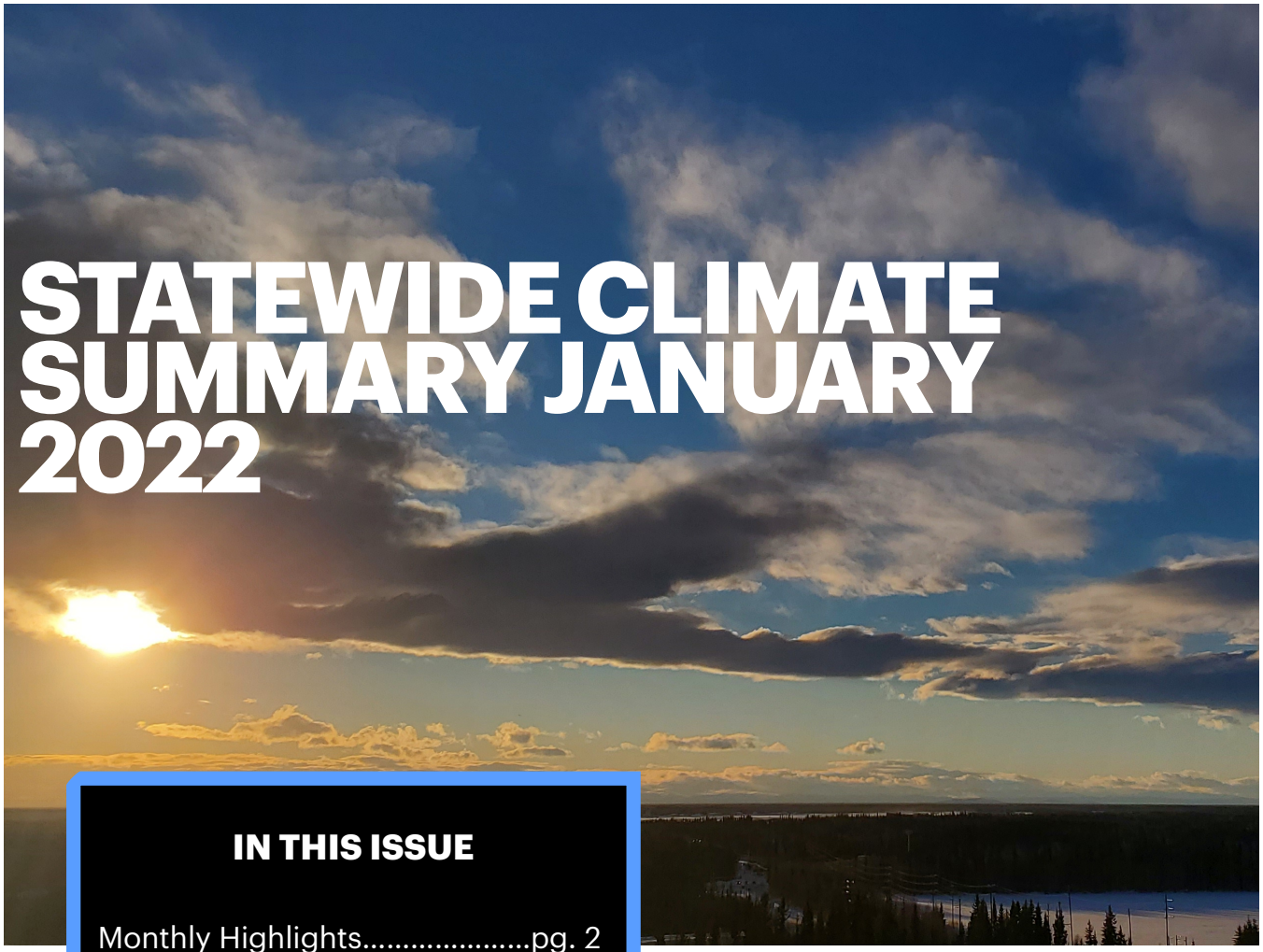
Alaska Climate Research Center
The Alaska State Climate Center



STATEWIDE CLIMATE SUMMARY JANUARY 2022

IN THIS ISSUE

GEOPHYSICAL INSTITUTE
University of Alaska Fairbanks

Alaska's Statewide Climate Summary for January 2022 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

A **cold start to the year** with Arctic air across Alaska, then **warmer than average temperatures** from the Interior to Southcentral.

A **strong wind event** in the Matanuska Valley on January 1st and 2nd left **thousands without power**.

Snow depth and snow water equivalent measurements at the end of the month were **above normal** across much of the state.

Heavy rainfall during the second half of the month **reduced the near record snowpack** in Juneau to almost nothing.

Significant Weather Events and Synoptics

A severe cyclone with the center over the Northern Gulf of Alaska introduced the new year (Figure 1). Northeasterly stormy winds across the Southeast Interior, the Cook Inlet and Bristol Bay caused massive power outages and chaos especially in the Matanuska-Susitna Borough on January 1st and 2nd. The strongest winds were observed over southcentral Alaska, with wind gusts up to 91 mph recorded at the Glenn Highway Interchange and gusts of 74-87 mph observed at locations between Wasilla and Palmer. Wind gusts damaged buildings, flipped airplanes and truck trailers, sent debris flying and left up to 22,000 households without power for long stretches of time with temperatures near zero.

