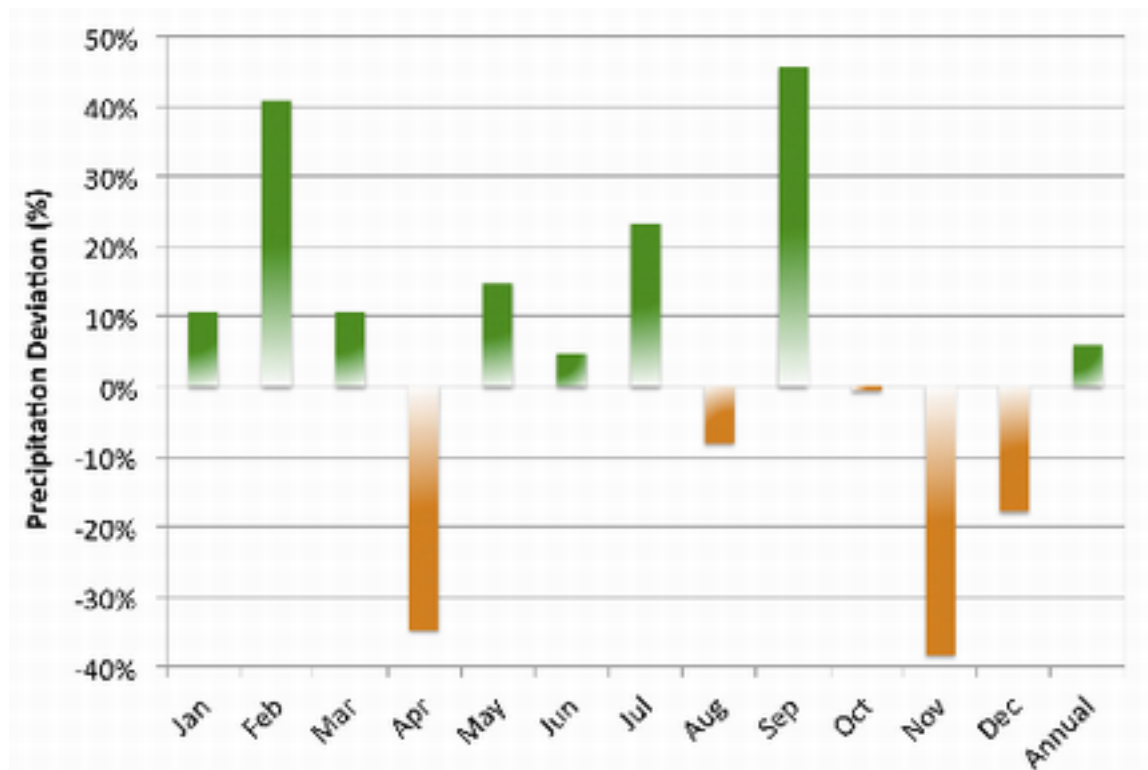


Figure 4: Precipitation deviation for the mean of the twenty first order stations in Alaska by month for

2012.

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 (Big Delta, Gulkana, Homer and Talkeetna) and one station (Bettles) was excluded for questionable data quality. It can be seen that two stations, Cold Bay and Yakutat, both coastal stations, measured more 80% above the expected amount of snowfall. Kodiak, King Salmon and Barrow, again all coastal stations, surpassed the expected snowfall by 60%. On the other extreme was Kotzebue, with only about half of the expected value.

Anchorage hits the books in 2012 with a record winter snowfall. On April 7th the total reached 134.5", topping the old record of 132.6" set in 1954-1955. This last bit of snow broke the record while ending the snowfall for the winter. The new winter record was built from numerous light snowfalls, with at least 36 days of more than an inch, and only two days of more than 7". Only one daily snowfall record was set during the winter in Anchorage, and that was 9.1" on February 3rd, which beat the 1970 record of 5.4". Cold Bay also set a seasonal snowfall record of 83.6", topping the 80.9" from 2008-2009. The frigid January saw a record monthly snowfall for Kodiak at 48.6", breaking the 2004 monthly record of 40.4". Valdez set a February snow depth record with 97" on the ground on the 27th, besting the 1990 record of 94". Maximum snow on ground in Valdez occurred on March 3rd at 100".

