



Alaska Climate Research Center
Alaska State Climate Center

STATEWIDE CLIMATE SUMMARY JUNE 2021



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Alaska’s Statewide Climate Summary for June 2021 provides an overview of weather for the month based on data from selected weather stations throughout the state. “Departure from normal” refers to the climatological average over the 1991-2020 normal period. Here, we report on temperature, precipitation and drought conditions in the state, as well as the condition of the Arctic sea ice.

HIGHLIGHTS

Warmer than usual temperatures were observed for parts of the Interior of the state, along with the Panhandle, due to impacts of the historic Pacific Northwest heat dome.

Much less precipitation than usual for the Interior of the state, along with **more than usual** for parts of the Panhandle.

Ketchikan set multiple **high temperature records** for the month.

This year’s **total acreage** burned to June 30th is the **lowest since 2008.**

The average sea ice extent ranks as **6th lowest** in the satellite record for the month of June.

Temperature

During the month of June, while colder than normal temperatures were observed at nine of the first-order stations, with the most notable lower than usual deviations at McGrath (-1.9 °F), King Salmon (-1.4 °F) and Bethel (-1.3 °F), warm temperatures in the middle of the month and towards the end of the month affected Southeast Alaska due to the presence of a heat dome over the Pacific Northwest. When the sun warms air above the ground or ocean, that air can rush up into the atmosphere to form a mountain – or dome – of slow-moving hot air under higher pressure that blocks new weather systems from moving in. This forms a block in the atmosphere, not allowing the weather to move, while continuing to gather heat. The dome was built into a very wavy jet stream, with extreme undulations. When the jet stream becomes very wavy and elongated, pressure systems can “pinch” off and become stalled or stuck in places they typically would not be, such as in this case. Overall, for the month of June, warmer than usual temperatures were recorded in the Interior and the Panhandle of the state with notable temperature deviations including Ketchikan (+2.2 °F), Fairbanks (+2.1 °F), Juneau (+1.7 °F) and St. Paul Island (+1.6 °F), as seen in Figures 1, 2 and Table 1. Figure 3 shows the daily temperature deviations for each of the first-order stations. Juneau and Ketchikan experienced warmer than usual temperatures near the end of the month, with Ketchikan breaking a highest maximum daily temperature record of 82°F on June 28th, which

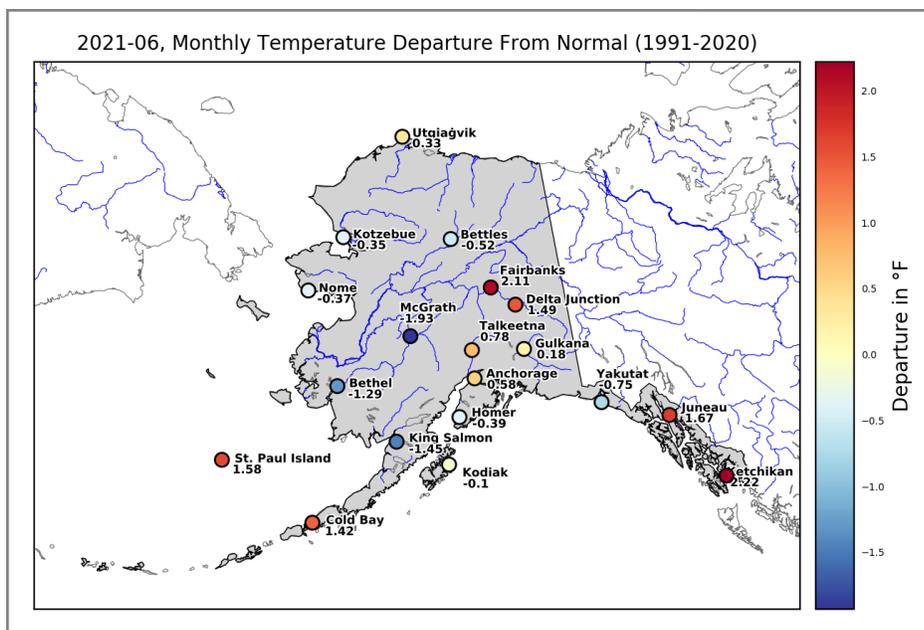


Figure 1. Monthly mean temperature departure from normal, June 2021, for selected stations around the state of Alaska.

