Typhoon Halong hits Alaska

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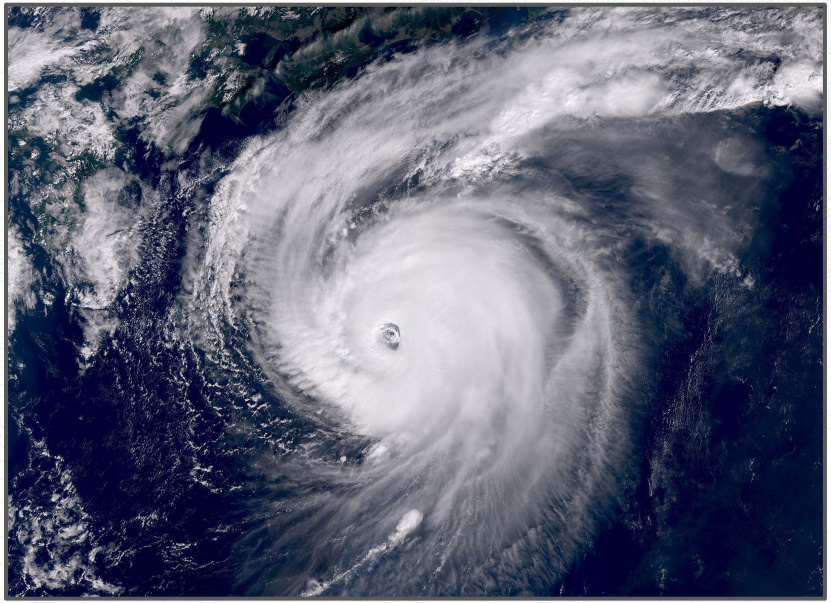
ACCAP
Alaska Center for Climate Assessment and Preparedness
A NOAA CAP/RISA team

Webinar Outline

- **Meteorology of Halong**
  - Track and ambient environment
  - Underingstanding typhoon/ex-typhoon
- Ex-typhoon Halong in historical (climate) context
  - Role of ex-typhoons in Alaska storminess
  - Merbok and Halong
- Impacts
  - Extreme winds
  - Storm surge and coastal inundation



Typhoon Halong, October 8, 2025

Image from Sentinel-3 courtesy EUMETSAT

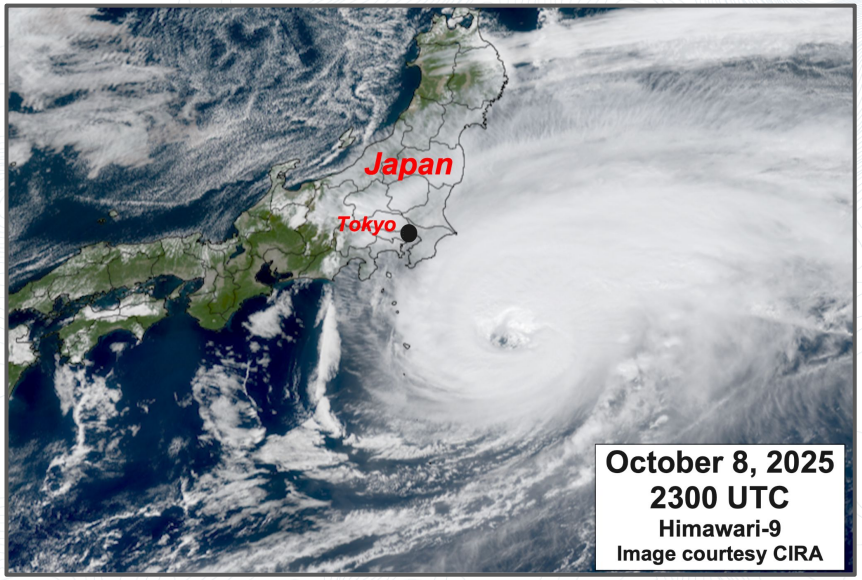
Typhoon/ex-typhoon Halong history

Formed southeast of Japan on Oct 5

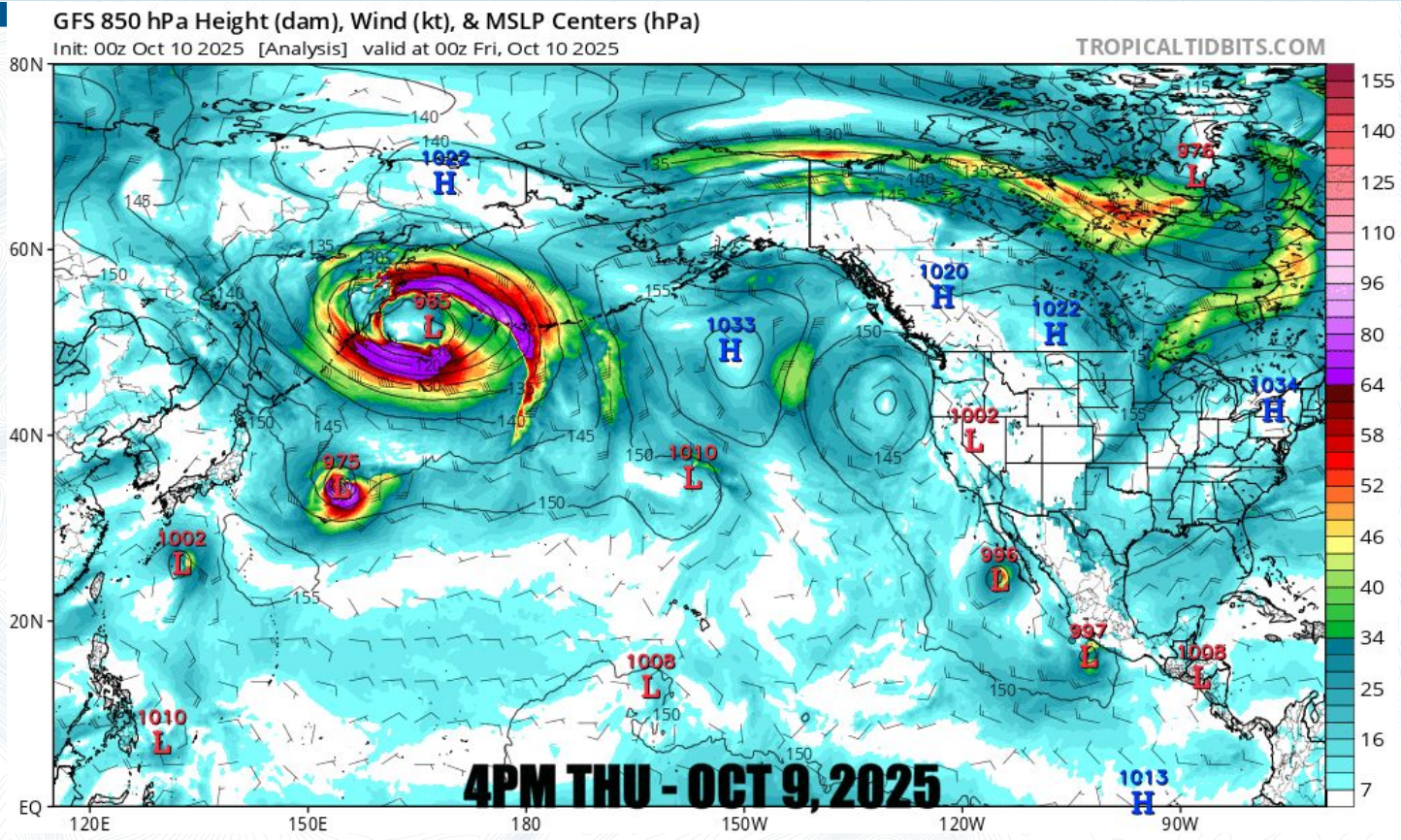
Strengthened to “Severe Typhoon” (Cat 4) just southeast of Japan Oct 6