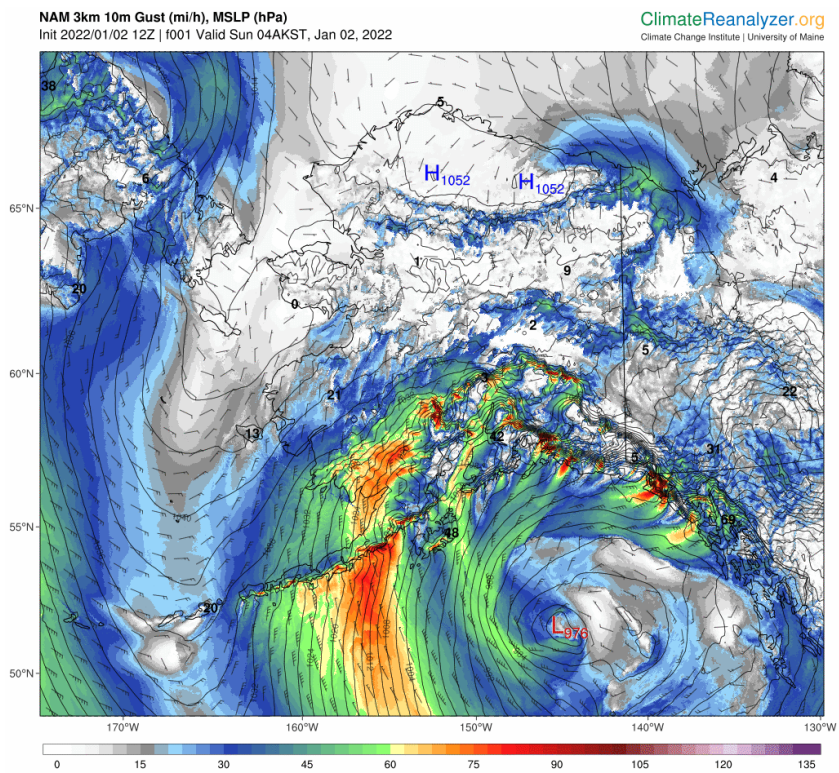


Figure 1. NAM 10-meter wind gust and mean sea-level pressure forecast for 12 UTC January 2.
Graphic source: Climate Reanalyzer (climateranalyzer.org), *Climate Change Institute, University of Maine.*

Arctic air and significant below normal temperatures persisted across the whole state the first week of January. During the course of January, several low-pressure systems moved across the Gulf of Alaska and northern Pacific impacting the western and southern coasts. Warm subtropical air was dispersed with a changed southerly flow towards

Alaska during the second week of January, with significant snow and rain falling over the south side of the Alaska Range. A front associated with a low-pressure system in the Gulf brought heavy snow and high winds, then rain to the Panhandle on January 9-10 (Figure 2A). Locations from Haines to Gustavus, Juneau, and Wrangell received a foot or more of snow before temperatures rapidly rose behind the northward moving front and precipitation transitioned to rain. Wind gusts of 52 mph were recorded the morning of January 9 at the Ketchikan Airport. Then over January 20-24, the circulation around another low resulted in snow and high winds across the West Coast, chinook winds to the Interior and Southcentral, and heavy rainfall over the Panhandle (Figure 2B). Temperatures across the Interior and Southcentral were in the 30s and 40s during this event, and several locations in the Panhandle set new daily precipitation records.

Overall, high sea-level pressure over Siberia and across the Bering Strait and northern Alaska, and low pressure south of the Aleutians and across the Gulf of Alaska persisted on the average of January.

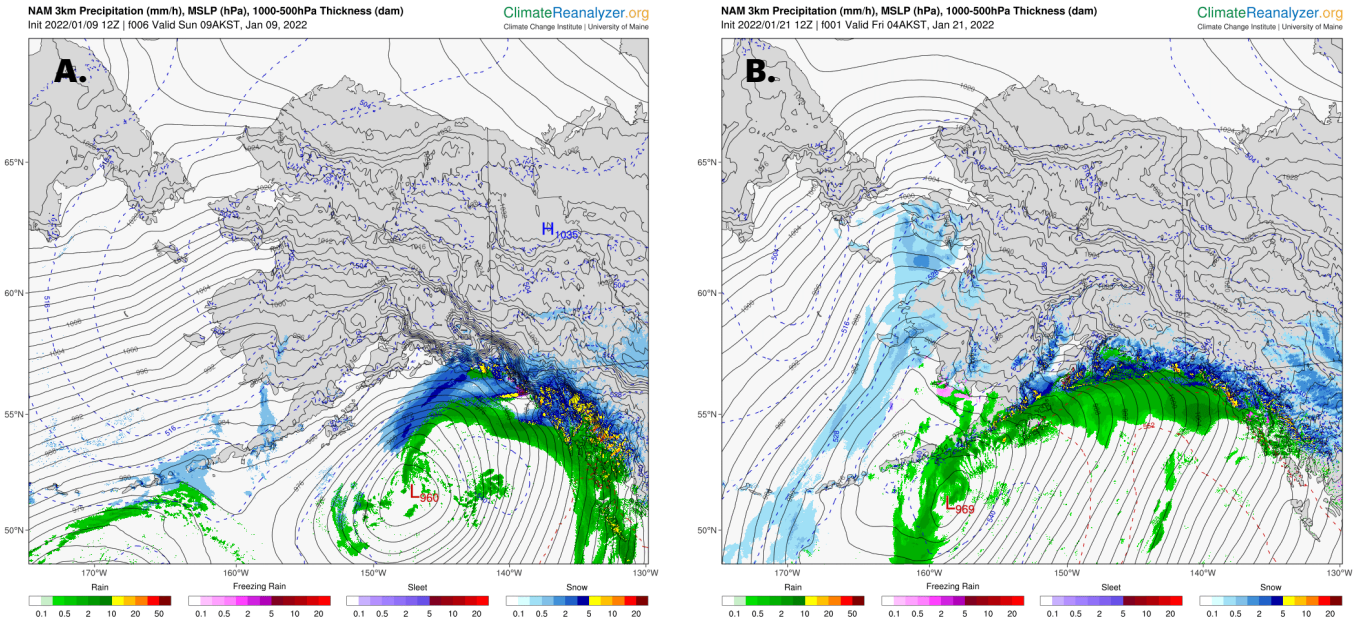


Figure 2. NAM precipitation, mean sea-level pressure, and 1000-500 hPa thickness forecast for (A) 18 UTC January 9 and (B) 12 UTC January 21. Graphic source: Climate Reanalyzer (*climateranalyzer.org), Climate Change Institute, University of Maine.*

Temperature

With Arctic air settled across most of the state, the new year started with below normal temperatures (Figure 3). The state's first -60°F observation of the winter occurred at Chicken on January 5 and was observed a second time on January 8. Then increasing cloud cover associated with low-pressure systems in the Gulf of Alaska brought warmer temperatures across the Interior, Southcentral, and Panhandle. The highest temperatures for the month in these regions occurred during a chinook wind event from January 21 to January 24. Anchorage set a new daily maximum temperature record of 47°F on January 21 and tied the daily maximum on January 22. Across the Interior temperatures were in