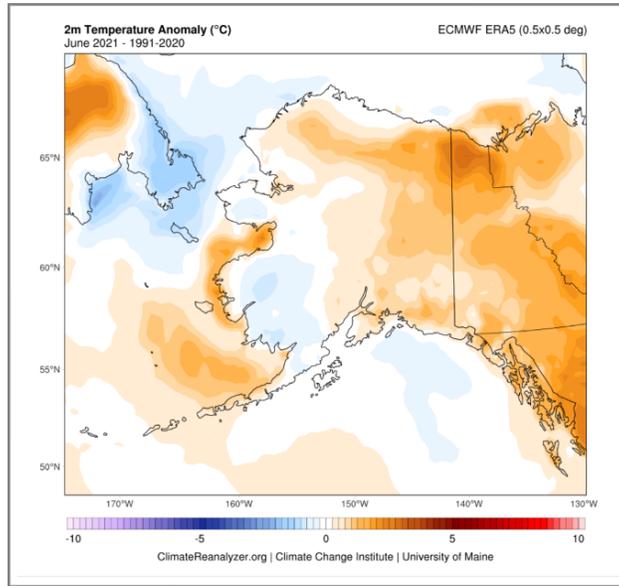


Figure 2. Temperature anomaly for the month of June 2021 relative to the 1991 to 2020 temperature normal as derived from ECMWF ERA5 4th generation reanalysis data, showing warmer than normal temperatures in the eastern part of the Interior and Panhandle, and colder than normal temperatures in the interior parts of the west coast of the state (data source: Climate Reanalyzer, Climate Change Institute, University of Maine).

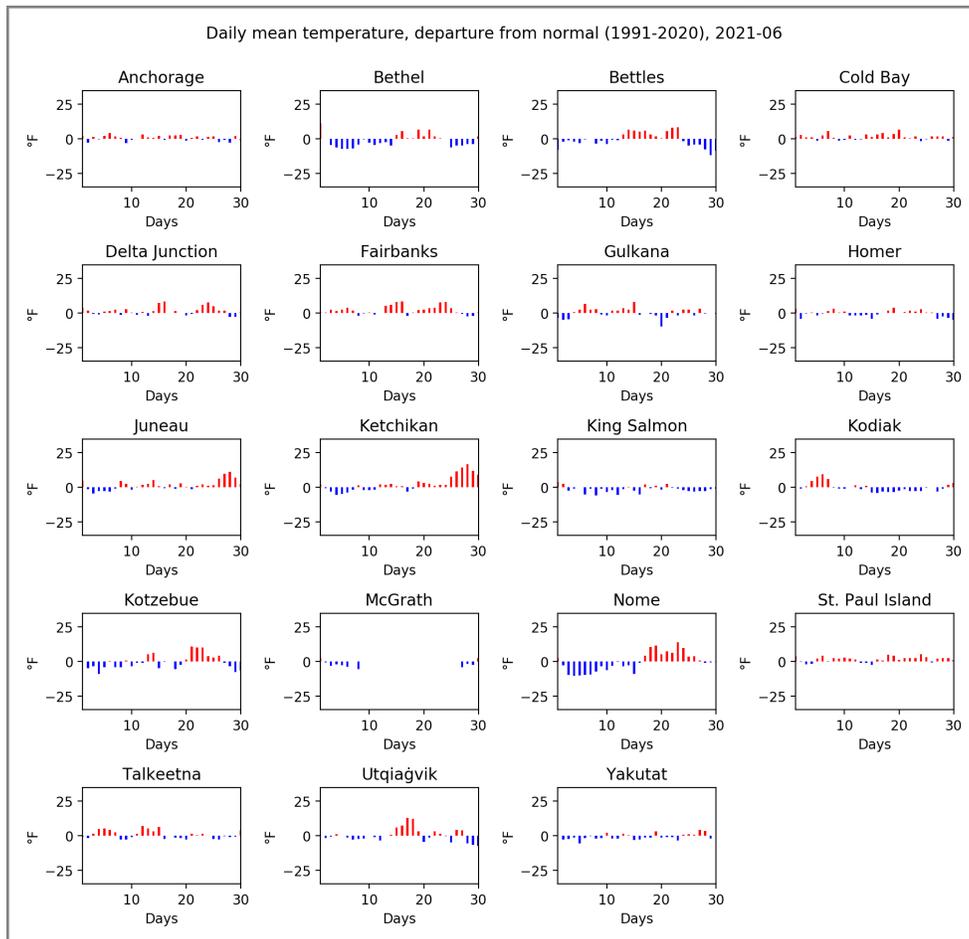


Figure 3. Daily mean temperature departures for each day in June 2021, at the selected stations.