Turned northeast Oct 8 and lost tropical characteristics Oct 10

Move into Bering Sea Oct 11 and Beaufort Sea Oct 12

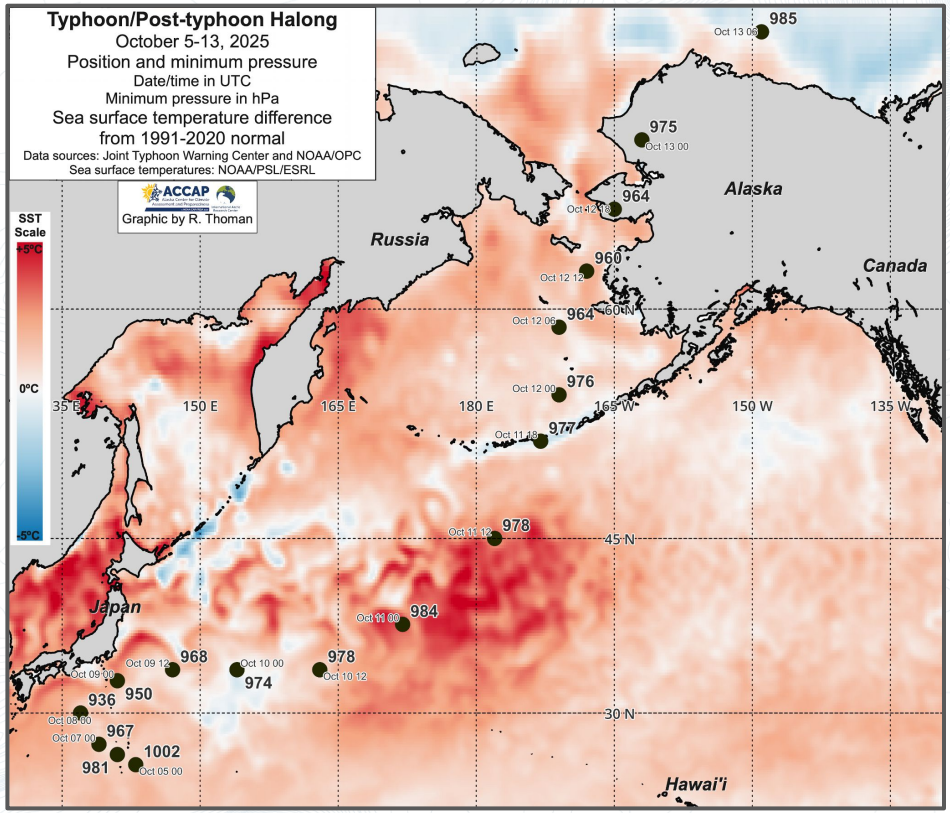


Typhoon/ex-typhoon Halong history

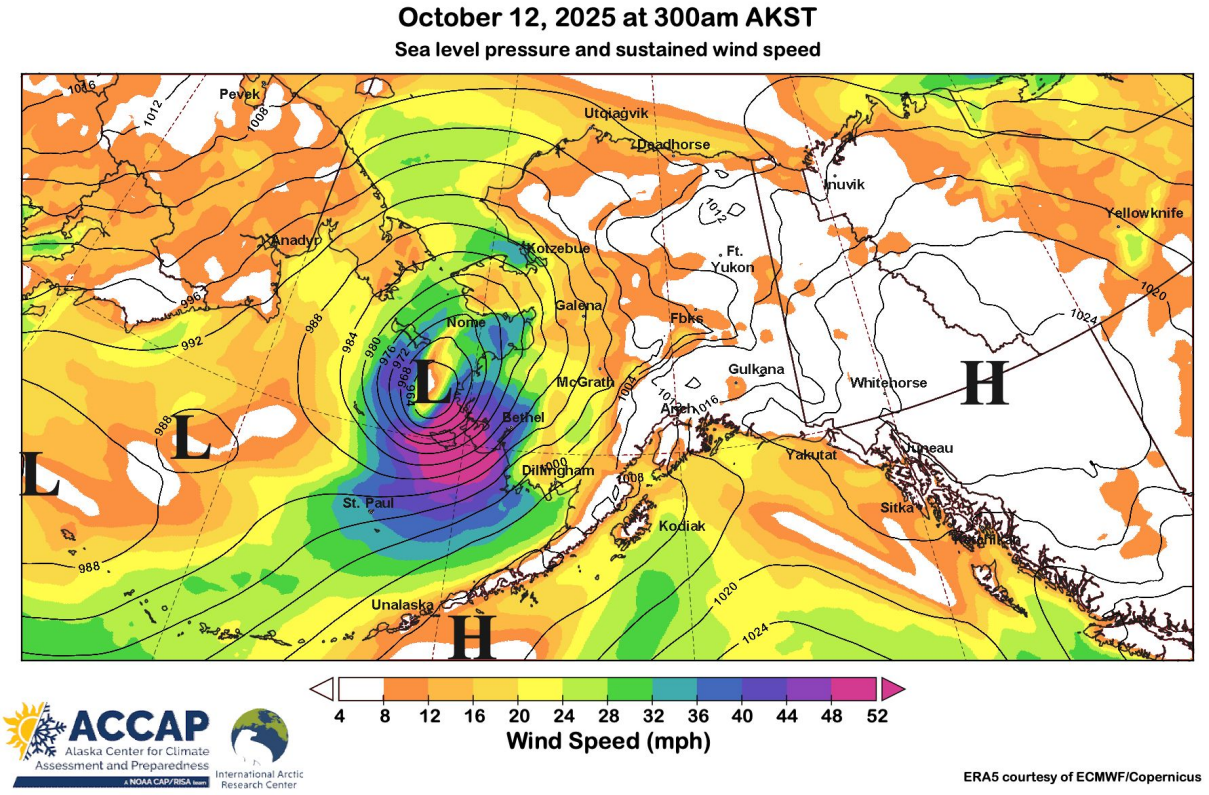


Ex-Halong: Track

- Halong over warmer than normal oceans virtually its entire lifespan
- Weakened east of Japan then reintensified in the Bering Sea
- Max Bering Sea intensity when centered offshore Emmonak
- Rapid northeast movement after the turn to northeast
