

Bizarre Happenings in the Far North: Lightning, Tropical Moisture, and More

Bob Henson · August 14, 2019, 2:38 AM EDT



Above: In this image taken on Thursday, August 1, 2019, large rivers of melting water form on an ice sheet in w Greenland and drain into moulin holes that empty into the ocean from underneath the ice. The heat dome that sm high temperature records in five European countries a week ago moved over Greenland in late July and early Au accelerating the melting of the island's ice sheet and causing massive ice loss in the Arctic. Image credit: Caspar Haarløv, Into the Ice via AP.

You'll have to forgive the Arctic. It's had a rough summer. Sea ice is running neck and neck with 2012 for the [lowest values on record](#) for this time of year. Wildfires are ringing the Arctic, pouring [more carbon dioxide into the air](#) than in any comparable period in 17 years of satellite observing. Alaska saw its [hottest month by far](#) in almost a century of recordkeeping. And a surge of warm air with origins in last month's [record-devouring European heat wave](#) pushed across Greenland at the end of July, melting 55 million tons of sea ice in five days. That's an unprecedented rate in satellite records, according to the European Union's Copernicus project, and [more than three times](#) the average melt rate for 1981-2010.

The past several days have doubled down, bringing weather events that wouldn't be out of place in the U.S. South but that stand out in the far north like a magnolia tree sitting on tundra.

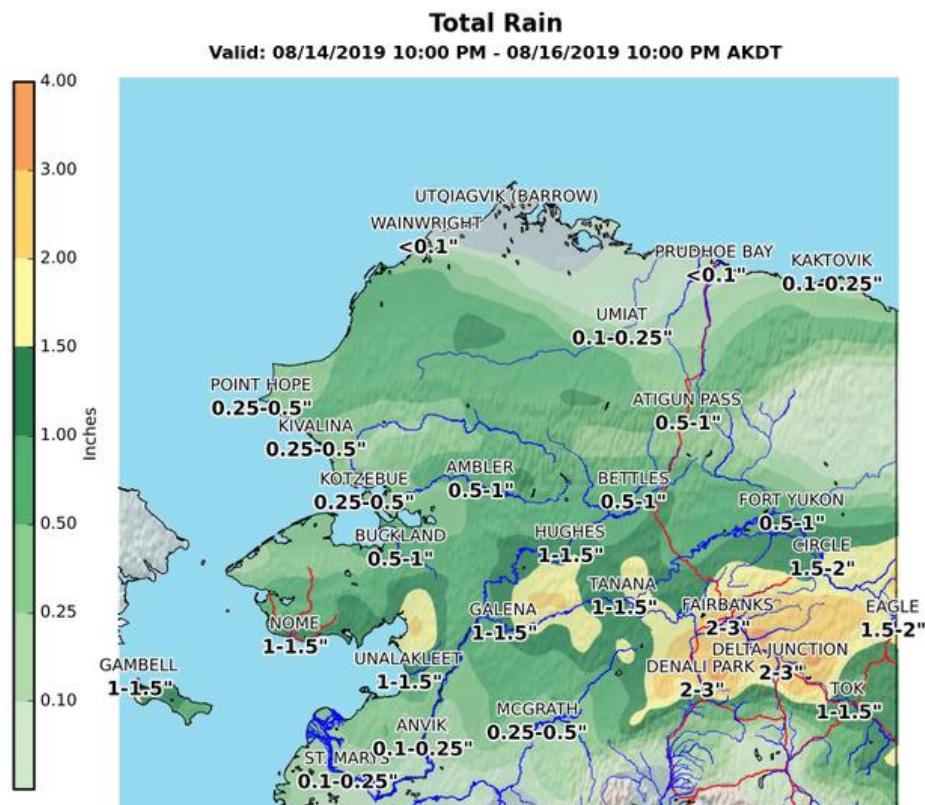
Wettest atmosphere on record, yet a record-dry August in southeast Alaska

August kicked off with a disorienting feed of tropical moisture from the typhoon-pockmarked Northwest Pacific into northern Alaska. Such atmospheric rivers do make their way into Alaska, especially in late summer, but in this case the moisture brought drenching rains across a vast area, including the heaviest 24-hour rainfall on record for Nome (2.43" on August 1-2), as well as [widespread flooding](#).