Station	Observed (°F)	Normal (°F)	Departure (°F)
Anchorage	56.5	55.9	0.6
Bethel	52.0	53.3	-1.3
Bettles	58.1	58.6	-0.5
Cold Bay	48.7	47.3	1.4
Delta Junction	59.9	58.4	1.5
Fairbanks	63.1	61.0	2.1
Gulkana	55.0	54.9	0.2
Homer	51.6	52.0	-0.4
Juneau	56.3	54.6	1.7
Ketchikan	57.5	55.3	2.2
King Salmon	51.4	52.8	-1.4
Kodiak	51.2	51.4	-0.1
Kotzebue	48.4	48.8	-0.4
McGrath	55.6	58.7	-1.9
Nome	47.9	48.3	-0.4
St. Paul Island	44.5	42.9	1.6
Talkeetna	57.8	57.0	0.8
Utqiagvik	36.9	36.6	0.3
Yakutat	51.2	51.9	-0.7

Table 1. Mean monthly air temperature, normal (1991-2020) and departure for selected stations throughout the state, June 2021. Color-coded to Figure 1 (yellow-orange-red = warmer than usual; shades of blue = cooler than usual).

was initially set back in 1946 when the temperature was 75°F. Fairbanks experienced warmer than usual temperatures near the middle of the month (Figure 3) leading to an overall average of warmer than usual for the month. While high temperatures for the later half of the month prevailed in Nome, colder than usual temperatures at the beginning of the month countered this, leading to near-normal conditions for the month.

Precipitation

Reporting stations in the Interior of the state had lower than usual precipitation for the month, with significant below-normal precipitation recorded in Delta Junction (23% of normal), Anchorage (30% of normal), Talkeetna (54% of normal) and Homer (60% of normal). Above-normal precipitation was observed in Gulkana (228% of normal), Kotzebue (180% of normal), Juneau (167% of normal), Nome (165% of normal) and Yakutat (146% of normal) (Figure 4A,B; Table 2). Record heat from the Pacific Northwest contributed to a flood on the Taku River near Juneau, as high elevation snowmelt and release of a glacial-dammed lake led to water topping river banks. Northwestern Alaska, especially Kotzebue, received excess rain near the end of the month as a frontal system stalled across the western Brooks Range. Figure 5 shows the monthly precipitation sums for June 2021 at the selected stations compared to the normal (1991-2020), in inches. Gulkana set a new precipitation record with 0.64" inches falling on 6/3/2021, breaking a record set the same day in 1983. Juneau broke precipitation records on 6/2/2021, receiving 1.28" of rain versus 1.02" back in 1977; and on 6/15/2021, receiving 1.46" of rain, compared with a previous record set in 1983. Kotzebue also broke a record, receiving 0.27" of precipitation on 6/14/2021, breaking a previous record by doubling the precipitation that fell the same day back in 1946.