- Only one other autumn storm this strong between St Lawrence Island and Yukon delta (since 1950)



Ex-Halong at peak intensity

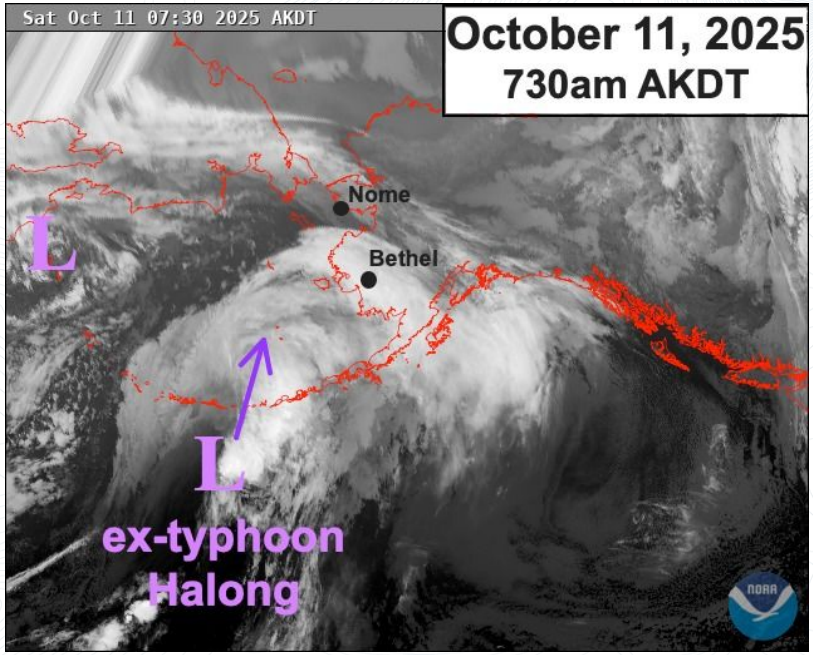


What's this "ex-" thing about?

Storms that extract energy from warm (80F or higher) ocean water and have sustained winds at least 39 mph are named

Storms that extract energy from horizontal air temperature differences are not named

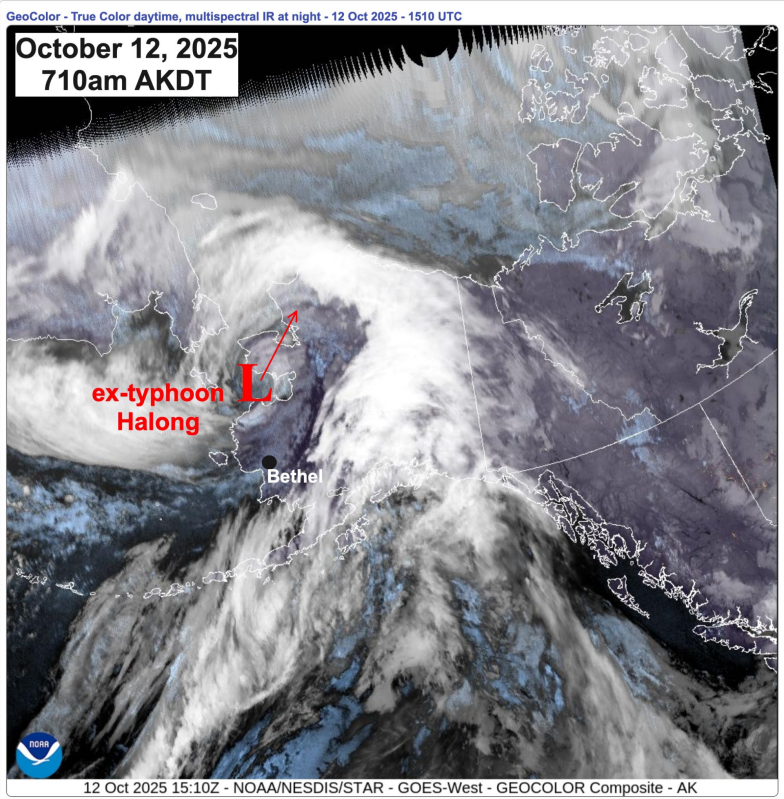
"Ex-" → a storm that began as a "warm water" storm and transitioned to a "air temperature difference" storm



Why does this “ex-” thing matter?