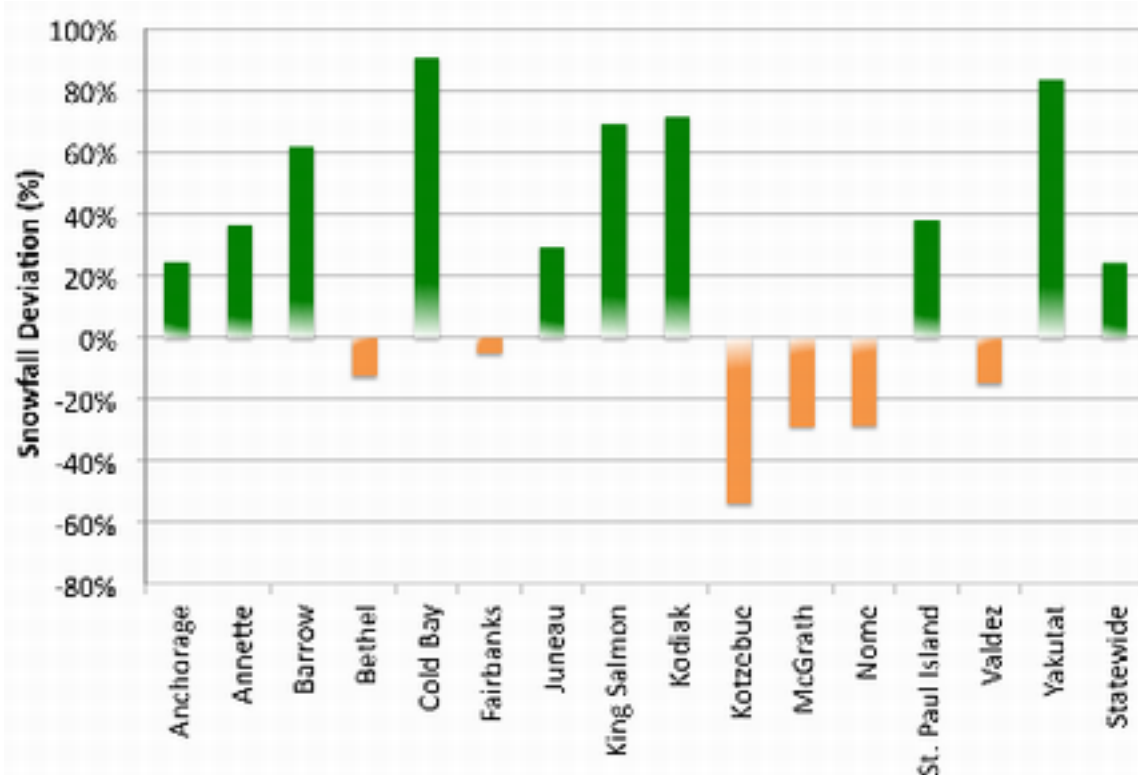


Figure 5: Mean annual snowfall deviations for sixteen of the first order stations in Alaska for 2012.

| Element | Date | Station | Value |
|--------------------------|-----------|-----------|--------|
| Highest Temperature | 6/23/2012 | Annette | 87°F |
| Lowest Temperature | 1/31/2012 | Bettles | -61°F |
| Highest Daily Average | 6/23/2012 | Fairbanks | 71°F |
| Lowest Daily Average | 1/31/2012 | Bettles | -55°F |
| Most Daily Precipitation | 9/20/2012 | Valdez | 4.27" |
| Most Daily Snowfall | 2/26/2012 | Valdez | 20.9" |
| Most snow on the ground | 3/6/2012 | Valdez | 100.0" |

Table C: Some interesting facts for 2012 for the twenty first order stations in Alaska.

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.

References

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Wendler, G. L. Chen and B. Moore 2012. The first Decade of the New Century: A cooling trend for most of Alaska. **The Open Atmospheric Science Journal** 6, 111-116

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.