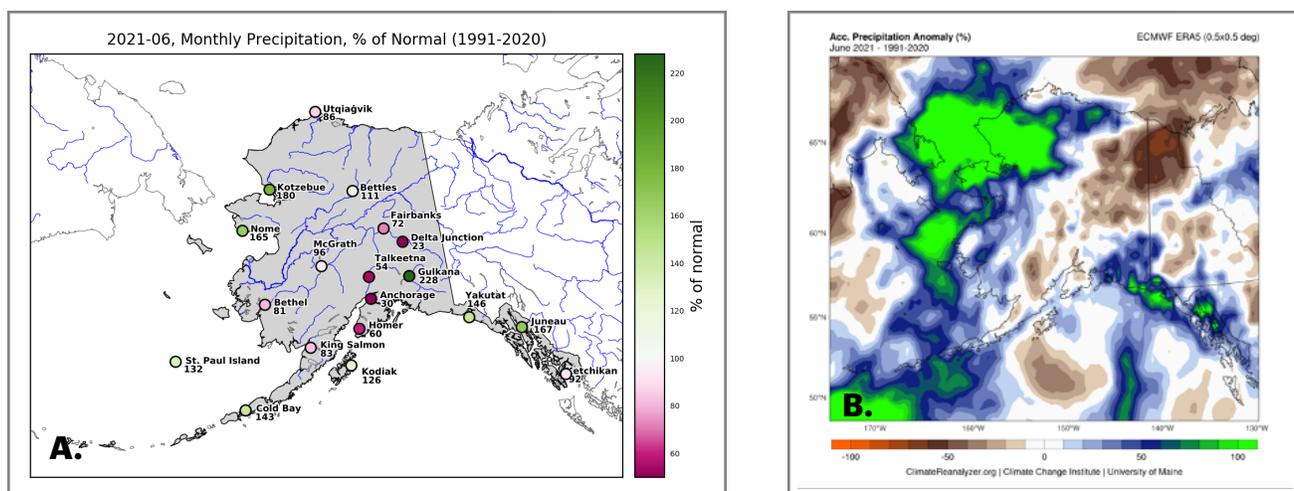


Figure 4. (A) Monthly mean precipitation departure from normal (in percent), June 2021, for selected stations around the state of Alaska. (B) Precipitation anomaly for the month of June 2021 relative to the 1991 to 2020 precipitation normal as derived from ECMWF ERA5 4th generation reanalysis data, showing drier than normal conditions in parts of the Interior, with wetter than normal conditions along the West Coast, particularly the northwest, and along the Panhandle (data source: Climate Reanalyzer, Climate Change Institute, University of Maine).

Station	Precipitation (in)	Normal (in)	% of Normal
Anchorage	0.3	1.0	30.4
Bethel	1.4	1.8	81.4
Bettles	1.6	1.5	111.0
Cold Bay	3.9	2.7	143.1
Delta Junction	0.5	2.2	22.9
Fairbanks	1.1	1.5	71.6
Gulkana	2.0	1.4	150.0
Homer	0.5	0.9	59.8
Juneau	6.4	3.8	167.0
Ketchikan	6.4	7.0	91.7
King Salmon	1.5	1.8	82.5
Kodiak	6.5	5.2	126.1
Kotzebue	1.1	0.6	180.0
McGrath	1.6	1.7	96.4
Nome	1.6	1.0	164.6
St. Paul Island	1.7	1.3	132.1
Talkeetna	0.9	1.7	53.8
Utqiagvik	0.4	0.4	86.0
Yakutat	7.9	5.4	146.4

Table 2. Monthly precipitation sum, normal (1991-2020) and departure expressed as a percentage of the normal (1991-2020) for selected stations throughout the state, June 2021. Shades of purple and green correlate with Figure 4A.