Even if intensity (lowest pressure) of the storm stays the same…

- Area with moderate to strong winds expands…sometimes by 3 to 5 times
- Area of ocean water being plow up by the winds expands



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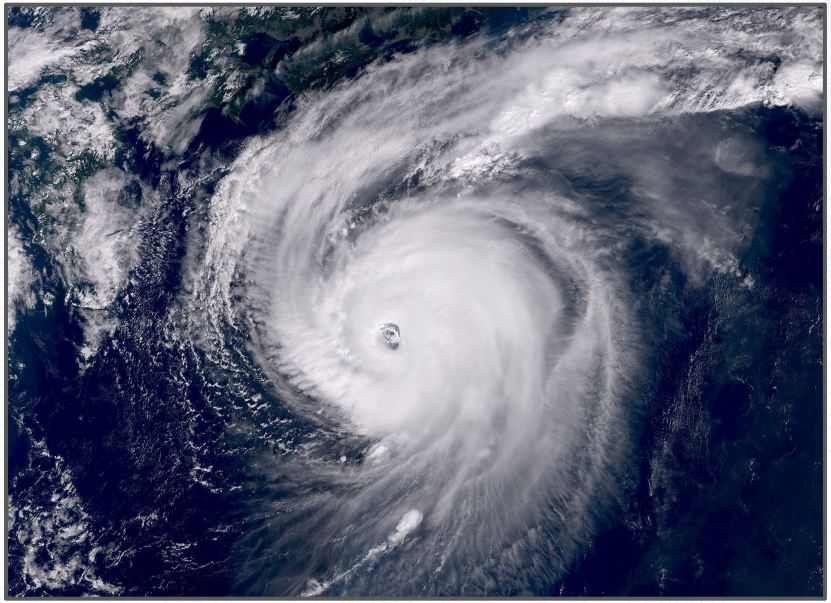
- **Ex-typhoon Halong in historical (climate) context**
  - Role of ex-typhoons in Alaska storminess
  - Merbok and Halong
- Impacts



Typhoon Halong, October 8, 2025

Image from Sentinel-3 courtesy EUMETSAT

Most western Alaska storms are NOT ex-typhoons

High impact coastal flood producing storms that were never typhoons

- Northern Bering Sea (Nov 1974)
- Eastern Norton Sound (Oct 1992)
- Kusko delta (Nov 2000)
- Northern Bering Sea (Oct 2004)
- Bristol Bay (Aug 2005)
- Bering Sea Superstorm (Nov 2011)
- Eastern Norton Sound (Nov 2013)
- Kusko delta (Aug 2024)
- Southern Chukchi Sea (Oct 2024)

75 cents — Final Edition

Anchorage Daily News

Wednesday, November 9, 2011 — BREAKING NEWS AT ADN.COM — Alaska's Newspaper

EPIC STORM BEARS DOWN

"It covers 750 to 1,000 miles almost in breadth. It's a huge storm. These things get named hurricanes down south and get a category. It's that magnitude."
– Jeff Osiensky, National Weather Service meteorologist

"This will be extremely dangerous and life threatening storm of an epic magnitude rarely experienced. All people in the area should take precautions to safeguard their lives and property."
– National Weather Service bulletin

"Winds getting stronger in #Nome. KNOM building shaking even more (my desk is on 2nd floor); feels like airplane turbulence."
– Nome resident David Dodman, on Twitter

Charlie Weyauvanna plays in sea foam near the Nome harbor Tuesday evening as the huge Bering Sea storm started kicking up. See more storm pictures at adn.com/photos.

Coastal communities prepare for fury of 100 mph winds, waves and blinding snow

By KYLE HOPKINS, CASEY GROVE and MIKE DUNHAM
Anchorage Daily News

Villages and towns across Alaska's western and northwest coasts braced Tuesday for a winter megastorm that the National Weather Service says could be among the worst on record.

Forecasters warned of life-threatening surf, wind and snow elsewhere villages along the Bering and Chukchi sea

FOR THE LATEST ON THIS STORM:
Check adn.com and www.arh.noaa.gov

warning coordination meteorologist with the National Weather Service. The storm was expected to hit across hundreds of miles of coastline, with the worst expected from the Yukon Riv-

rtful storm in 1974, forecasters said.

Severe shoreline erosion was forecast, as was a storm surge of up to 9 feet that was expected to cause coastal flooding.

As the state triggered an emergency operations center in Anchorage, some villagers hundreds of miles away boarded windows in preparation for the worst.

"There was a big rush at the store today to get water," said Elmer Davis, a former police officer who lives in the village of

Ex-typhoons and Alaska

Since 1970

More than 60 ex-typhoons have impacted some part of Alaska

1. Western/central Aleutians
2. Eastern Aleutians/Pribilof Islands
   a. ex-Ivy 1977
3. Alaska Peninsula/Bristol Bay
   a. ex-Soulik 2018
4. Gulf of Alaska
   a. Ex-Oho 2015

