Alaska Statewide Climate Summary May 2020

May 2020 HIGHLIGHTS:

- **GLOBALLY, MAY SET NEW TEMPERATURE RECORDS SINCE THE BEGINNING OF INDUSTRIALIZATION. ON A GLOBAL SCALE, MAY WAS 0.63°C WARMER THAN THE AVERAGE MAY FROM 1981-2010 (ECMWF). ALASKA WAS A HOTSPOT: TEMPERATURES WERE ABOVE NORMAL ACROSS ALL OF ALASKA, WITH THE WARMEST TEMPERATURES ALONG THE WEST COAST.**
- **NOME SET A NEW RECORD FOR MONTHLY AVERAGE TEMPERATURE OF 45.7°F, BREAKING THE PREVIOUS RECORD OF 43.8°F SET IN 1983.**
- **MOST OF ALASKA WAS DRIER THAN NORMAL WITH THE EXCEPTION OF BETHEL, DELTA JUNCTION, AND GULKANA.**
- **ALASKA CONTINUED TO BE FREE OF ABNORMAL DRYNESS AND DROUGHT DESPITE DRIER THAN NORMAL CONDITIONS.**
- **DRY WEATHER AND LIGHTNING HAVE TRIGGERED SEVERAL WILDFIRES.**
- **SEA ICE EXTENT AT THE END OF MAY WAS BELOW AVERAGE IN THE CHUKCHI SEA, BUT LESS SO THAN IN RECENT YEARS.**

The following report provides an overview of the May weather. The report is based on data from selected weather stations throughout the state of Alaska. "Departure from normal" refers to the climatological average over the 1981-2010 period.

Temperature

Temperatures across Alaska were warmer than normal during May 2020, with the warmest temperatures along the west coast. Nome set a record for monthly average temperature with temperatures of 45.7°F, 8.9°F warmer than normal. The previous record was 43.8°F set in 1983. Kotzebue was 7.9°F warmer than normal, followed by Bethel with temperatures 6.6°F above normal. The observed monthly temperatures in Bettles and Fairbanks were 4.5°F and 3.9°F above normal respectively. Juneau and Anchorage recorded cooler, but still above average, deviations from normal temperatures with temperatures 2.8°F and 2.6°F above normal

respectively. Utqiaġvik recorded an average monthly temperature of 22.5°F, 1.3°F above normal.

Multiple stations set new records for mean, minimum, and maximum daily temperatures on specific days during May 2020. Yakutat set a new daily record for highest maximum temperature on May 10th of 73°F, 5°F higher than the previous record of 68°F set in 2005. Similarly, Kotzebue set a new daily record for highest maximum temperature on May 31st of 72°F, 5°F higher than the previous record of 67°F set in 2016. Cold Bay set a new daily record for lowest minimum daily temperature on May 28th of 29°F, breaking the previous record of 30°F set in 1976. All values and dates are listed in Table A1, A2 and A3 in the appendix.

Figures 2 and 3 show mean daily temperature departures from normal for 2020 in Homer and Nome. While red and blue bars represent positive and negative departures from normal mean daily temperatures, red and blue lines represent the highest and lowest values of mean daily temperature on record for each day of the year. Days in which red bars (positive departures) are higher than the red line indicate high mean daily temperature records (Figure 2, Table A1). As an example, Nome set new daily records for maximum mean temperature on May 8th, May 18th, and May 31st (Figure 3, Table A1). The observed temperatures in Nome were above normal except for 2 days throughout the month.

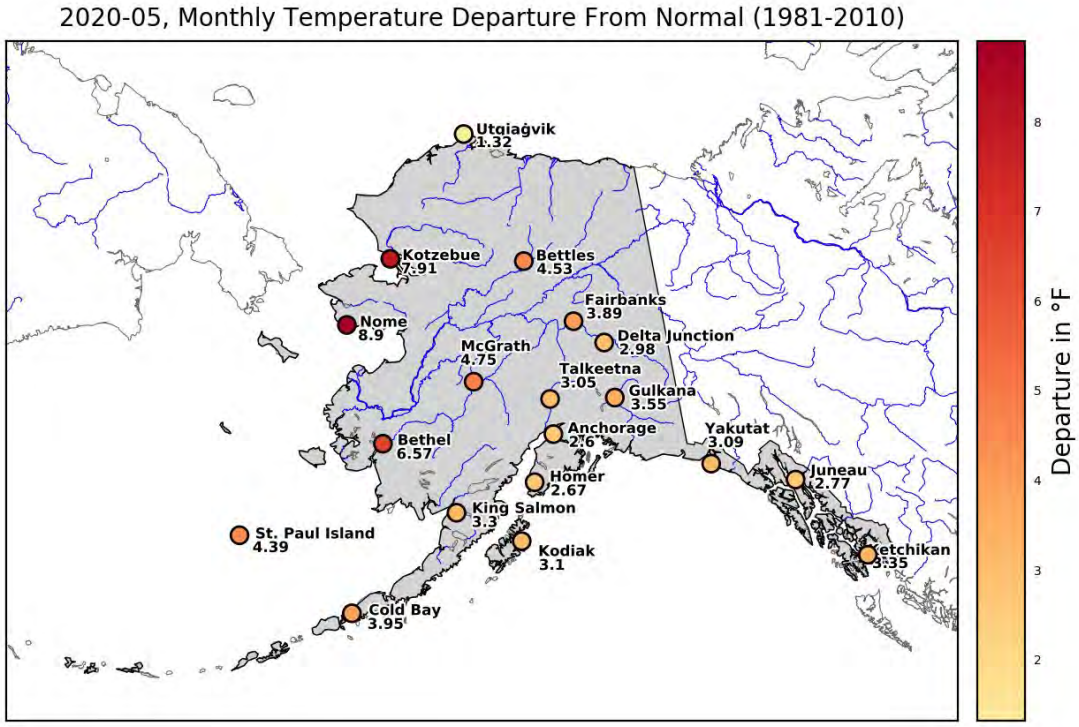

Figure 1: Monthly mean temperature departure from normal, May 2020.

Table 1: Mean monthly air temperature, normal (1981-2010) and departure for selected stations throughout the state, May 2020.

Station	Observed (°F)	Normal (°F)	Departure (°F)
Anchorage	50.4	47.8	2.6
Bethel	48.5	41.9	6.6
Bettles	48.9	44.4	4.5
Cold Bay	44.2	40.3	4.0
Delta Junction	50.6	47.6	3.0
Fairbanks	53.3	49.4	3.9
Gulkana	48.8	45.2	3.6
Homer	47.1	44.5	2.7
Juneau	51.4	48.6	2.8
Ketchikan	52.0	48.6	3.4
King Salmon	47.5	44.1	3.3
Kodiak	47.4	44.3	3.1
Kotzebue	39.8	31.9	7.9
McGrath	51.5	46.7	4.8
Nome	45.7	36.8	8.9
St. Paul Island	40.6	36.2	4.4
Talkeetna	50.8	47.7	3.0
Utqiaġvik	22.5	21.1	1.3
Yakutat	47.8	44.8	3.1

Figure 2: Homer daily mean temperature departures from normal (1981-2010) for 2020. Red and blue bars represent positive and negative temperature departures. Grey line represents the mean normal temperature, red and blue lines represent respectively the historic highest and lowest records of mean daily temperature.