NWS Fairbanks

Another round of heavy rain is expected late tonight into Friday. Most of Fairbanks North Star Borough will see over two inches of rain between late tonight and Friday afternoon. Here is map of the expected rainfall totals between 10 PM tonight and 10 PM



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Early this week, another soggy surge of upper-level moisture swept into southwest and central parts of Alaska. The new surge will contribute to heavy rains across central Alaska that could lead to [additional flooding](#) later this week. With [4.28" of rain](#) this month through Tuesday, Fairbanks could top its August precipitation record (6.88", from 1930) by this weekend. And the moisture plume itself is already a record-breaker. At several locations separated by hundreds of miles, Tuesday brought the wettest atmosphere ever observed in the 70-plus years since regular radiosondes (weather balloons) have been launched over Alaska. This is based on precipitable water (PW), the amount of moisture in a column of air above the surface.

According to climatologist Brett Brettschneider, the following locations set all-time PW records:

[**Bethel, 12Z Tuesday: 1.86"**](#) (old record 1.77" from August 6, 1956)

[**Fairbanks, 0Z Wednesday: 1.59"**](#) (old record 1.57" from July 13, 1971)

[**Anchorage, 0Z Wednesday: 1.76"**](#) (old record 1.67" from August 26, 1990)

For perspective:

—There was [more moisture](#) in the air on Tuesday night above Anchorage than there was above Corpus Christi, Texas (1.73"), which sits on the Gulf Coast.

—The amount of water above Anchorage [would have beaten](#) the all-time record for Salem, Oregon (1.73").

With the main jet stream absurdly far north, parts of southeast Alaska that are typically moist have been markedly dry this month. Even with the record amount of moisture sitting above it, Anchorage was able to squeeze out only a trace of rainfall on Tuesday. The city has seen no measurable rain all month—something that's occurred on August 1-13 only once before (1969) in airport records going back to 1954. No rain is expected in Anchorage for at least the next week.

Juneau hasn't seen measurable rain [since July 29](#), making this the first August in 124 years of recordkeeping to go this long without rain. The city could get some sprinkles or spritzes starting Wednesday, and perhaps a bigger dose of rain toward the weekend.



[NWS Juneau](#)

Dry weather continues in Southeast. [#Juneau](#) is going for a historic dry record. As a rain forest rain usually comes often, but that has not been the norm this year. This is a bitter-sweet record in the making. [#akwx #drought #AKdrought](#) .@KTOOpubmedia .@JuneauEmpire .@800KINY

Lightning near the North Pole?

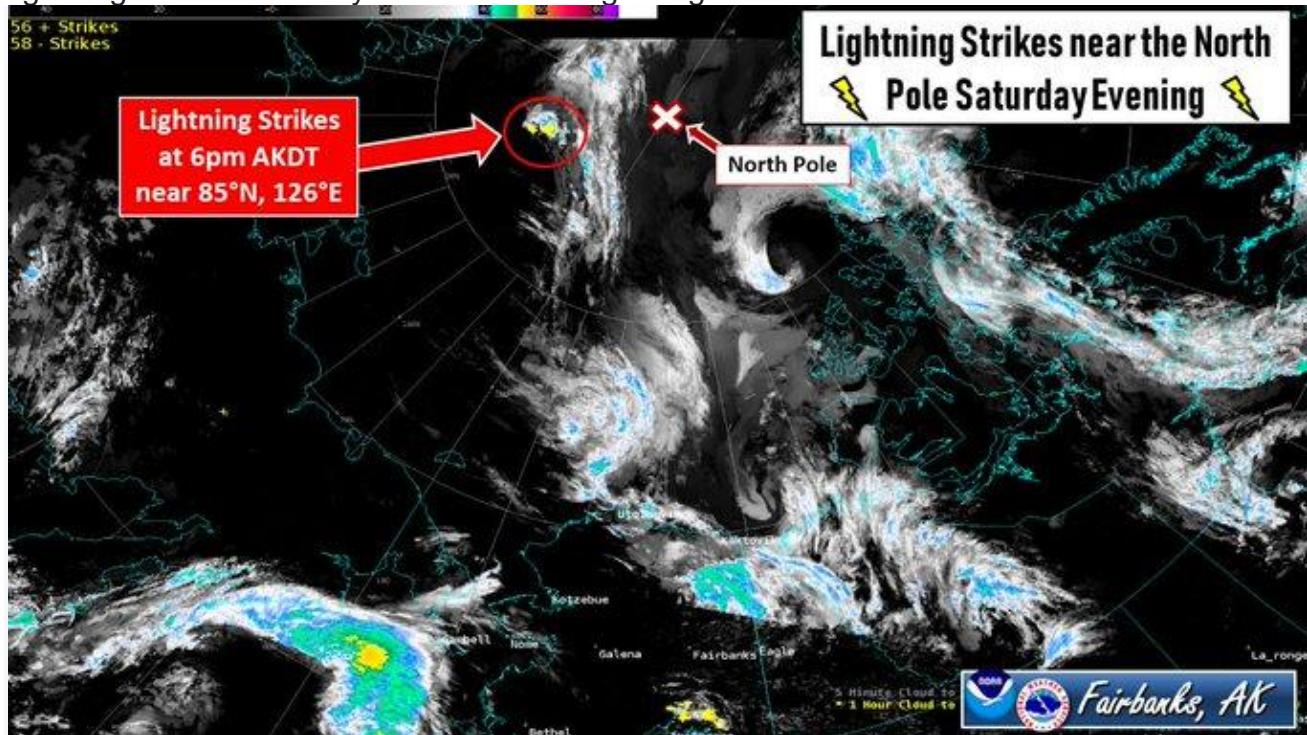
Social media lit up this past weekend when a total of 48 lightning discharges were reported north of 85°N latitude, or within about 450 miles of the North Pole. The lightning came from low-topped, elevated thunderstorms that occasionally pop up over the Arctic, but seldom so close to 90°N. Elevated storms develop when moist, unstable air sits above cooler, more stable air near the surface. In this case, a surge of warm air swept toward the pole, riding atop much cooler air just above the mostly ice-covered central Arctic Ocean.