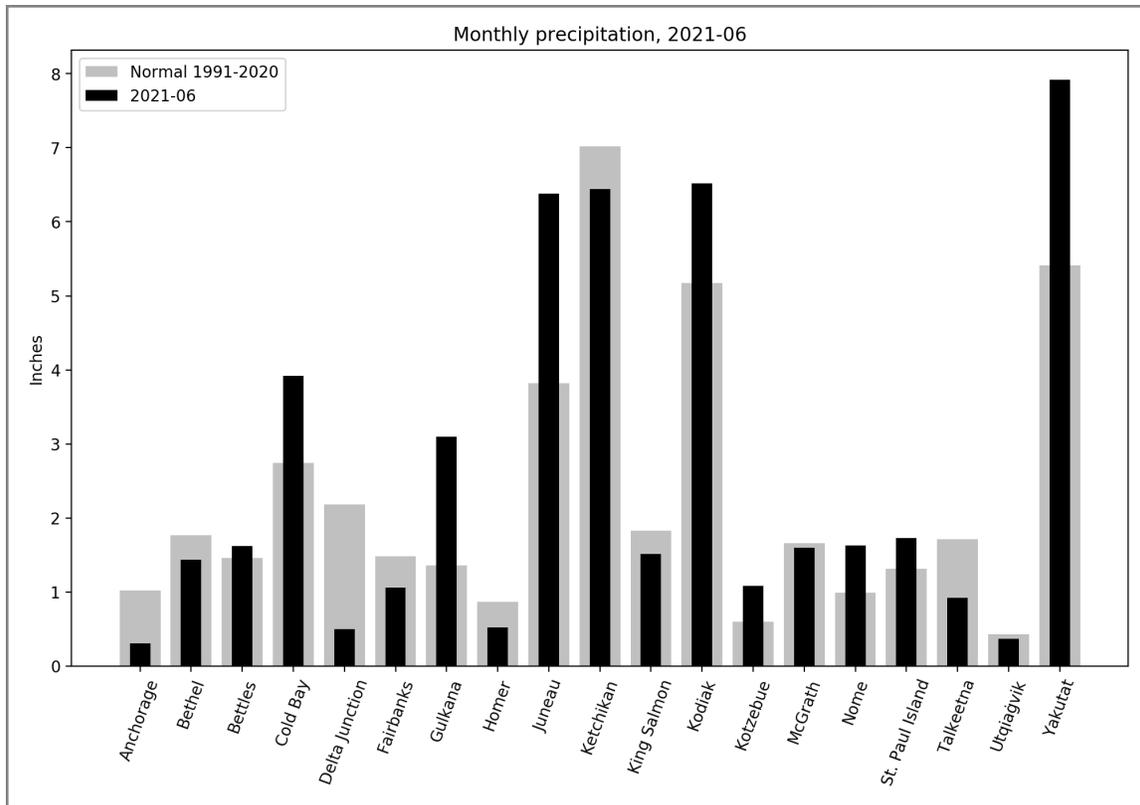


Figure 5. Monthly precipitation sums for June 2021 at the selected stations compared to the normal (1991-2020), in inches.

Drought

Despite below normal precipitation in the Interior of the state for the month, only the North Slope is showing abnormally dry conditions for June 2021. Very warm temperatures were reached across parts of the North Slope in the middle of the month. On June 15th, Deadhorse reached 80 °F. Figure 6 has been produced through a collaboration of the USDA, NOAA and the National Drought Mitigation Center.

Wildfire Activity

As of July 1, 2021, the year-to-date fires total 272, with 72,355 acres burned. The majority (175) are human-caused, with 86 caused by lightning and 11 with an undetermined cause. This year’s total acreage burned to June 30th is the lowest since 2008 and lowest June total since 2014. Please check our UAFSmoke website at <http://smoke.alaska.edu> for current and 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.