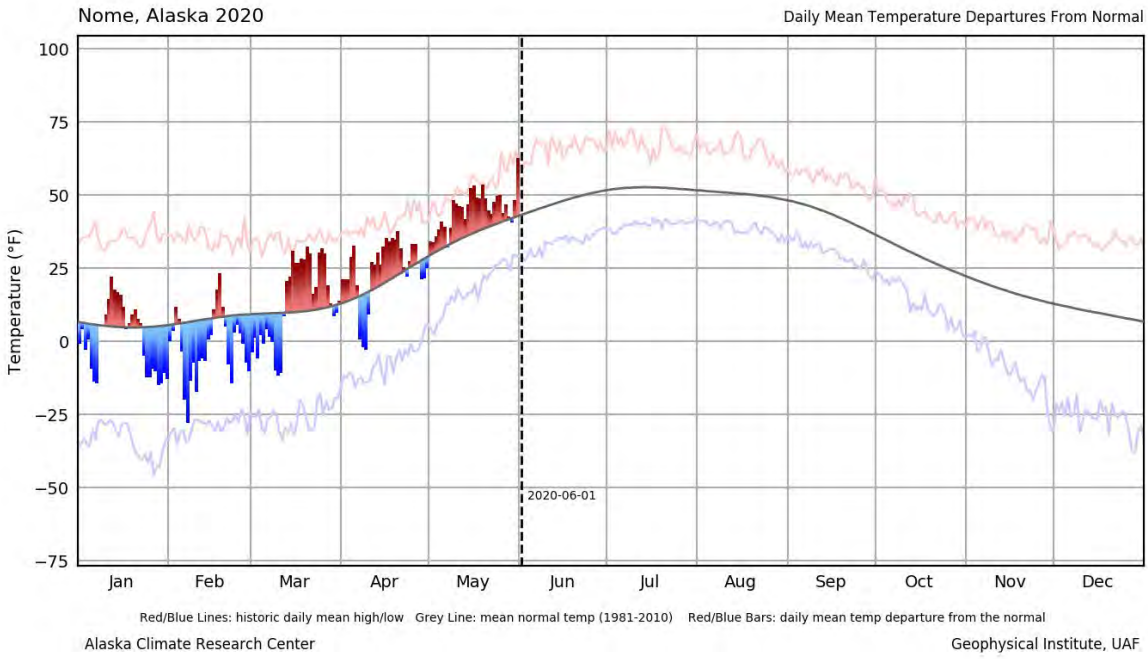

Figure 3: Nome daily mean temperature departures from normal (1981-2010) for 2020. Red and blue bars represent positive and negative temperature departures. Grey line represents the mean normal temperature, red and blue lines represent respectively the historic highest and lowest records of mean daily temperature.

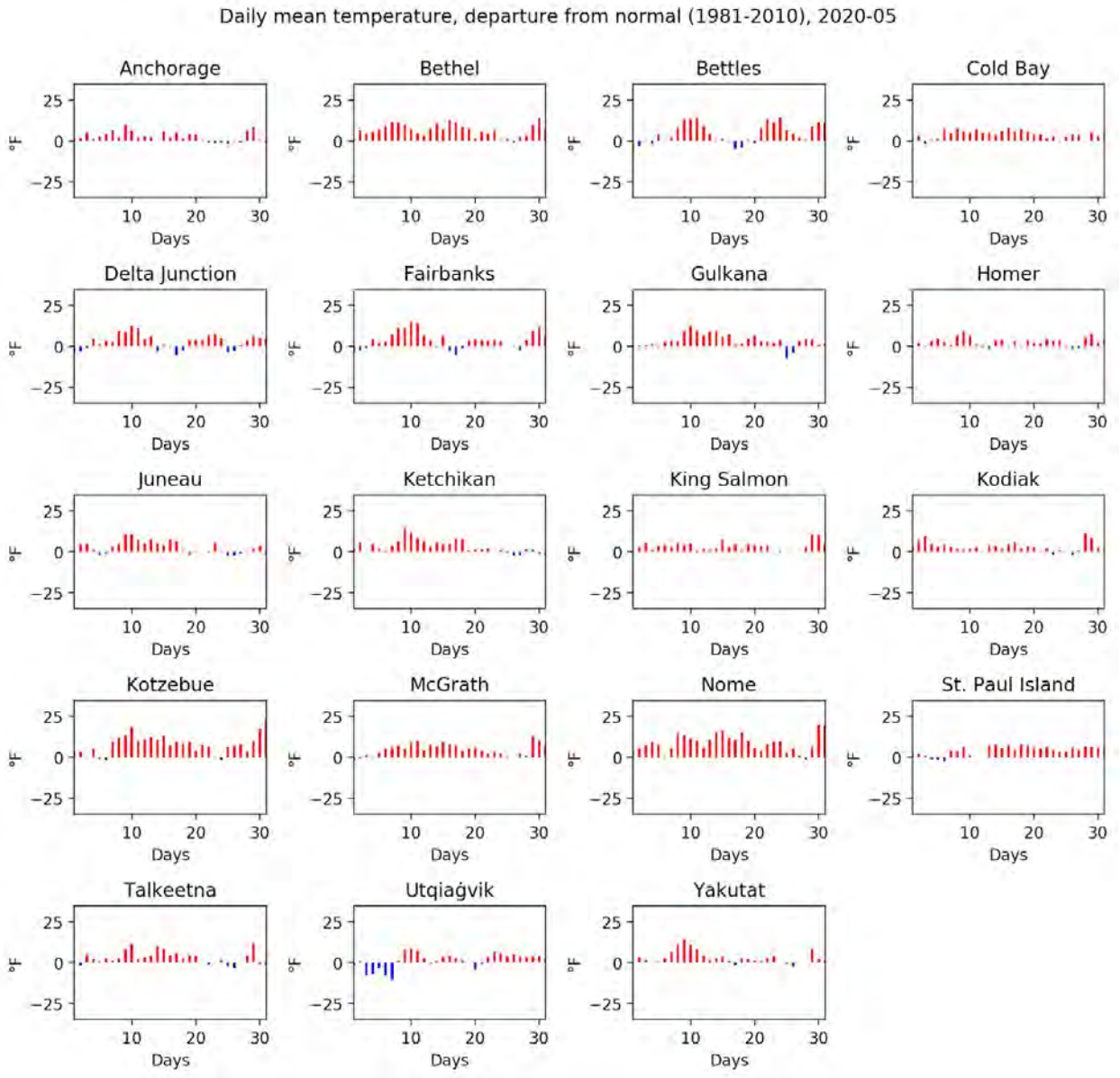

Figure 4: Daily mean temperature departures for each day in May 2020, at the selected stations.