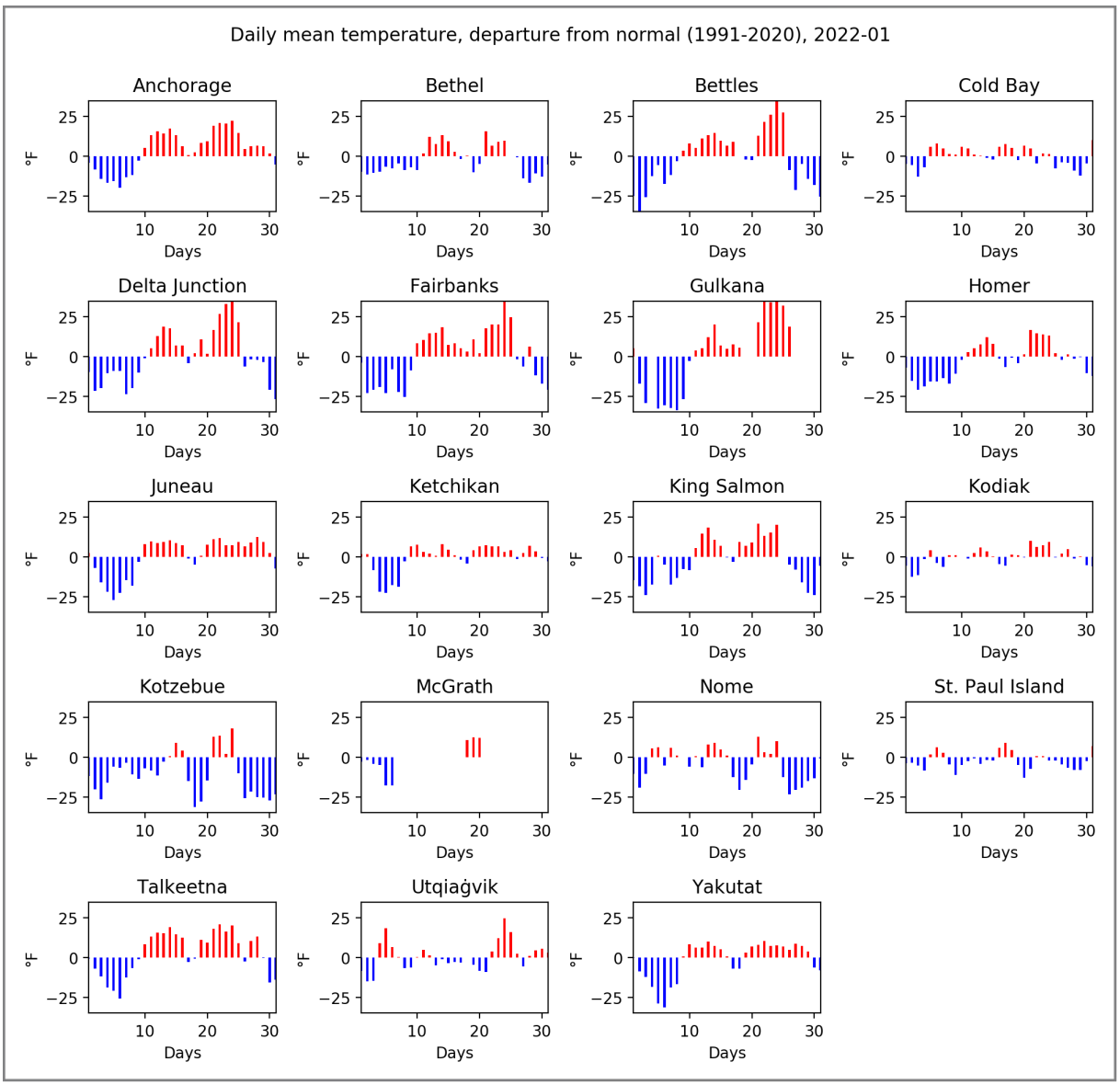


Figure 3. *Daily mean temperature departures for each day in January 2022 at the selected stations.*

the 30s and 40s on January 24, with notable high temperatures in Delta Junction (46°F) and Nenana (48°F). High pressure building up from the west and clearing skies over the mainland resulted in colder temperatures across the mainland to close out the month.

Overall looking at monthly mean temperatures, warmer than normal temperatures were recorded at first-order stations across much of the Interior, the northern Cook Inlet, and the central and southern Panhandle, while colder than normal temperatures were reported across the West Coast and northern Panhandle (Figure 4, Table 1).