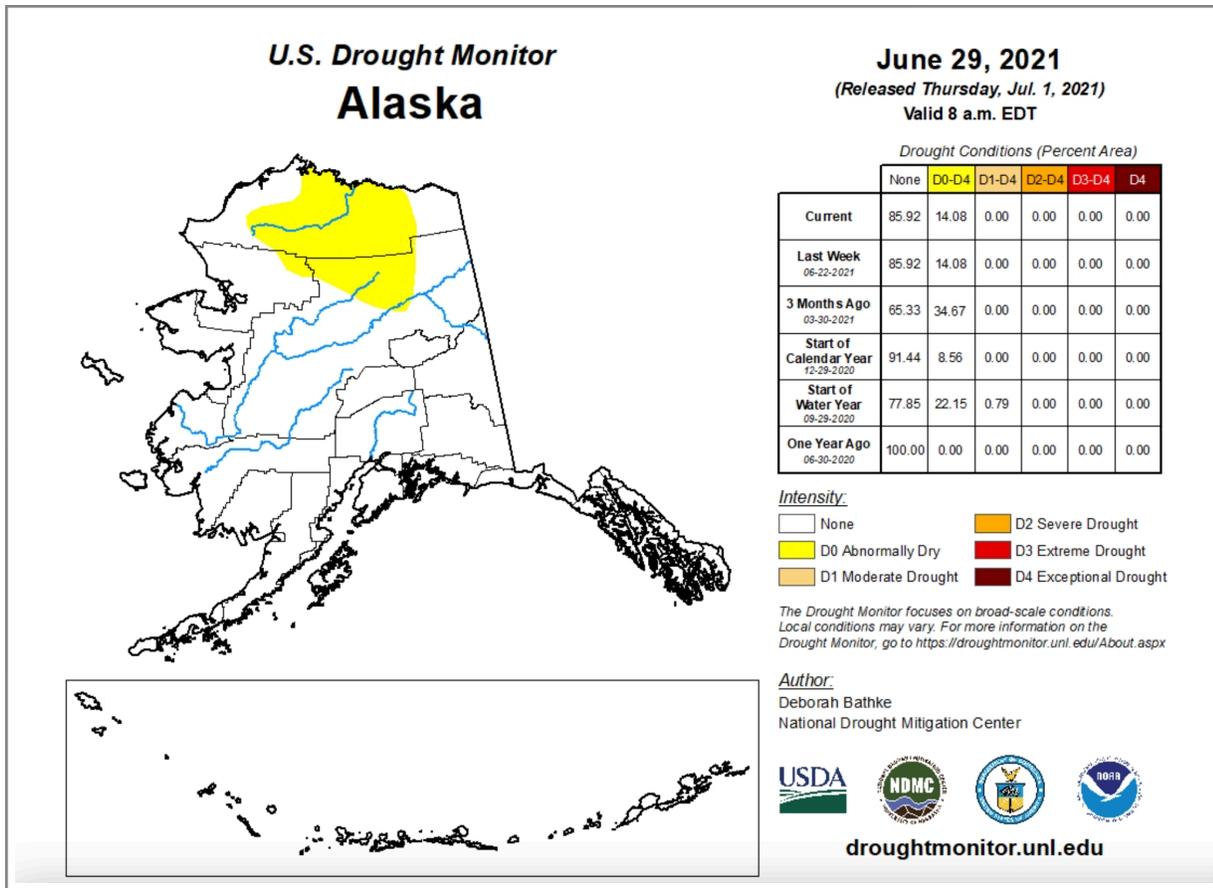


Figure 6: U.S. Drought Monitor map for Alaska, updated on June 29, 2021. The table on the right shows the percent area affected by different categories of drought intensity. Figures and data produced and released by the U.S. Drought Monitor, a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration (<https://droughtmonitor.unl.edu>).

Arctic Sea Ice

Loss of Arctic sea ice in June was relatively steady and rapid. The average extent for the month ranked 6th lowest in the passive microwave satellite record. While rapid ice loss was observed in Hudson Bay, Baffin Bay, the Siberian coast and the Chukchi Sea, ice remained extensive along the northern coast of Alaska. In the first

week of the month, the sea level extent decreased by a large rate of 4.6%, while the following week, it slowed down a bit to a rate of 4%. By the third week of the month, sea ice extent loss increased again to nearly 5% (4.95%) and then, by the end of the month, slowed to a rate of 3.96%. It was a bit more anomalously negative for this time of year. Overall, during the course of June 2021, sea ice extent decreased from 11.630 to 10.191 M km². Figure 7 shows the time series for 2021 of daily Arctic sea ice extent, up to June 24, 2021, while Figure 8 shows the sea ice extent for the month of June 2021, as compared with the median edge (1981 – 2010).