All first order stations experienced above normal temperatures during the majority of days in May (Figure 4). Utqiaġvik experienced a cold spell from May 2nd through May 7th. A low in the Northern Gulf of Alaska brought clouds and rain to the southern coast on May 4th. On the 19th, a cold front went through the peninsula, bringing rain to the region, followed by cooler temperatures. Another front came through the same area on the 23rd, again bringing rain followed by cooler temperatures. On May 24th and 25th, a front stalled over the southern Interior bringing rain south of Fairbanks. The heaviest rain from that event was over the Alaska range. A blocking high over the mainland started to break down on May 30th, allowing low pressure to track northward causing cloudy conditions, rain showers, and cooler temperatures across the Southcentral and into the Interior at the end of the month.

Precipitation

Precipitation in May, unlike that in March and April, was below normal across most of Alaska, with the exception of Bethel, Delta Junction, and Gulkana (Figures 5 and 6, Table 2). Gulkana received 1 inch of rain, 146.2% of normal. The majority of the rain, 0.74 inch, fell on May 25th. Delta Junction reported 1.2 inches of rain, 136.7% of normal. Three quarters of an inch of rain fell in Delta Junction on May 25th. Bethel received 1.2 inches of precipitation, 101.8% of normal. The precipitation in Bethel fell mostly as rain but there was a small amount of snow on the morning of May 11th.

Bettles reported 0.2 inch of rain, 23.9% of normal precipitation. Yakutat received 3.4 inches of rainfall, 41.4% of normal. McGrath received 0.5 inches of rainfall, 43.1% of normal. Most of the rain in McGrath, 0.27 inches, fell on May 26th. Juneau and Ketchikan reported 60.3% and 64.5% of normal precipitation respectively. Similarly, Cold Bay and Kodiak received 65.0% and 65.5% of normal precipitation respectively. Nome and Kotzebue received 73.3% and 78% of normal precipitation respectively. Fairbanks reported 0.5 inch of rain, 81.7% of normal precipitation. The majority of the rain, 0.39 inch, fell on May 31st. A line of thunderstorms moved through the Fairbanks area around 5:30PM on the 31st. Winds gusted over 35 mph. Lightning from the thunderstorms sparked a fire 10 to 20 miles south/southeast of the Fairbanks airport. Anchorage reported 0.6 inch of rain, 87.5% of normal precipitation. Most of the rain, 0.35 inch, fell on May 24th.

Comparisons of precipitation (rain plus SWE, where applicable) measurements with the 1981-2010 normal data are provided in Table 2 and Figure 6.

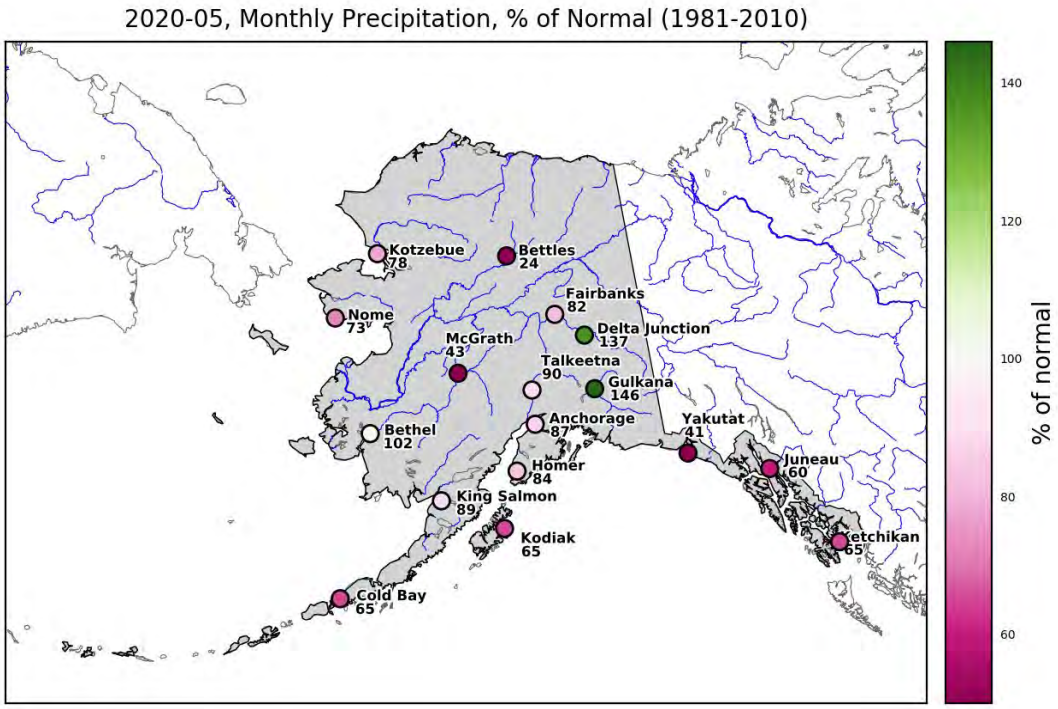

Figure 5: Monthly precipitation sums expressed as percent of normal (1981-2010), May 2020.

Table 2: Monthly precipitation sum, normal (1981-2010) and departure expressed as a percentage of the normal (1981-2010) for selected stations throughout the state, April 2020.