[NWS Fairbanks](#)

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A number of lightning strikes were recorded Saturday evening (Aug. 10th) within 300 miles of the North Pole. The lightning strikes occurred near 85°N and 126°E. This lightning was detected by Vaisala's GLD lightning detection network. #akwx



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As it turns out, not all of these flashes were lightning strikes reaching the surface. Lightning is typically classified as intracloud (IC) or cloud-to-ground (CG) flashes. Of these, only a CG flash actually strikes the ground (or ocean); IC flashes play out above ground level.

The lighting near the North Pole was detected by the proprietary [GLD360](#) monitoring system deployed by Vaisala. This ground-based system is distinct from NASA's [satellite-based lightning sensors](#), whose coverage doesn't quite extend to the planet's north and south poles. GLD360 detects the electromagnetic signal produced by lightning flashes around the world, estimating the peak current and polarity of each discharge. More recently, GLD360 has begun divvying up lightning into IC and CG types.

What's most impressive about last weekend isn't that lightning was detected so close to the North Pole, but that there was so much of it. Consider the admittedly short history of lightning detection over this northernmost part of the globe, as summarized for Category 6 by Vaisala researcher/engineer [Ryan Said](#), developer of the GLD360 system. Since observations began in 2012, according to Said, only three prior lightning events were detected north of 85°N, and they produced a total of just nine flashes. By comparison, last weekend brought a total of 48 flashes to that region. All but seven of those were CGs, according to Said.

In the larger area north of 80°N, a typical summer brings two to five events, with several dozen flashes in all. No single event on record had produced more than about 50 flashes until July 2018, when just over 300 flashes were observed on a single day. Last weekend, more than 1000 flashes were detected. About 80% of these were CGs, Said told Category 6.