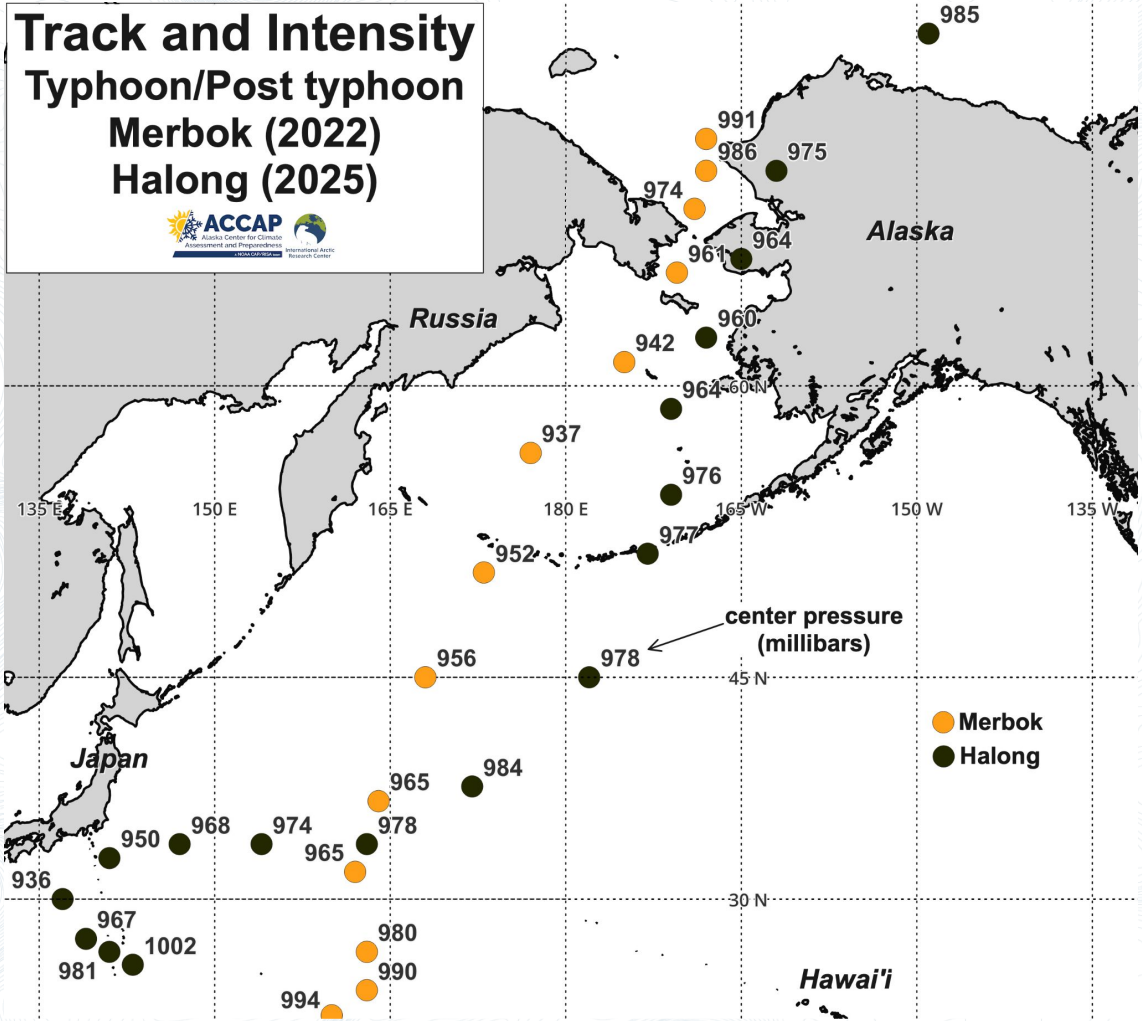
Only four ex-typhoons have moved into the Arctic after impacting northern Bering Sea coast

1. Ex-Carlo (Oct 1996)
2. Ex-Merbok (Sep 2022)
3. Ex-Ampil (Aug 2024)
4. Ex-Halong (Oct 2024)

Ex-typhoons also impact Alaska by bringing high moisture content air into the state

Since 1990 significant trend down in number of West Pac typhoons

Merbok vs. Halong track and intensity comparison

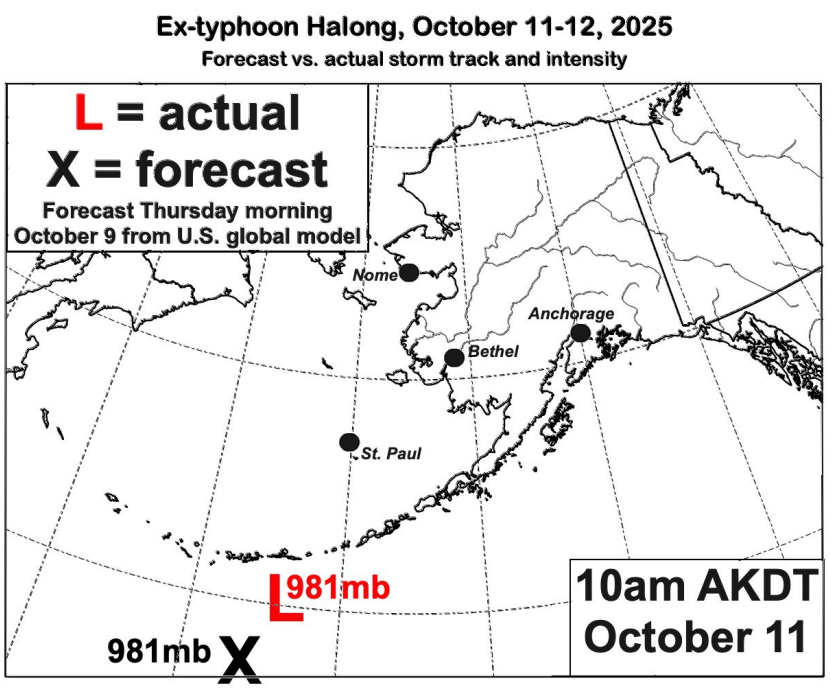


Ex-Halong Track vs forecast

Large-scale models had the right idea week in advance

Actual path/intensity compared well to forecasts several days in advance to about the Pribilof Islands