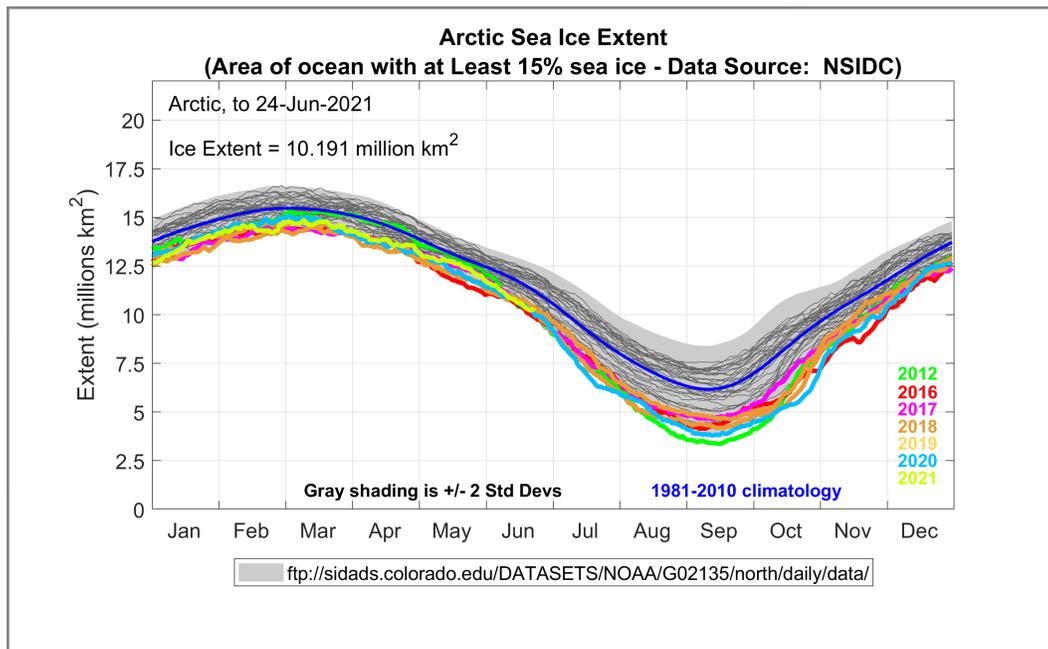


Figure 7. Time series of daily Arctic sea ice extent. This year’s data (lime green) are updated until June 24, 2021. The median sea ice extent for the 1981-2010 reference period is depicted in blue. Specific years are highlighted in colors. Plot Compiled by: Howard J. Diamond, PhD; Climate Science Program Manager at NOAA’s Air Resources Laboratory Data Source: National Snow & Ice Data Center (<https://nsidc.org/>).