Station	Precipitation (in)	Normal (in)	% of normal
Anchorage	0.6	0.7	87.5
Bethel	1.2	1.1	101.8
Bettles	0.2	0.9	23.9
Cold Bay	1.7	2.6	65.0
Delta Junction	1.2	0.9	136.7
Fairbanks	0.5	0.6	81.7
Gulkana	1.0	0.6	146.2
Homer	0.7	0.8	84.1
Juneau	2.1	3.4	60.3
Ketchikan	5.3	8.2	64.5
King Salmon	1.1	1.3	88.8
Kodiak	3.7	5.6	65.5
Kotzebue	0.3	0.4	78.0
McGrath	0.5	1.1	43.1
Nome	0.6	0.9	73.3
Talkeetna	1.5	1.6	89.5
Yakutat	3.4	8.2	41.4

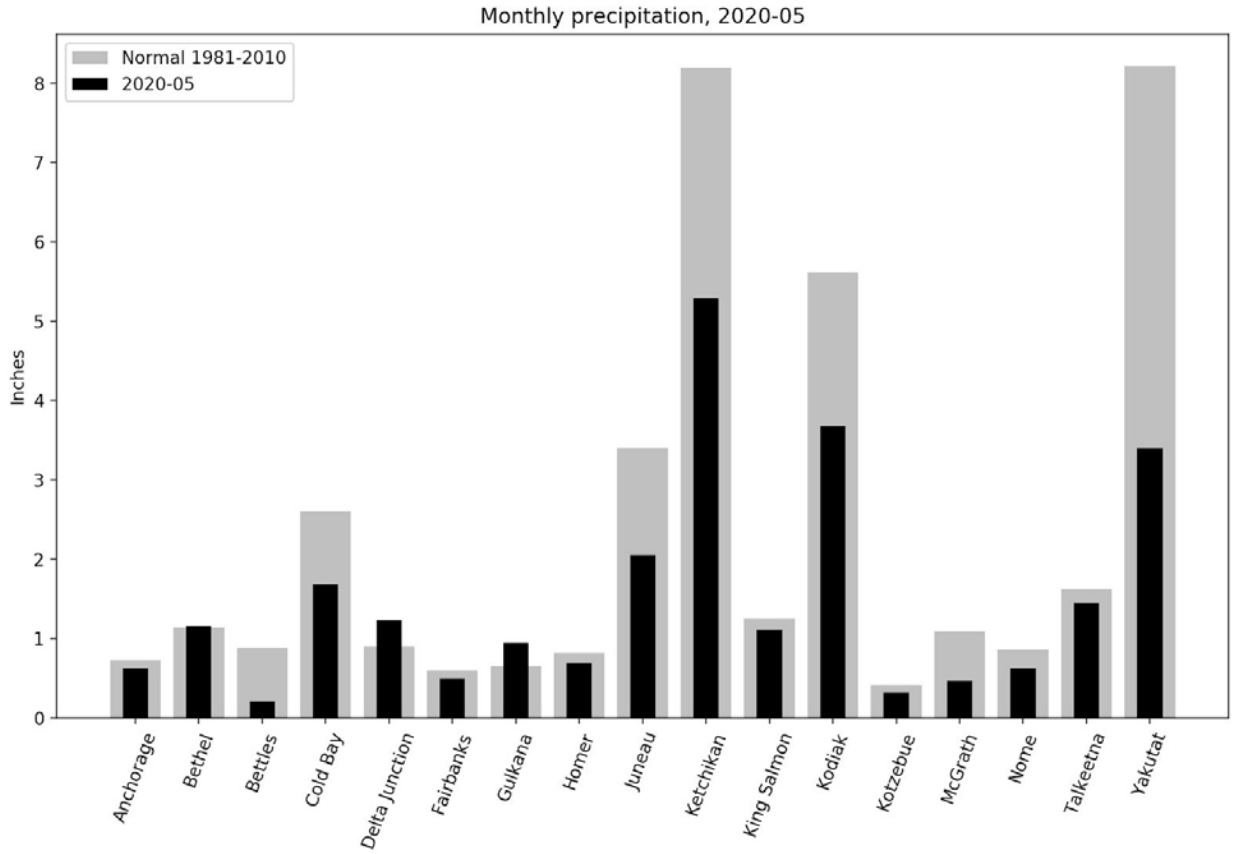

Figure 6: Monthly precipitation sums for April 2020 at the selected stations compared to the normal (1981-2010), in inches.

Drought Conditions

Alaska continued to be free of abnormal dryness and drought through May 2020 despite below normal precipitation over much of the state during the month (Figure 7). (source: https://droughtmonitor.unl.edu/).

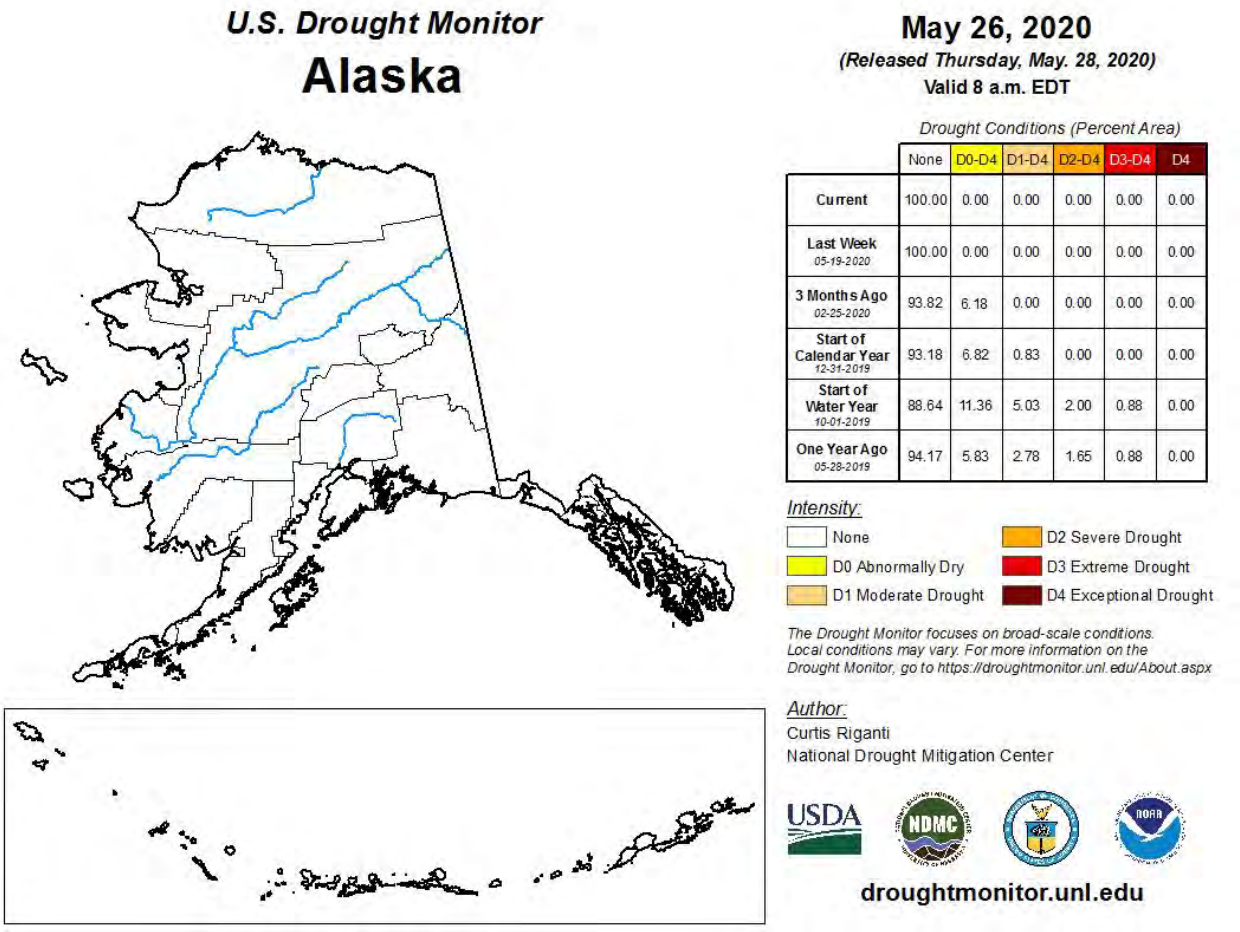

Figure 7: U.S. Drought Monitor map for Alaska, updated on May 26, 2020. The table on the right shows the percent area affected by different categories of drought intensity. Figures and data produced and released by the U.S. Drought Monitor, a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration (https://droughtmonitor.unl.edu).