Actual path/intensity diverged significantly north of the Pribilofs



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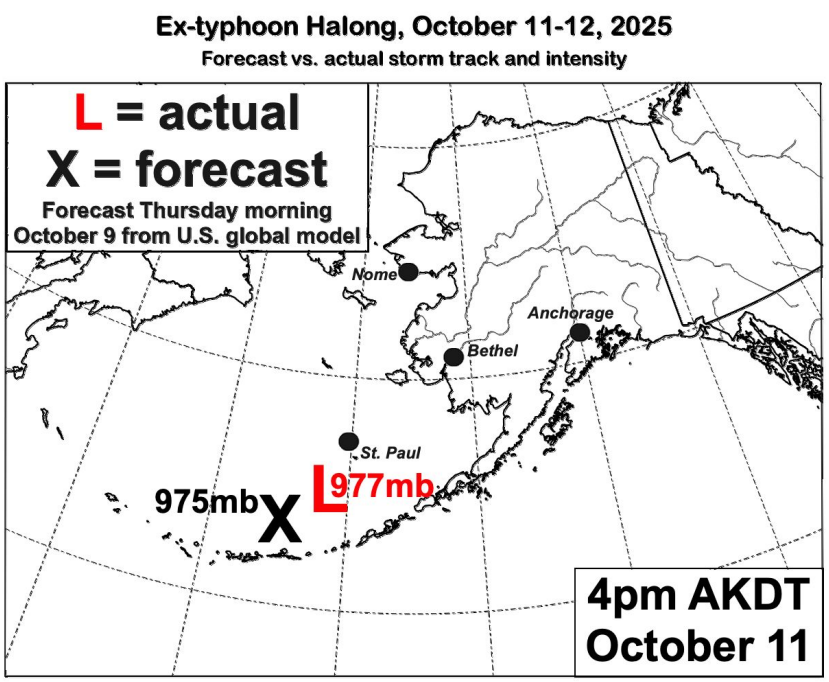

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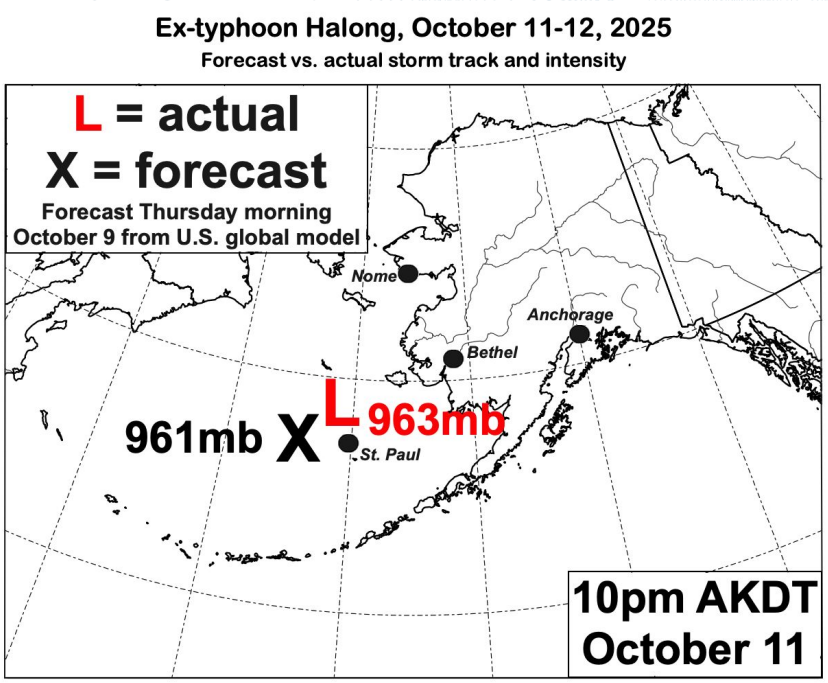

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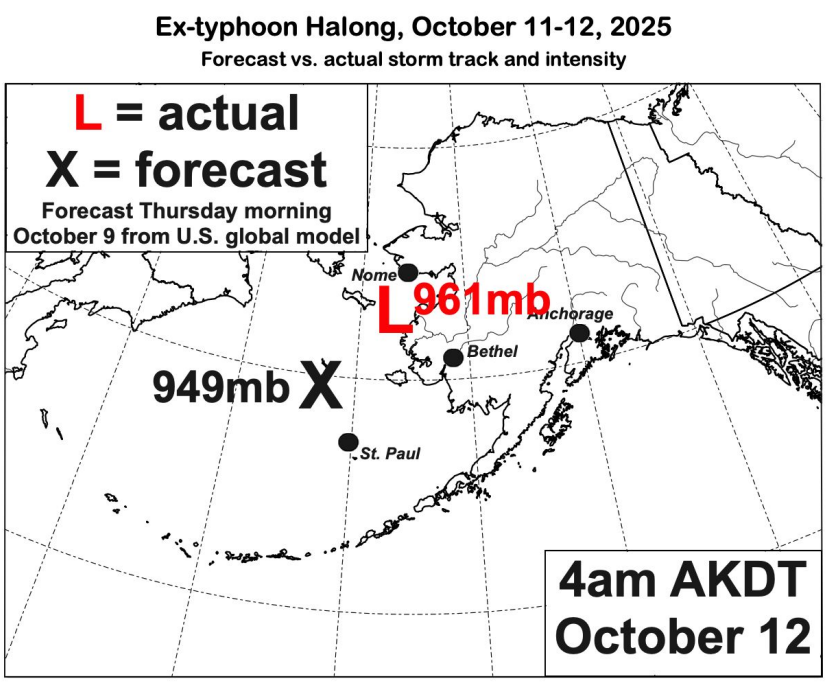

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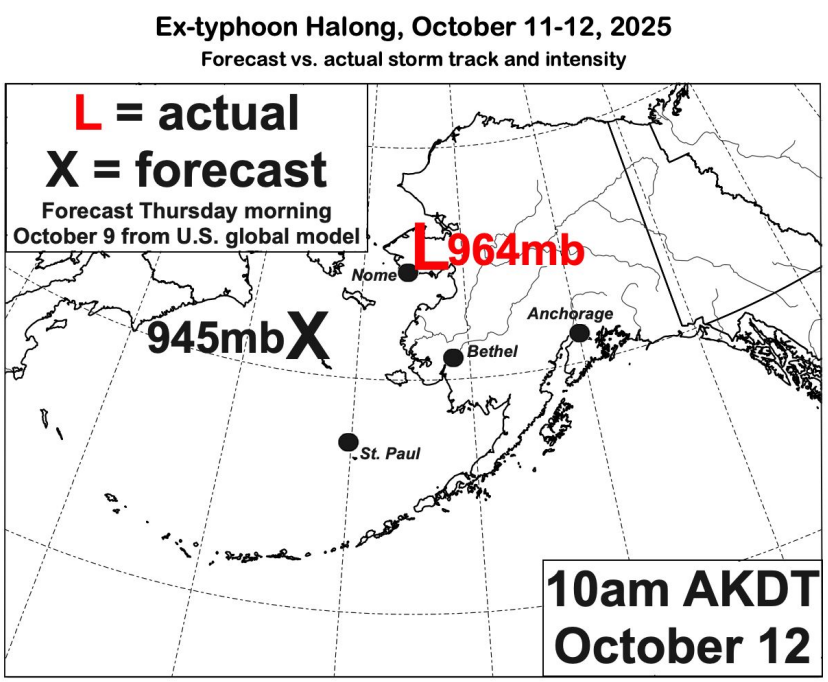