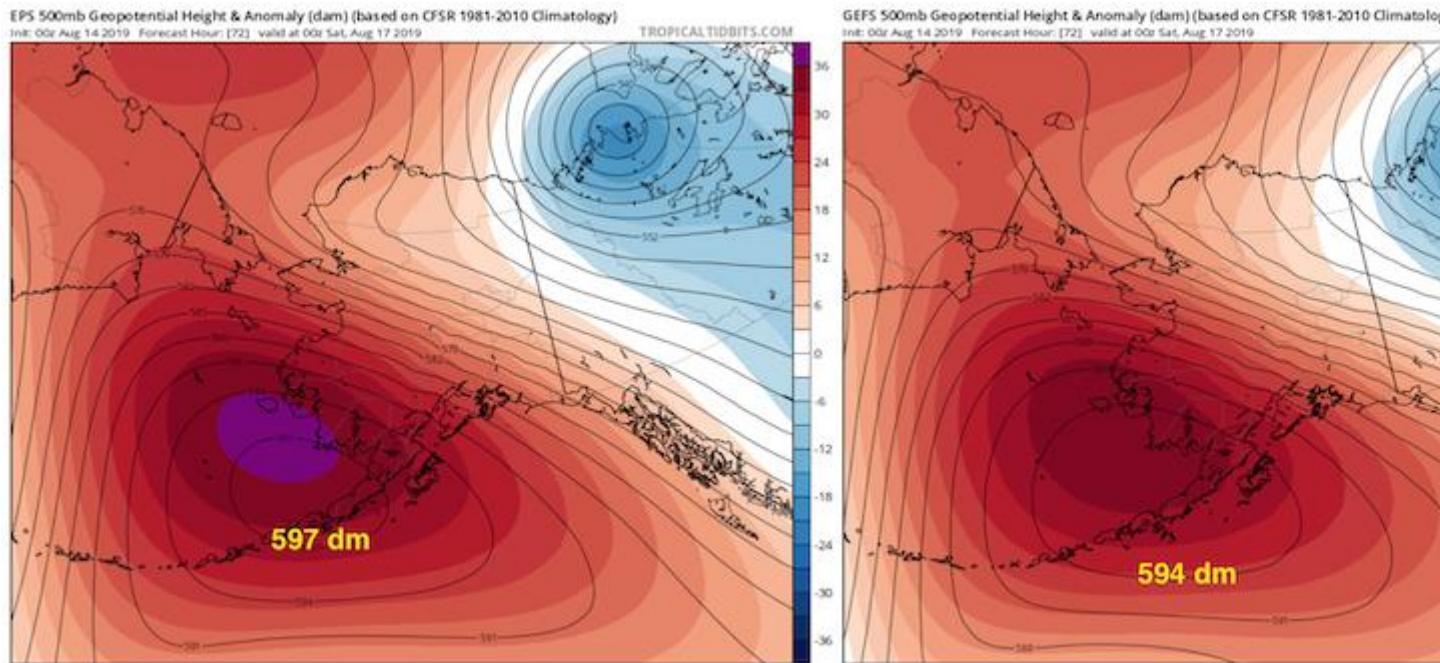


Figure X. 500-millibar heights and anomalies (departures from the 1981-2010 average), in decameters, predicted by European (left) and GFS (right) model ensembles from 0Z Wednesday, August 14, 2019, valid at 0Z Saturday, August 17, 2019. The highest contour is labeled on each map. Image credit: [tropicaltidbits.com](#).

Warmest upper levels on record for southwest Alaska possible this week

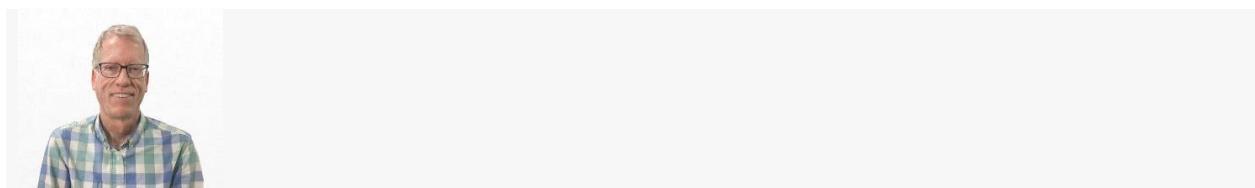
The upper-level ridging that's scrunched Alaskan weather features north of their usual locations will peak later this week, in what could bring unprecedently warm air at upper levels. The 500-millibar pressure level—about midway up through the atmosphere's mass—rises and falls as the atmosphere below it warms and cools.

Typically in August, the 500-mb surface is located about 562 decameters (18,400 feet) above Alaska. But by Thursday and Friday, both the GFS and European models are projecting that the 500-mb heights will soar to at least 590 dm, and perhaps above 594 dm, from southwest Alaska and the far northern Gulf of Alaska into the southeast Bering Sea. These "high heights" will likely challenge some all-time records. Below is a sampling of such records for Alaska as compiled by Brettschneider. I've highlighted some locations to watch in bold.