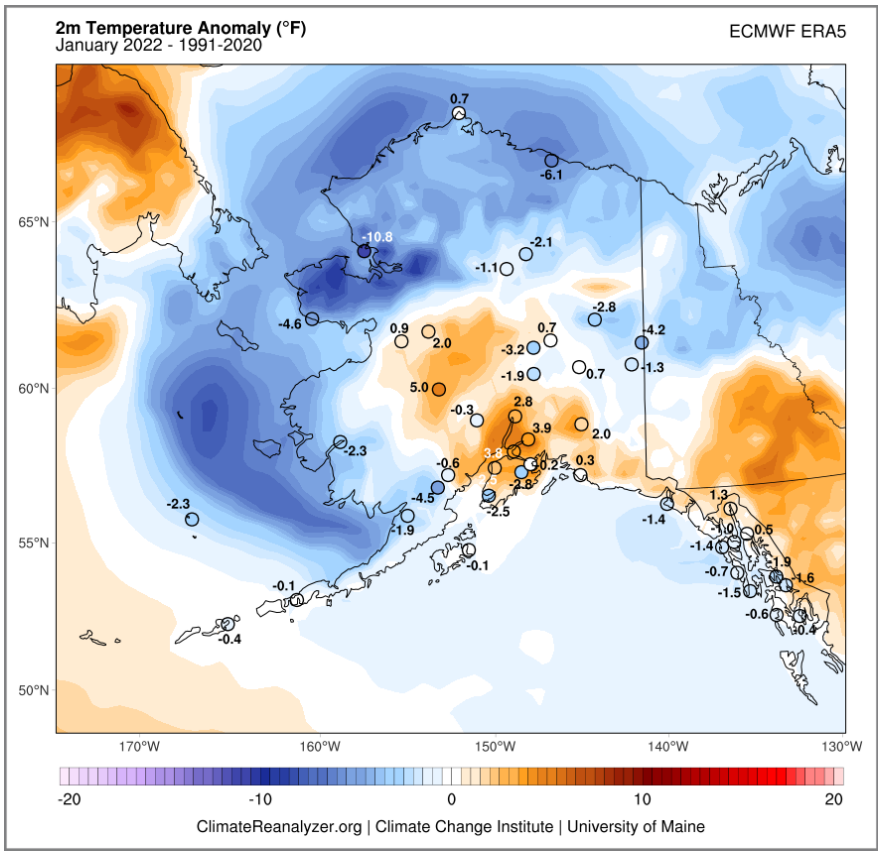


Figure 4. *Monthly mean temperature departure from normal (ºF), January 2022, for selected stations around the state of Alaska and ERA5 gridded temperature anomalies. Temperature data for McGrath are from the McGrath SNOTEL station and ERA5 gridded data are from Climate Reanalyzer, Climate Change Institute, University of Maine.*

Precipitation and Snowfall

Much of Interior and Southeast Alaska started the month with a substantially larger snowpack than normal. On January 1st, the snow depth at Juneau was 20 inches, the

Station	Observed (ºF)	Normal (ºF)	Departure (ºF)
Anchorage	20.6	16.8	3.8
Bethel	4.6	7.0	-2.4
Bettles	-11.7	-10.6	-1.0
Cold Bay	28.3	28.4	-0.1
Delta Junction	-0.3	-0.9	0.7
Fairbanks	-7.6	-8.3	0.7
Gulkana	-1.8	-3.4	2.1
Homer	22.9	25.4	-2.5
Juneau	29.0	28.4	0.5
Ketchikan	35.2	35.6	-0.4
King Salmon	14.8	16.6	-1.9
Kodiak	31.1	31.2	-0.1
Kotzebue	-12.7	-2.0	-10.7
McGrath	-0.7	-5.7	5.0
Nome	1.0	5.6	-4.6
St. Paul Island	23.0	25.3	-2.3
Talkeetna	16.4	13.6	2.8
Utqiaġvik	-10.8	-11.5	0.7
Yakutat	27.2	28.6	-1.4

Table 1. *Mean monthly air temperature, normal (1991-2020) and departure for selected stations throughout the state, January 2022. Color-coded to Figure 4 (yellow-orange-red = warmer than usual; shades of blue = cooler than usual). Temperature data for McGrath are from the McGrath SNOTEL station.*

second highest snow depth for that date on record. Snow depth was notably high at Fairbanks and Bettles as well, ranking the third (34.0 in) and tenth highest (37.0 in), respectively (Figure 5). A storm on January 9-10 brought heavy snowfall to the northern and central Panhandle before transitioning to rain. Several buildings in Yakutat and Juneau sustained damage or collapsed under the load of the snowpack, and disaster declarations were issued for several communities in response. Then the next storm on January 20-23 brought heavy rainfall throughout much of the Panhandle. The Juneau

airport recorded 3.48 inches of rain on January 21, the third highest daily precipitation total on record and setting a new record for 1-day total precipitation for that date and for the month. Yakutat and Sitka also set new daily precipitation records on January 21 of 2.75 and 4.09 inches, respectively. The highest storm total was observed at the Pelican COOP station, which reported 9.05 inches over a 48-hour period. The rainfall from this storm drastically reduced the snowpack across the region. In Juneau, the snow depth went from a maximum of 26 inches on January 9 to a trace of snow on January 23 (Figure 5D).