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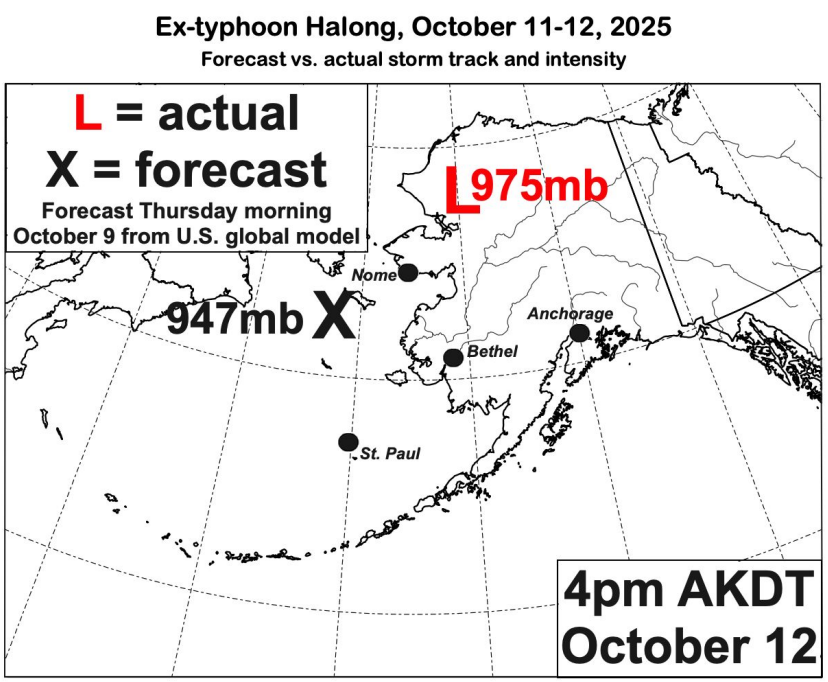

Ex-Halong: actual vs forecast

What happened?

- Different models from different national centers generally similar with extremely strong ex-typhoon Halong central/northern Bering Sea Oct 11-13
- Different models shifted the track northeastward and faster with less intense center about the same time (afternoon Oct 9 to afternoon Oct 10)
  - This suggests something in the “starting conditions”
- Only 44 percent of [illegible] the week leading [illegible]
  - Unknown
- New [illegible] surface temperature

Ex-Halong: actual vs forecast

What happened?

- Different models from different national centers generally similar with extremely strong ex-typhoon Halong central/northern Bering Sea Oct 11-13
- Different models shifted the track northeastward and faster with less intense center about the same time (afternoon Oct 9 to afternoon Oct 10)
  - This suggests something in the “starting conditions”
- Only 44 percent of “usual” western Alaska NWS upper air observations in the week leading to ex-typhoon Halong
  - Unknown how much of a role this played in the less intense storm & late shift of the track
- **New**: Mingshi Yang at U. Illinois: model simulations suggest very warm SSTs MAY have contributed to strength of ex-Halong in the Bering Sea

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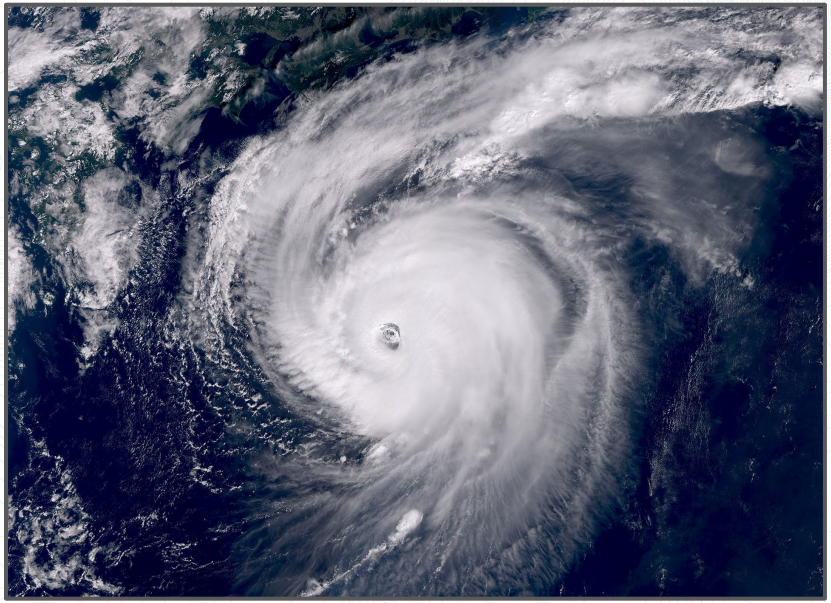
- **Impacts**
  - Extreme winds
  - Storm surge and coastal inundation