Location, record-highest 500-mb height (in meters), date

Cold Bay, 5965, 8/14/1952
St. Paul, 5912, 8/10/1956
Kodiak, 5938, 8/11/1956
Anchorage, 5905, 8/12/2005
King Salmon, 5935, 8/11/1956
Barrow, 5869, 8/1/2002
Kotzebue, 5900, 8/1/2002
Nome, 5916, 6/25/1953
McGrath, 5920, 6/26/1953
Fairbanks, 5885, 8/11/2005
Yakutat, 5984, 7/24/2009
Annette Island, 5957, 9/7/1989
Shemya, 5970, 8/5-6/1981

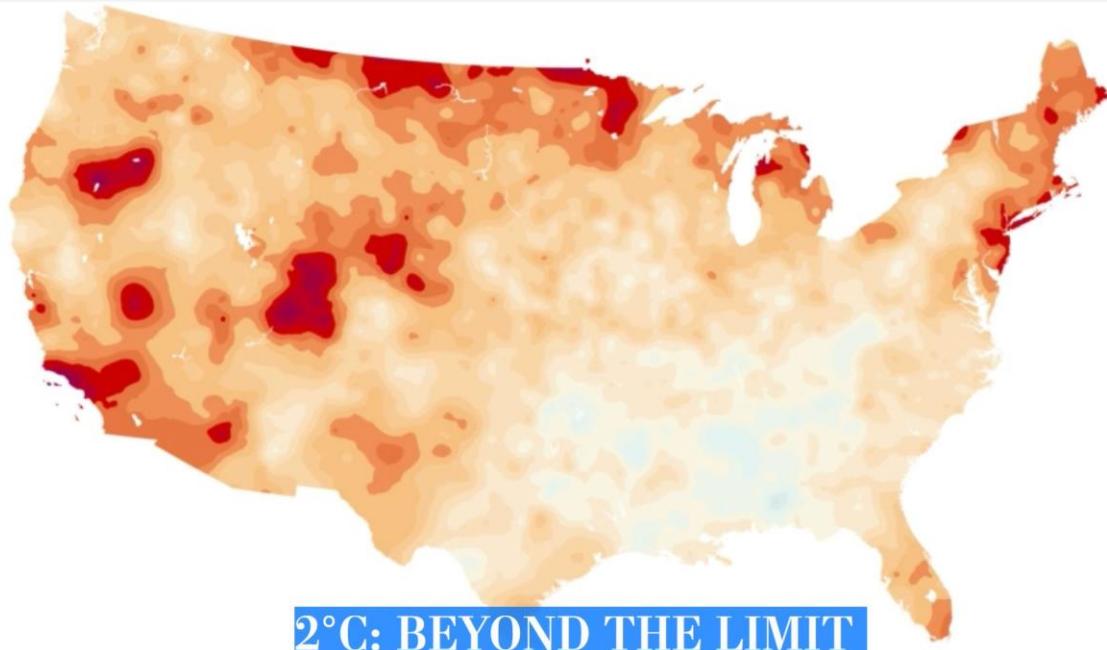
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2°C: BEYOND THE LIMIT

Extreme climate change has arrived in America

By [Steven Mufson](#) , [Chris Mooney](#) , [Juliet Eilperin](#) and [John Muyskens](#)
Photography by [Salwan Georges](#) AUG. 13, 2019

2°C: BEYOND THE LIMIT

°C °F

LAKE HOPATCONG, N.J. — Before climate change thawed the winters of New Jersey, this lake hosted boisterous wintertime carnivals. As many as 15,000 skaters took part, and automobile owners would drive onto the thick ice. Thousands watched as local hockey clubs battled one another and the Skate Sailing Association of America held competitions, including one in 1926 that featured 21 iceboats on blades that sailed over a three-mile course.

In those days before widespread refrigeration, workers flocked here to harvest ice. They would carve blocks as much as two feet thick, float them to giant ice houses, sprinkle them with sawdust and load them onto rail cars bound for ice boxes in New York City and beyond.

New Jersey's average temperatures have risen nearly 2 degrees Celsius since 1895 — double the average for the Lower 48 states.

[Click here to see your county](#)

"These winters do not exist anymore," says Marty Kane, a lawyer and head of the Lake Hopatcong Foundation.

That's because a century of climbing temperatures has changed the character of the Garden State. The massive ice industry and skate sailing association are but black-and-white photographs at the local museum. And even the hardy souls who still try to take part in ice fishing contests here have had to cancel 11 of the past dozen competitions for fear of straying onto perilously thin ice and tumbling into the frigid water.

New Jersey may seem an unlikely place to measure climate change, but it is one of the fastest-warming states in the nation. Its average temperature has climbed by close to 2 degrees Celsius since 1895 — double the average for the Lower 48 states.