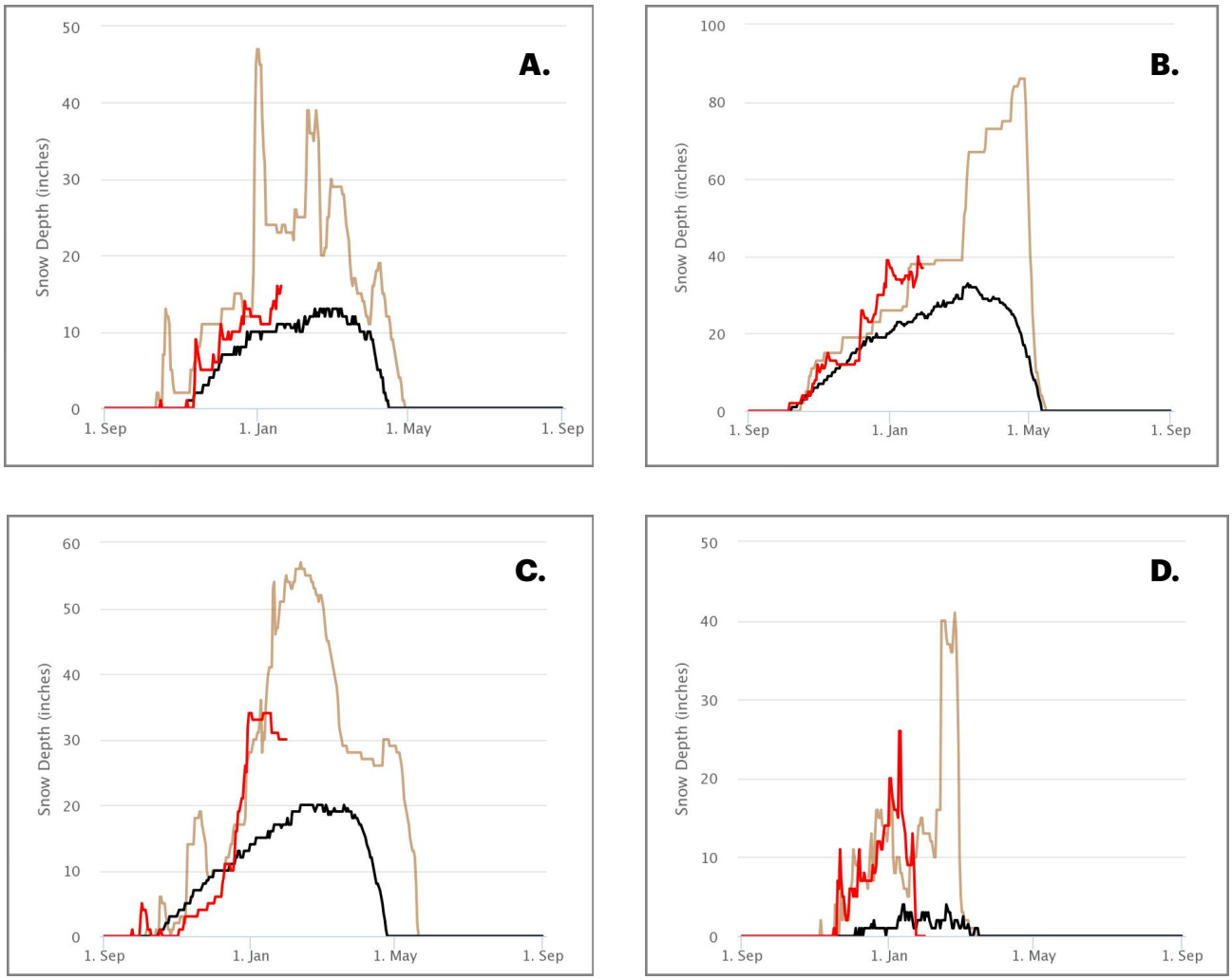


Figure 5. *Average (black line), maximum (tan line), and 2021-2022 (red line) snow depth for (A) Anchorage, (B) Bettles, (C) Fairbanks, and (D) Juneau. Graphic source: Alaska-Pacific River Forecast Center (weather.gov/aprfc/Snow_Depth).*

With increased storm activity across the central and eastern North Gulf Coast, precipitation was near or above normal for the Cook Inlet, Bristol Bay and Panhandle (Figure 6&7, Table 2). Juneau had its wettest January on record, surpassing the previous record of 11.98 inches set in 2015. Much of the Interior and West Coast also recorded above normal precipitation, with the exception of localized minima over the Seward Peninsula and parts of the Tanana Valley. Total monthly snowfall was below normal at Bettles and Fairbanks (Table 3), but the snowpack was still roughly 10 inches above average at the end of the month. Snowfall was above normal for the month in Anchorage; however, the snow depth increased only slightly from 12 inches to 14 inches due to above normal temperatures near the end of the month. Across state, the water equivalent of the snowpack was above normal or much above normal for this time of year (Figure 8).

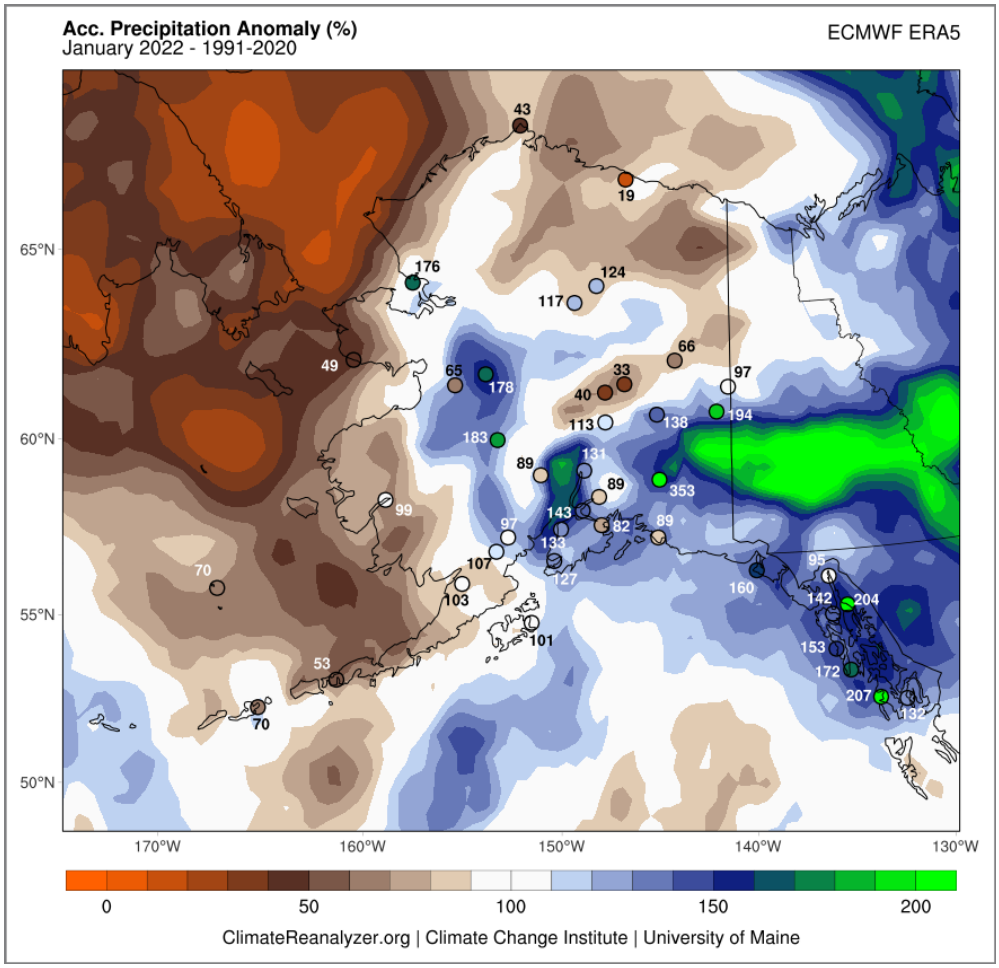


Figure 6. *Monthly mean precipitation departure from normal (in percent), January 2022, for selected stations around the state of Alaska and ERA5 gridded temperature anomalies. Precipitation data for McGrath are from the McGrath SNOTEL station and ERA5 gridded data are from Climate Reanalyzer, Climate Change Institute, University of Maine.*