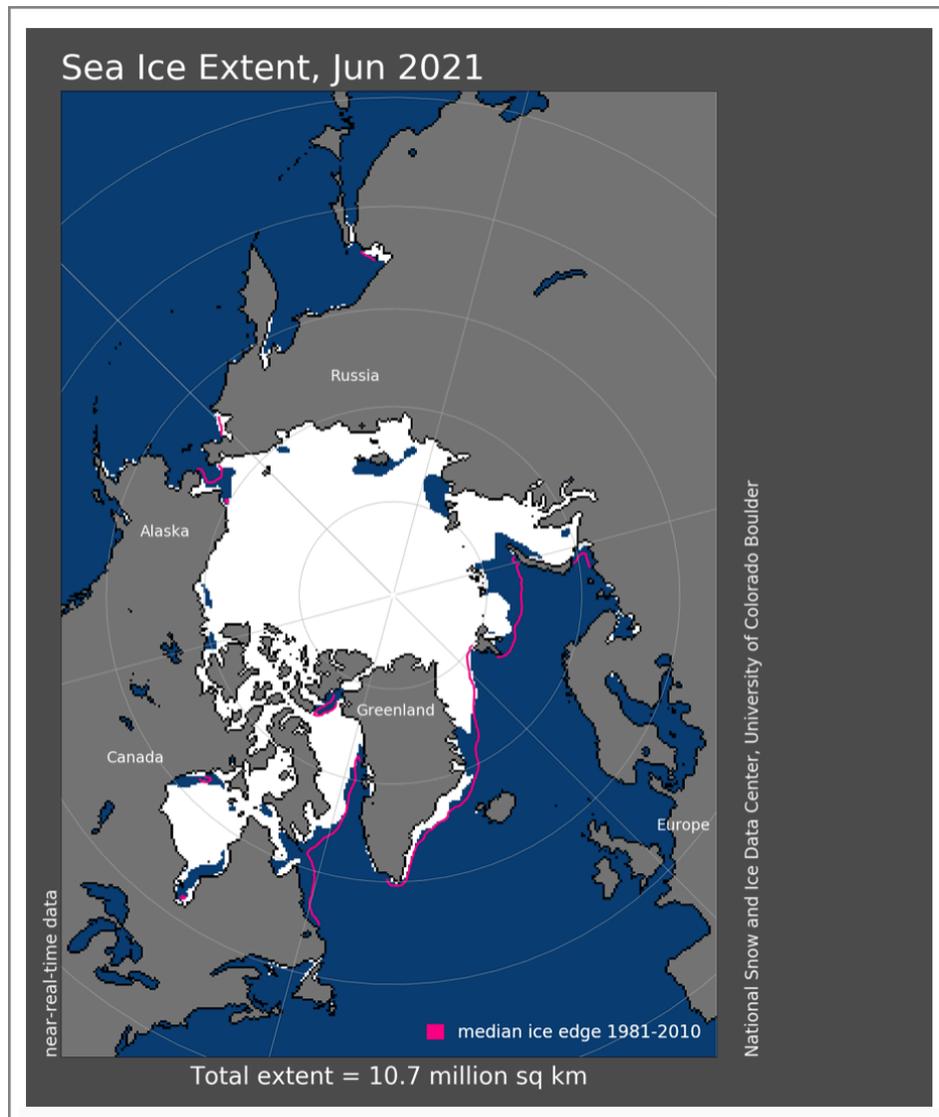


Figure 8. Arctic sea ice extent for the month of June 2021.
Image: National Snow and Ice Data Center (nsidc.org).

Newsworthy Information

UAF provides the big picture in wildfire season

Fire season is underway in Alaska and the UAF geophysical institute is helping battle the flames. The Geographic Information Network of Alaska (GINA), with support from the federal Joint Polar Satellite System program, uses data from two satellites orbiting 512 miles above Earth to provide fire managers with information vital to fighting wildfires in Alaska.

<https://news.uaf.edu/uaf-provides-the-big-picture-in-wildfire-season/>



UAF photo by Todd Paris

The “Big Dog” antenna is housed in a dome atop the Akasofu Building on the University of Alaska Fairbanks campus. The antenna is one of two that are used to receive VIIRS data from two polar-orbiting satellites.



The Taku River surpassed its major flood stage level overnight on June 29, 2021, threatening structures along its banks. (Photo courtesy of Suzanne Bavaard).

Major flooding underway on Taku River near Juneau

Major flooding is underway after a glacial dam release dumped even more water into an already swollen river. Increased snow melt from recent heavy rains and warm temperatures pushed the river above minor flood stage the morning on Sunday, June 27th.

<https://www.alaskapublic.org/2021/06/30/major-flooding-underway-on-taku-river-near-juneau/>

Appendix

Table A1: June 2021 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. Six new records were set for highest mean daily temperatures was set and none for lowest mean daily temperature record.

Highest Mean Daily Temperature on Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Cold Bay	2021-06-17	52.0	1999	51.5
Cold Bay	2021-06-20	55.0	1975	53.5
Ketchikan	2021-06-26	68.0	2019	67.5
Ketchikan	2021-06-27	71.0	2019	68.5
Ketchikan	2021-06-28	73.5	1995	66.0
Utqiagvik	2021-06-17	50.5	2004	49.5

Table A2: June 2021 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. One new highest maximum daily temperature records were set and one was set for lowest maximum daily temperature records.

Highest Maximum Daily Temperature Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Ketchikan	2021-06-28	82.0	1946	75.0

Lowest Maximum Daily Temperature Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Bettles	2021-06-29	52.0	1981	54.0

Table A3: June 2021 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. 11 new records for highest minimum daily temperatures were set and one new record for lowest minimum daily temperature.

Highest Minimum Daily Temperature on Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Cold Bay	2021-06-30	49.0	1962	48.0
Delta Junction	2021-06-24	62.0	2004	60.0
Juneau	2021-06-24	54.0	1984	53.0
Ketchikan	2021-06-26	60.0	2019	57.0
Ketchikan	2021-06-27	62.0	2019	57.0
Ketchikan	2021-06-28	65.0	1995	59.0
Kodiak	2021-06-05	50.0	1980	49.0
Kodiak	2021-06-06	50.0	1979	49.0
Kotzebue	2021-06-23	58.0	2015	57.0
Talkeetna	2021-06-22	55.0	2001	54.0
Utqiagvik	2021-06-17	44.0	1996	39.0

Lowest Minimum Daily Temperature Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
King Salmon	2021-06-16	31.0	1970	32.0

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 comments, ideas or errors to webmaster@akclimate.org.