Wildfire Activity

Wildfire season has started across the state. Dry weather, along with lightning, have triggered several wildfires. As of the June 8th Alaska Interagency Coordination Center Situation Report (https://fire.ak.blm.gov/content/aicc/sitreport/AICC%20Situation%20Report.pdf), there have been 183 fires to date which have burned 42,836.0 acres. The center is currently tracking 83 fires in Alaska (active, smoldering, or in the process of being demobilized) (http://smoke.alaska.edu).

Please check our UAFSmoke website at http://smoke.alaska.edu for updated fire information. UAFSmoke shows current wildfire status information and up to 72 hours forecast of concentration of black carbon and particulate matter included in wildfire smoke.

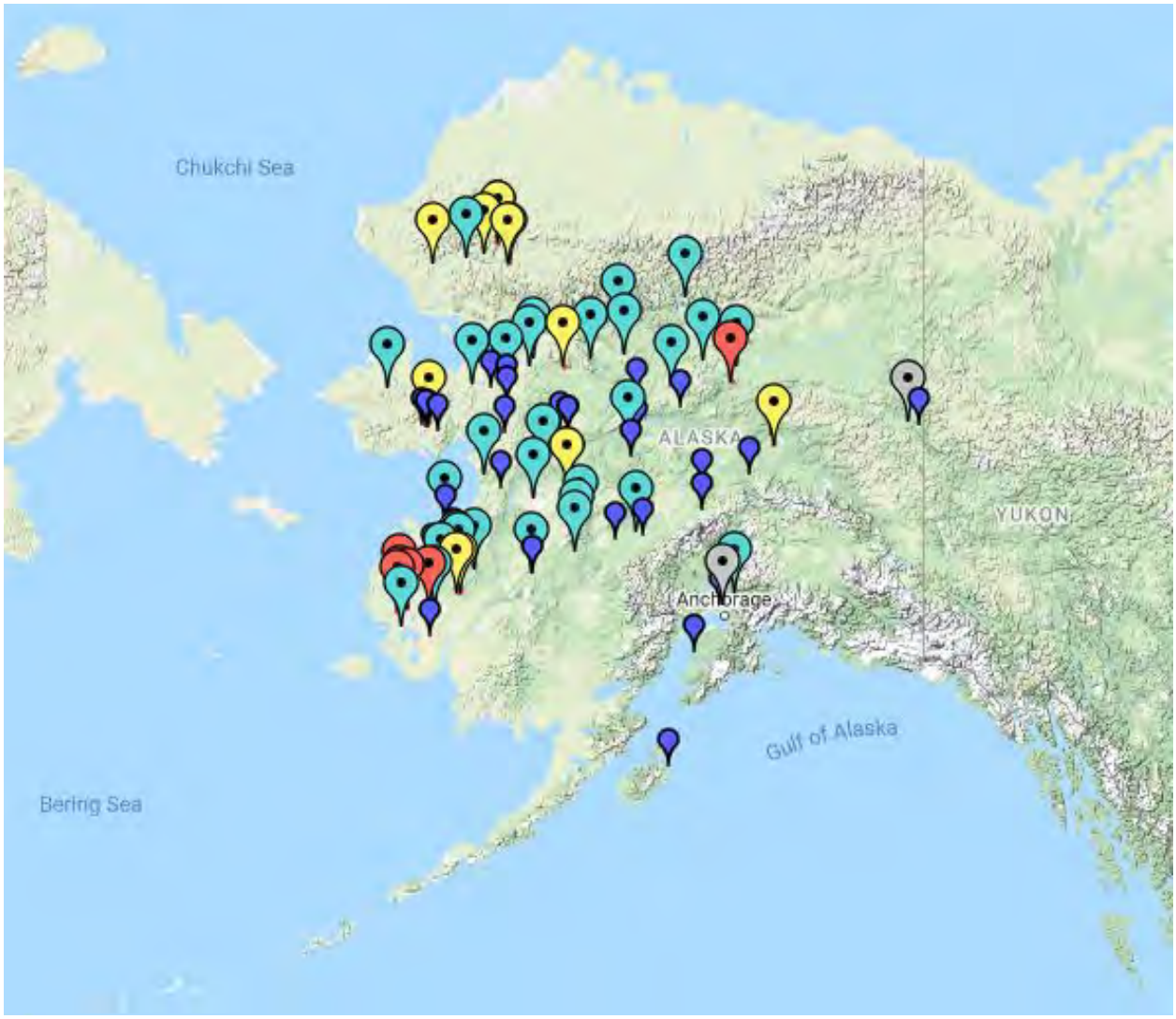

Figure 8: Map of current wildfires updated on June 8, 2020 from the UAFSmoke website (http://smoke.alaska.edu). Data are from the Alaska Interagency Coordination Center. Circles represent the size, but not the shape, of the fire. Fires that have not been updated in more than a week are shown with grey markers.

GINA Direct Broadcast Satellite Data Wildfire Monitoring

Author: Carl Dierking
Sponsor: NOAA JPSS (Joint Polar Satellite System Program)

Temperatures are warming and summer is fast approaching, but along with that is the increasing fire threat in interior Alaska. To help the Alaska Fire Service (AFS) monitor the fire situation the

Geographic Information Network of Alaska (GINA) uses its "Direct Broadcast" (DB) and Near Real-time (NRT) processing capability to provide specialized polar orbiting satellite products within 15-20 mins of the overpass. Direct Broadcast is a term for the ability to receive data directly from satellites as they are passing overhead. Low-latency satellite fire-products are especially important this season because of the additional Covid-19 precautions that are required for aircraft operations.

The images below (Figure 9) are examples of some of these specialized products for recent fires in the Yukon Delta region of southwest Alaska. These images were created with data from the Visible Infrared Imaging Radiometer Suite (VIIRS). VIIRS is a primary instrument onboard the SNPP and NOAA-20 spacecrafts, with a spatial resolution as high as 375-m.