Station	Precipitation (in)	Normal (in)	% of Normal
Anchorage	1.1	0.8	142.7
Bethel	0.8	0.8	98.7
Bettles	1.1	0.9	126.0
Cold Bay	1.8	3.4	53.3
Delta Junction	0.3	0.2	138.1
Fairbanks	0.2	0.6	32.8
Gulkana	1.9	0.7	261.6
Homer	2.7	2.2	126.5
Juneau	12.3	6.0	204.2
Ketchikan	21.3	16.2	131.8
King Salmon	1.0	0.9	103.2
Kodiak	8.4	8.4	100.7
Kotzebue	1.1	0.6	175.8
McGrath	2.1	1.2	183.0
Nome	0.5	0.9	48.9
St. Paul Island	1.1	1.6	70.2
Talkeetna	1.8	1.3	131.3
Utqiaġvik	0.0	0.1	42.9
Yakutat	19.9	12.4	160.3

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, January 2022. Shades of brown, blue, and green correlate with Figure 6. Precipitation data for McGrath are from the McGrath SNOTEL station.*

Station	Snow (in)	Normal (in)	Deviation (%)	Snow Depth (in)
Anchorage	15.5	12.4	125.0	14
Bettles	9.0	14.0	64.2	34
Fairbanks	3.2	10.2	31.4	29
Juneau	22.7	24.5	92.7	1

Table 3. *Monthly snowfall sum, normal (1991-2020), departure expressed as a percentage of the normal, and end-of-month snow depth for the selected stations that measure snowfall, January 2022. Snowfall data for Anchorage are from the NWS Anchorage Weather Forecasting Office and data for Bettles are from the Bettles Field SNOTEL station.*

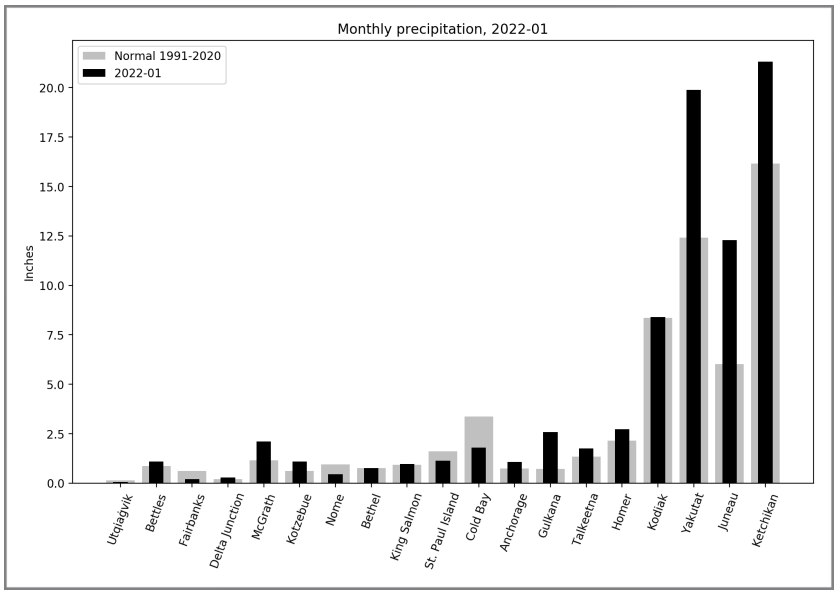


Figure 7. *Monthly precipitation sums for January 2022 at the selected stations compared to the normal (1991-2020), in inches. Precipitation data for McGrath are from the McGrath SNOTEL station.*

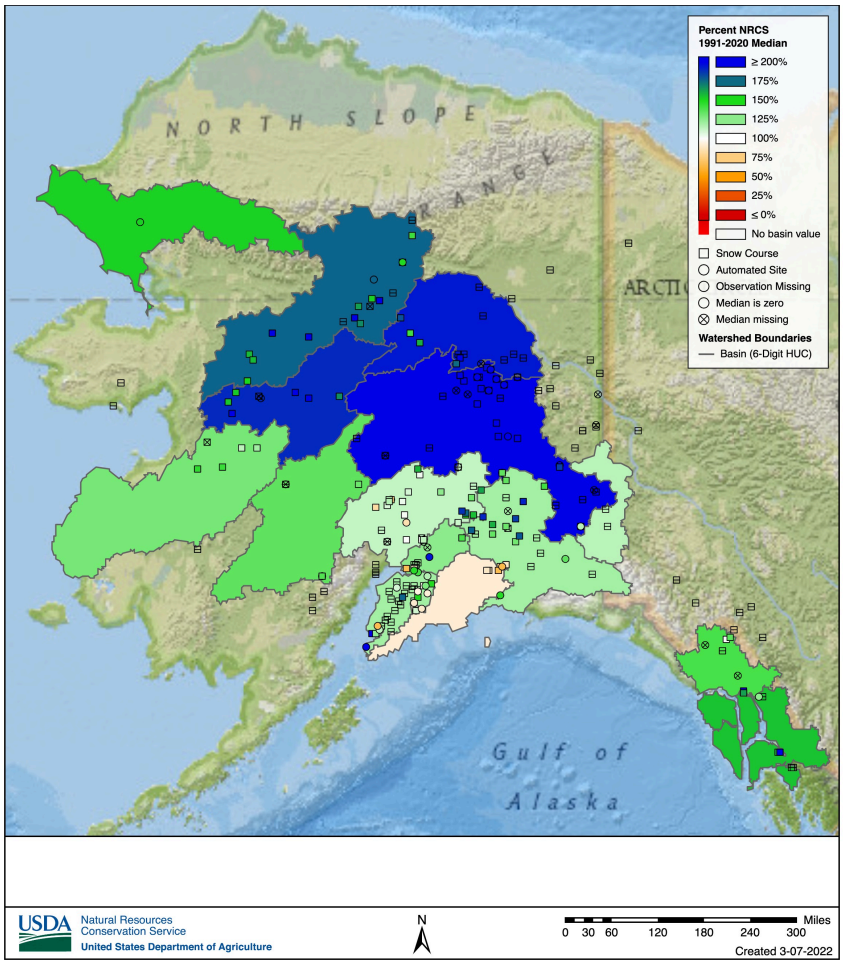


Figure 8. *Season to date snow water equivalent departure from normal (1991-2020, in percent) at the end of January 2022 for SNOTEL stations and watershed basins across Alaska. Source: USDA Natural Resources Conservations Service (https://www.wcc.nrcs.usda.gov/snow/).*