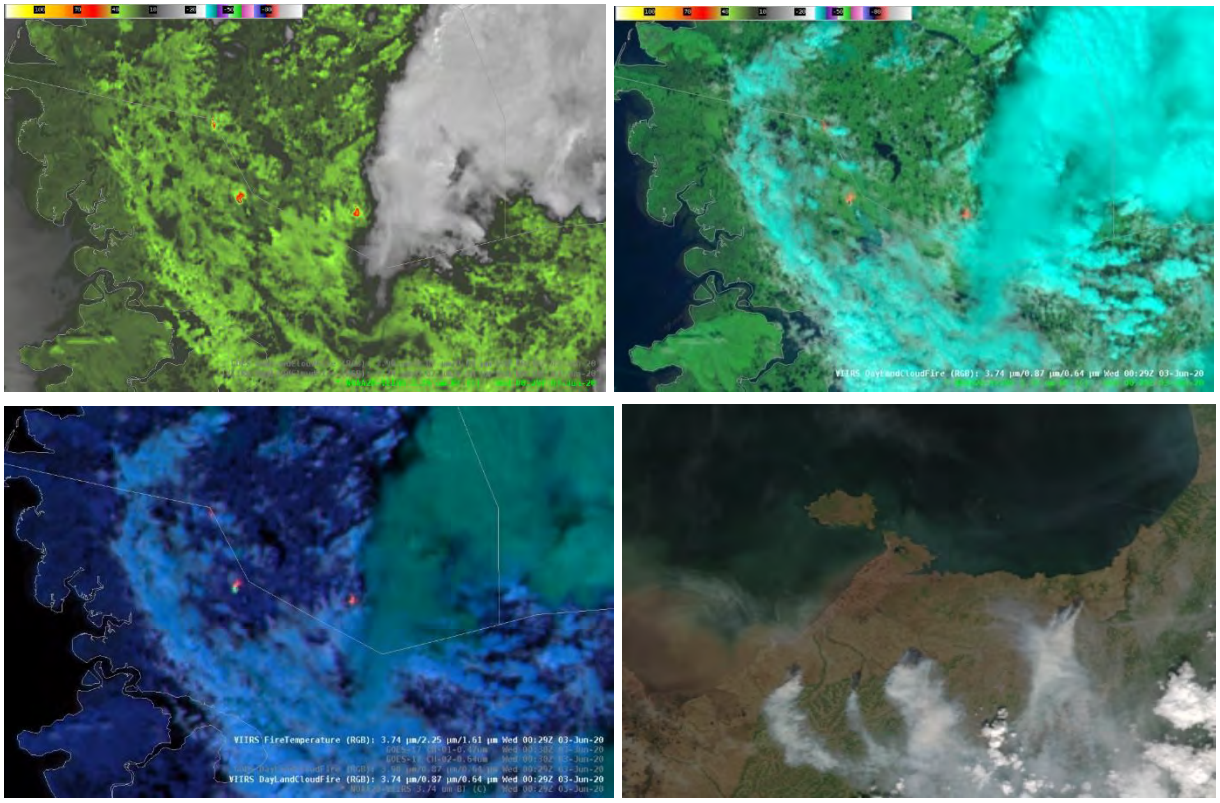

Figure 9: Examples of specialized products for recent fires in the Yukon Delta region of southwest Alaska. Upper left: VIIRS i04 band at 0029UTC 03 Jun 2020, Upper right: red-green-blue (RGB) combination of three VIIRS satellite bands called the DayLandCloudFire RGB**,** Lower left: FireTemperature RGB which is a combination of three satellite bands with decreasing sensitivity to energy emissions from fires, Lower right: TrueColor RGB which looks much like what the human eye would see from space. *Note that this image is not from the recent fires in southwest Alaska.*

In the upper left is an example of the **VIIRS i04 band** at 0029UTC 03 Jun 2020 which is sensing thermal energy at 3.74 µm. This is a region of the radiation spectrum that is very sensitive to fires. The legend at the top of the image shows how colors are assigned to temperatures in

degrees Celsius. Positive values are on the left and negative values on the right. The three red "hot" spots near the center of the image indicate fires.

On the upper right is a red-green-blue (RGB) combination of three VIIRS satellite bands from the same pass that is called the **DayLandCloudFire RGB**. One of three bands used is the VIIRS i04 band (3.74 µm). In this image red indicates fires, clouds are cyan, vegetation is green and burned areas appear brown. This combination of satellite bands was developed by Curtis Seaman at the Cooperative Institute for Research in the Atmosphere (CIRA).

On the lower left is the **FireTemperature RGB** which is a combination of three satellite bands with decreasing sensitivity to energy emissions from fires. Again the VIIRS i04 band (3.74 µm) is used since it is the most sensitive, and as fires increase in size or intensity, the other bands contribute more to the image. Colors for fire activity range from red to yellow to white as the size or intensity of the fire increases.

On the lower right is an example of the **TrueColor RGB** which combines red, green and blue visible satellite channels into an image that looks much like what the human eye would see from space. The blue visible contribution at 0.49 µm is especially good at detecting smoke. These images can be useful for tracking the distribution of smoke from a fire. *Note that this image is not from the recent fires in southwest Alaska.*

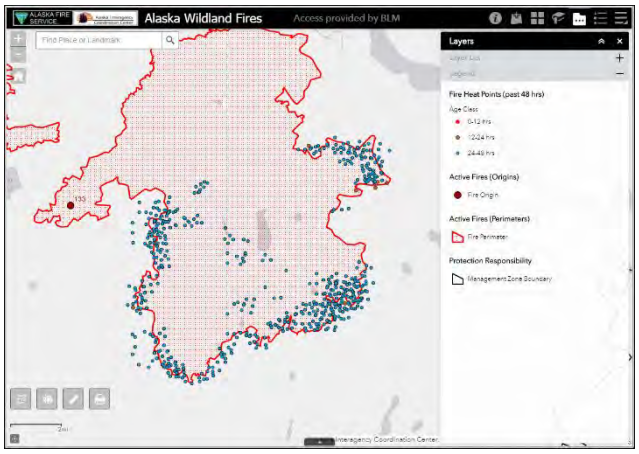

Figure 0: Example map of VIIRS Active Fires fire points.

The last product is not an image, but a collection of fire points, called **VIIRS Active Fires**, that are automatically calculated from satellite data with every VIIRS pass. The image on the left (Figure 10) is an example of these points plotted on a GIS map for a large fire from a previous year. This is a tool for continuous monitoring of fire activity, alerting the location of new fires in remote regions and following the progress of existing fires. Besides geographic positions, it provides quantitative information like the radiative power of the fire.

In the summer of 2020, VIIRS Fire Heat Points are displayed in near real-time on the Alaska Wildland Fire Information Map Series (**https://tinyurl.com/yyxyqduz**).
All of these satellite products contribute critical information that fire managers use to deploy valuable resources in their effort to control dangerous wildfires in Alaska.

Arctic Sea Ice

Over the weeks of April 23rd to May 28th, sea ice decreased by 13.96%. During the weeks of April 23rd to May 14th, sea ice decreased by 7.48%, over three times the decreasing rate of the previous 2 week period, from 13.548 M km^2 to 12.535 M km^2. Sea ice extent decreased by

7.00% from May 14th to May 28th. The sea ice extent (light blue line in figure 11) is about even with the 2018 level (orange line). Towards the end of May, ice extent was below average in the Chukchi Sea, but less so than in recent years (Figure 12, https://nsidc.org/arcticseaicenews/).

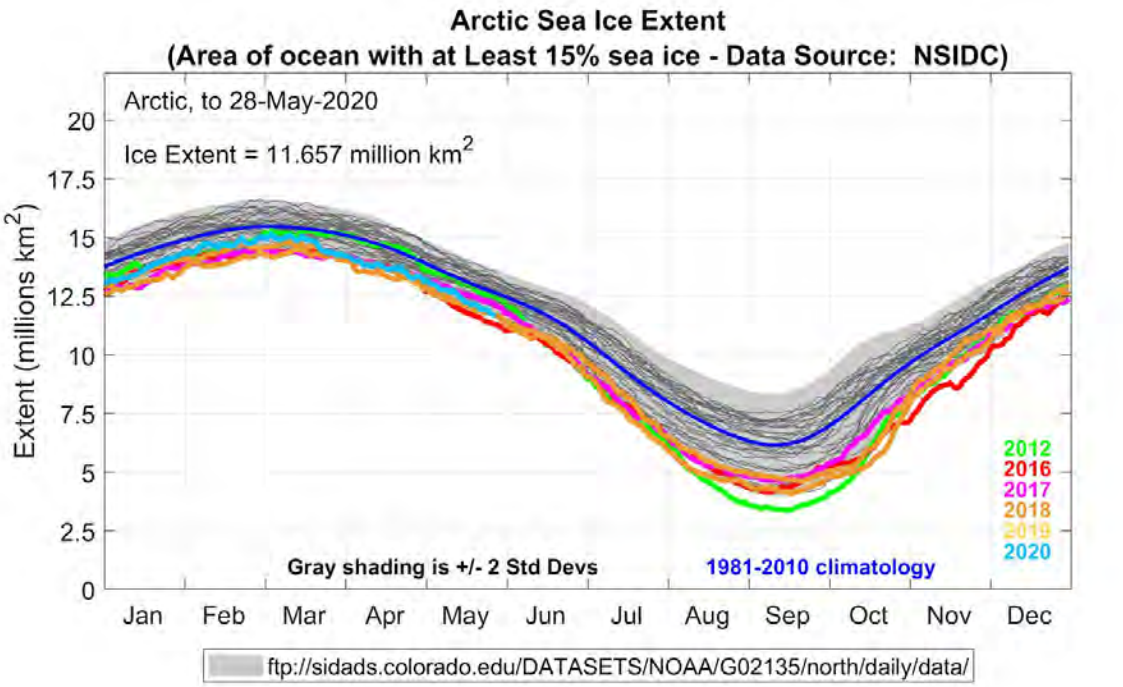

Figure 11: Time series of daily Arctic sea ice extent. This year's data (light blue) are updated until April 23, 2020. The median sea ice extent for the 1981-2010 reference period is depicted in blue. Specific years are highlighted in colors. Plot Compiled by: Howard J. Diamond, PhD; Climate Science Program Manager at NOAA's Air Resources Laboratory Data Source: National Snow & Ice Data Center (NSIDC; https://nsidc.org/).

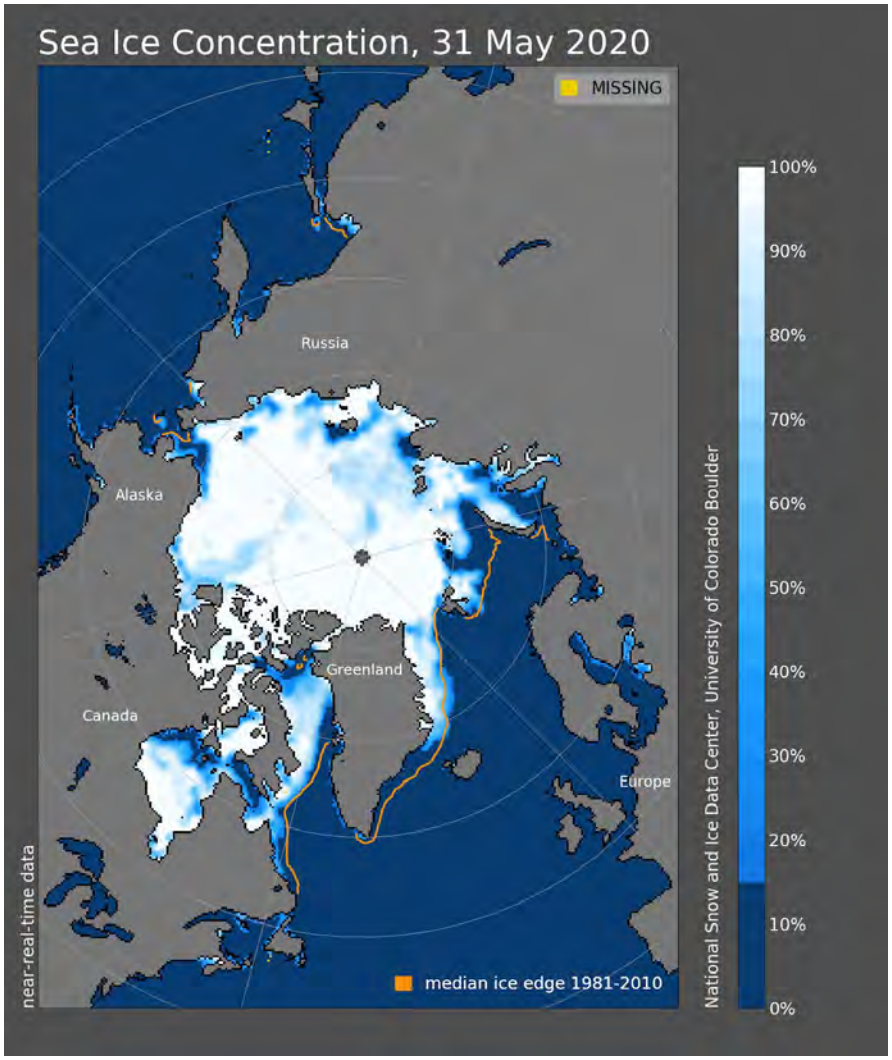

Figure 12: Daily Arctic Sea Ice concentration for May 31, 2020. Median ice edge for the 1981-2010 reference period is depicted in yellow. Image: NSIDC (nsidc.org)