Arctic Sea Ice

The average Arctic sea ice extent for January 2022 was 13.88 square kilometers (5.36 million square miles, the 16th lowest in the satellite record. Although well below the average extent of 14.42 million square kilometers for the 1981-2010 period, the average for the month was within the lowest 10% of normal extents and the highest since 2009. Overall sea ice growth slowed to an average rate of 1.83% per week at the beginning of the month to 1.11% at the end. Areas with below average sea ice include Baffin Bay and the Sea of Okhotsk, while the sea ice over the eastern Bering Sea was above average with the return of colder temperatures. By January 27, the arctic sea ice extent has grown to 14.02 million square kilometers (54.14 million square miles). Figure 9 shows a time series of sea ice extent while Figures 10A,B show the sea ice extent and concentration as of January 31, 2022 compared to the average from 1981-2010.

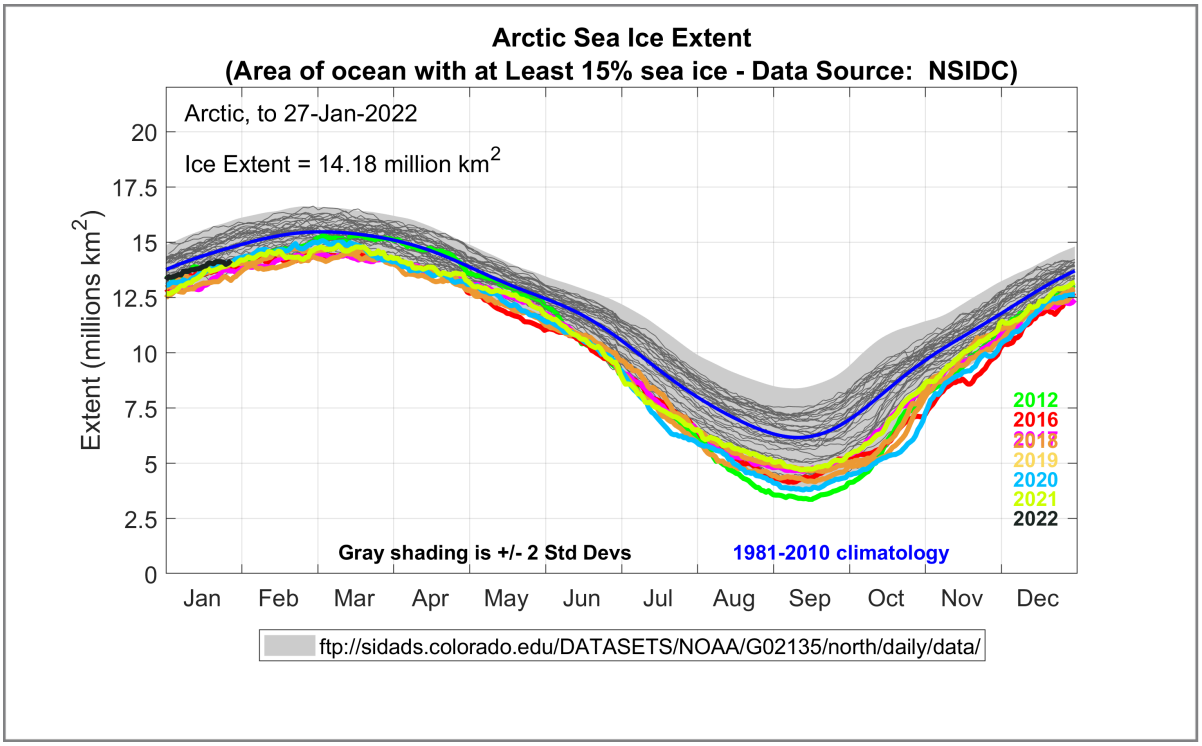


Figure 9. *Time series of daily Arctic sea ice extent. This year's data (jungle green) are updated until January 27, 2022. The median sea ice extent for the 1981-2010 reference period is depicted in blue. Specific years are highlighted in colors. Plot Compiled by: Howard J. Diamond, PhD; Climate Science Program Manager at NOAA's Air Resources Laboratory Data Source: National Snow & Ice Data Center (nsidc.org/).*