Newsworthy information

The Kuskokwim ice classic ended at 9:58PM on May 3, 2020. The tripod disappeared under water before moving downstream and stopping the clock. (https://www.kyuk.org/post/kuskokwim-ice-classic-tripod-falls-pandemic-slows-winner-announcement)

The National Weather Service declared that May 10th was Green Up Day in Fairbanks. Green Up Day is determined to be the date when leaf buds on birch and aspen trees open enough to produce a faint, yet distinct, green color through the boreal forest canopy. The latest Green Up day recorded since 1974 was May 26, 2013 and the earliest was April 26, 2016. (https://www.webcenter11.com/content/news/Green-Up-Day--570392661.html).

A large ice jam damaged buildings and property in Kotzebue on May 28th as lake ice in Kobuk Lake became stuck and pushed onto shore. The buildings had been there a long time and had never been damaged by an ice jam.
(https://www.webcenter11.com/content/news/Large-ice-jam-damages-buildings-in-Kotzebue-570852151.html, https://www.ktuu.com/content/news/Buildings-threatened-by-large-ice-pack-in-Kotzebue-570810381.html)

Lightning ignited at least 15 fires across Alaska during the last weekend in May. There were approximately 1,858 recorded lightning strikes throughout the state on Saturday, May 30th and more than 2,900 on Sunday, May 31st. Most of the new lightning-caused fires over that weekend occurred in Southwest Alaska. The only human-caused fire on Saturday, May 30th occurred when a structure fire in Anchor Point spread to grass and was quickly extinguished by firefighters.
(https://akfireinfo.com/2020/05/31/lightning-ignites-at-least-15-fires-across-alaska-this-weekend/)

This information consists of climatological data compiled by the Alaska Climate Research Center, Geophysical Institute, University of Alaska Fairbanks. For more information on weather and climatology, visit the center website at http://akclimate.org. Please report any errors to webmaster@akclimate.org. River ice information has been received from GINA, the Geographic Information Network of Alaska, Geophysical Institute, University of Alaska Fairbanks.

Appendix

Table A1: April 2020 daily records of mean daily temperature, i.e. highest/lowest values of mean daily temperature ever recorded on specific days. Records are computed since the beginning of the respective time series. Only highest records were set this month.

Highest Mean Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Anchorage	2020-05-09	55.5	1995	55.0
Bethel	2020-05-17	54.0	1959	53.5
Cold Bay	2020-05-06	46.0	1996	45.0
Cold Bay	2020-05-11	46.5	1967	45.5
Cold Bay	2020-05-16	48.5	2016	47.0
Cold Bay	2020-05-17	46.5	1968	45.5
Cold Bay	2020-05-18	48.0	2003	47.0
Gulkana	2020-05-10	56.0	2018	52.0
Juneau	2020-05-09	57.5	1995	57.0
Ketchikan	2020-05-09	61.5	1954	60.0
King Salmon	2020-05-29	58.0	2013	57.5
King Salmon	2020-05-30	58.0	1993	57.5
Kodiak	2020-05-28	58.0	1993	57.0
Kotzebue	2020-05-10	48.0	1983	45.5
Kotzebue	2020-05-31	61.5	2016	58.0
Nome	2020-05-08	48.0	1980	47.0
Nome	2020-05-18	53.5	1980	50.0
Nome	2020-05-31	62.5	2015	60.5
St. Paul Island	2020-05-13	43.0	1978	41.5
St. Paul Island	2020-05-14	43.5	2016	42.5
St. Paul Island	2020-05-16	43.5	1981	42.5
St. Paul Island	2020-05-18	44.5	2015	42.5
St. Paul Island	2020-05-19	44.0	2017	42.0
Talkeetna	2020-05-10	57.0	1995	56.5
Talkeetna	2020-05-29	64.5	2010	62.5
Yakutat	2020-05-09	58.0	1995	55.0
Yakutat	2020-05-10	54.5	1995	53.0

Table A2: April 2020 daily records of minimum daily temperature, i.e. highest/lowest values of minimum daily temperature ever recorded on specific days. Records are computed since the beginning of the respective time series. One lowest record and multiple highest records were set this month.

Highest Minimum Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Bethel	2020-05-08	43.0	1935	40.0
Bettles	2020-05-22	53.0	1994	52.0
Bettles	2020-05-24	52.0	1960	51.0
Cold Bay	2020-05-10	41.0	1981	40.0
Cold Bay	2020-05-16	43.0	1968	42.0
Fairbanks	2020-05-08	47.0	1978	46.0
Kotzebue	2020-05-31	51.0	2016	49.0
Nome	2020-05-08	40.0	1978	39.0
Nome	2020-05-14	45.0	1983	41.0
Nome	2020-05-18	46.0	1915	40.0
Nome	2020-05-31	52.0	2015	50.0
St. Paul Island	2020-05-16	40.0	2015	39.0
St. Paul Island	2020-05-18	40.0	2015	39.0
St. Paul Island	2020-05-19	40.0	1989	39.0
St. Paul Island	2020-05-28	42.0	1993	40.0
Talkeetna	2020-05-29	52.0	2002	51.0

Lowest Minimum Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Cold Bay	2020-05-28	29.0	1976	30.0

Table A3: April 2020 daily records of maximum daily temperature, i.e. highest/lowest values of maximum daily temperature ever recorded on specific days. Records are computed since the beginning of the respective time series. Only highest records were set this month.

Highest Maximum Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Bethel	2020-05-07	66.0	1940	63.0
Cold Bay	2020-05-06	55.0	1997	51.0
Cold Bay	2020-05-18	54.0	1992	53.0
Gulkana	2020-05-09	74.0	2005	71.0
Gulkana	2020-05-10	75.0	1975	72.0
Homer	2020-05-28	68.0	1947	67.0
Homer	2020-05-29	67.0	1993	66.0
Juneau	2020-05-09	76.0	1995	73.0
Ketchikan	2020-05-09	78.0	1975	74.0
Kotzebue	2020-05-10	57.0	1983	56.0
Kotzebue	2020-05-31	72.0	2016	67.0
St. Paul Island	2020-05-14	52.0	2002	48.0
Talkeetna	2020-05-10	72.0	1954	70.0
Utqiaġvik	2020-05-10	37.0	1925	36.0
Yakutat	2020-05-09	75.0	1995	74.0
Yakutat	2020-05-10	73.0	2005	68.0