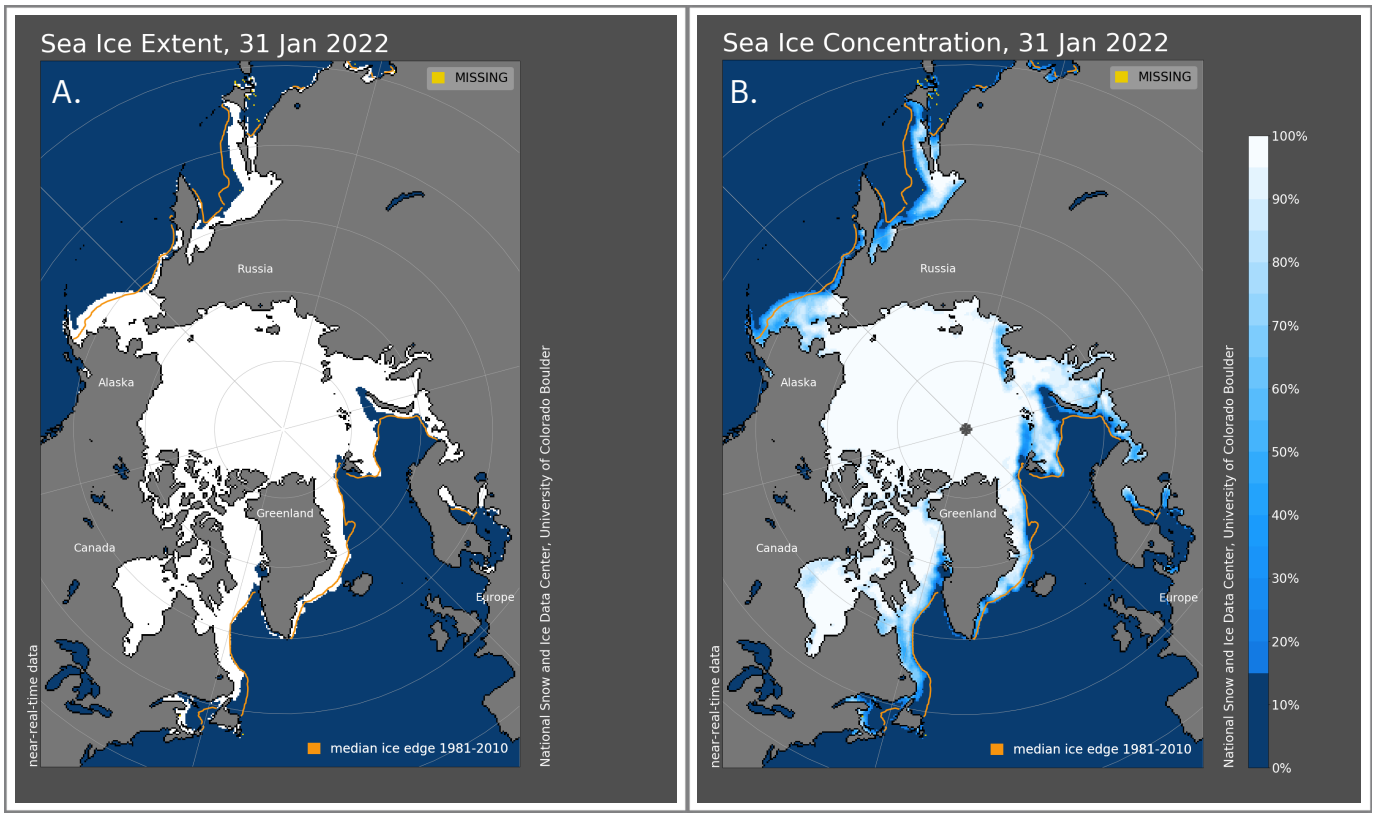
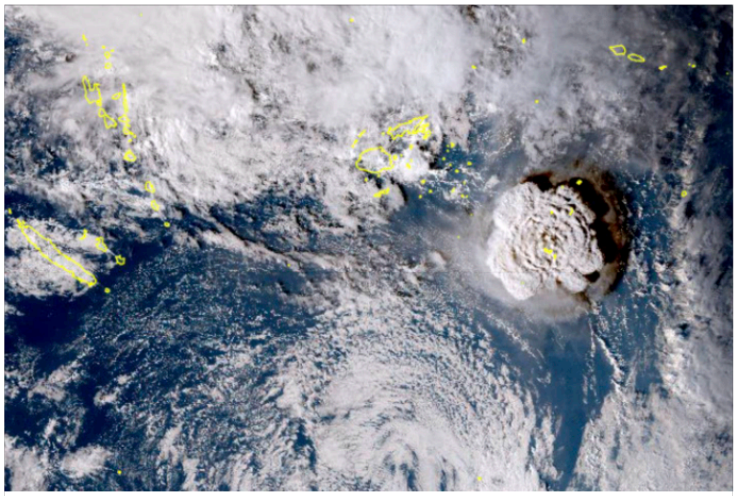


Figure 10. *(A) Sea ice extent and (B) sea ice concentration as of January 31, 2022, and as compared with the 1981 - 2010 median edge. Images: National Snow and Ice Data Center (nsidc.org).*

Newsworthy Information

Volcano eruption near Tonga causes booms heard by Alaskans nearly 6,000 miles away

Early on January 15, many Alaskans heard mysterious booming sounds. These were later attributed to the eruption of an undersea volcano near Tonga in the South Pacific.



In this satellite image taken by Himawari-8, a Japanese weather satellite, and released by the agency, shows an undersea volcano eruption at the Pacific nation of Tonga Saturday, Jan. 15, 2022. An undersea volcano erupted in spectacular fashion near the Pacific nation of Tonga on Saturday, sending large waves crashing across the shore and people rushing to higher ground. (Japan Meteorology Agency via AP)

https://www.adn.com/alaska-news/science/2022/01/15/volcano-eruption-near-tonga-causes-booms-heard-by-alaskans-nearly-6000-miles-away/

Check out our blog post about the eruption's shockwave:
https://akclimate.org/tonga-eruption-shockwave/

Photo by Andy Mahoney, UAF Geophysical Institute
Residents of Utqiagvik return by snowmachine from the lead at the edge of the shore-fast ice.

Scientists aim to improve sea ice predictions' accuracy, access

As the amount of sea ice in the Arctic declines and becomes more mobile, accurate forecasts are becoming even more vital for things like fisheries and resource development, shipping, subsistence activities and wildlife management.

https://uaf.edu/news/scientists-aim-to-improve-sea-ice-predictions-accuracy-access.php

Dozens of experts arrive in Fairbanks for air quality research

The Alaskan Layered Pollution and Chemical Analysis project, or ALPACA, seeks to improve understanding of how pollution behaves in cold and dark conditions and how the layered atmosphere affects pollution events.

https://uaf.edu/news/dozens-of-experts-arrive-in-fairbanks-for-air-quality-research.php

Photo by Meeta Cesler-Maloney
Small inexpensive PurpleAir sensors on a tower in downtown Fairbanks measure particulate matter as part of the ALPACA research.

Appendix

Table A1: January 2022 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. One new highest mean daily temperature record was set and one was set for lowest mean daily temperature record.

Highest Mean Daily Temperature on Record				
Station	**Date**	**New Record (°F)**	**Year of Old Record**	**Old Record (°F)**
Homer	2022-01-21	42.0	1987	40.5

Lowest Mean Daily Temperature on Record				
Station	**Date**	**New Record (°F)**	**Year of Old Record**	**Old Record (°F)**
Yakutat	2022-01-06	-3.0	1965	-2.0

Table A2: January 2022 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. No new highest maximum daily temperature records were set and one was set for lowest maximum daily temperature record.

Lowest Maximum Daily Temperature Record				
Station	**Date**	**New Record (°F)**	**Year of Old Record**	**Old Record (°F)**
Yakutat	2022-01-06	6.0	1975	11.0

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.