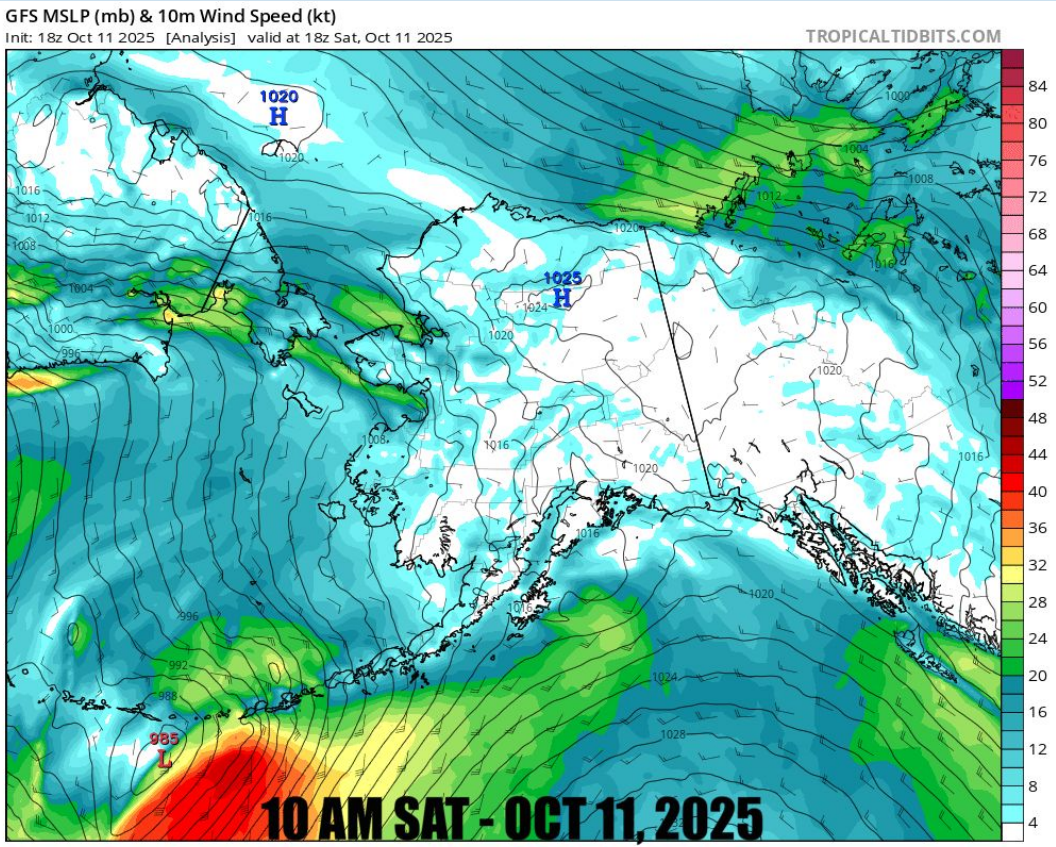
Typhoon Halong, October 8, 2025

Image from Sentinel-3 courtesy EUMETSAT

Typhoon/ex-typhoon Halong Storm Track

Storm track of Halong across Alaska

Colors indicate forecast sustained wind speeds



Toksook Bay winds

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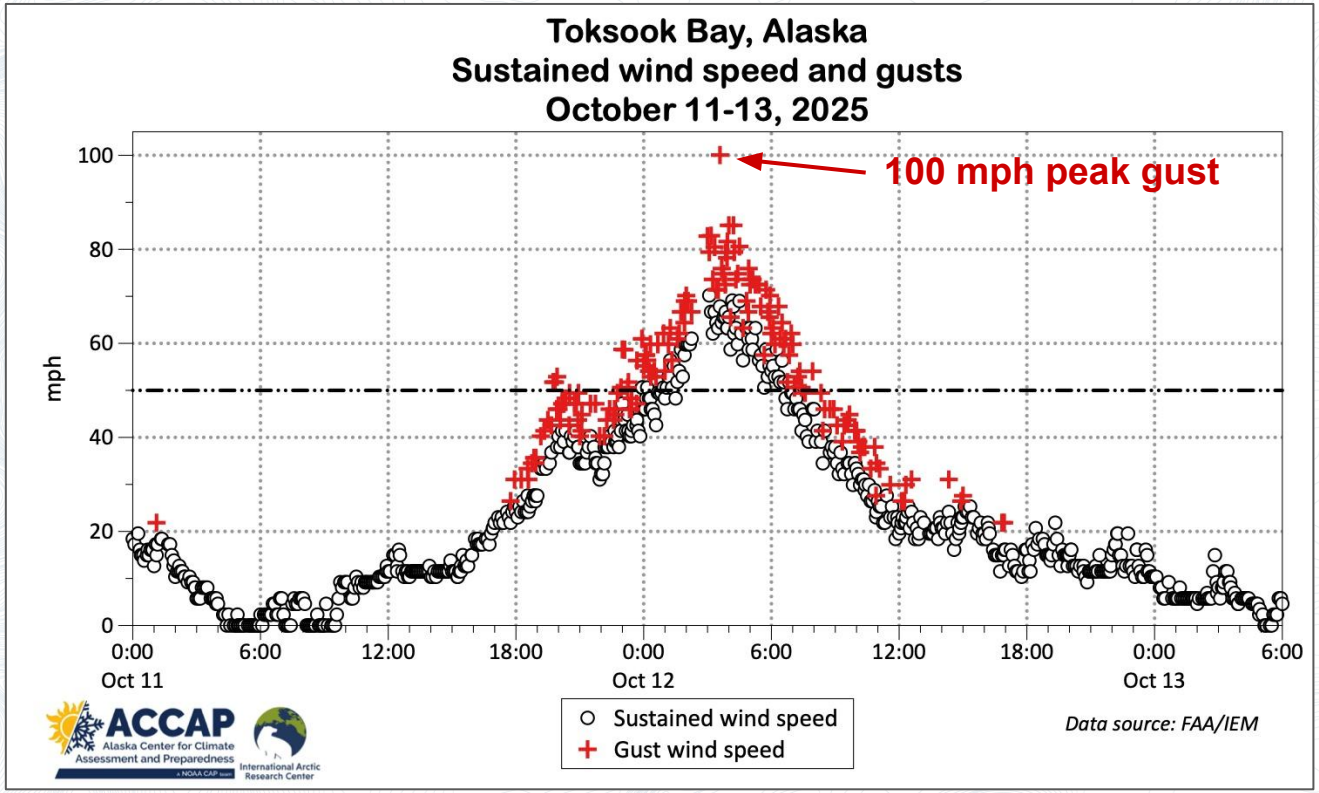

Kipnuk winds

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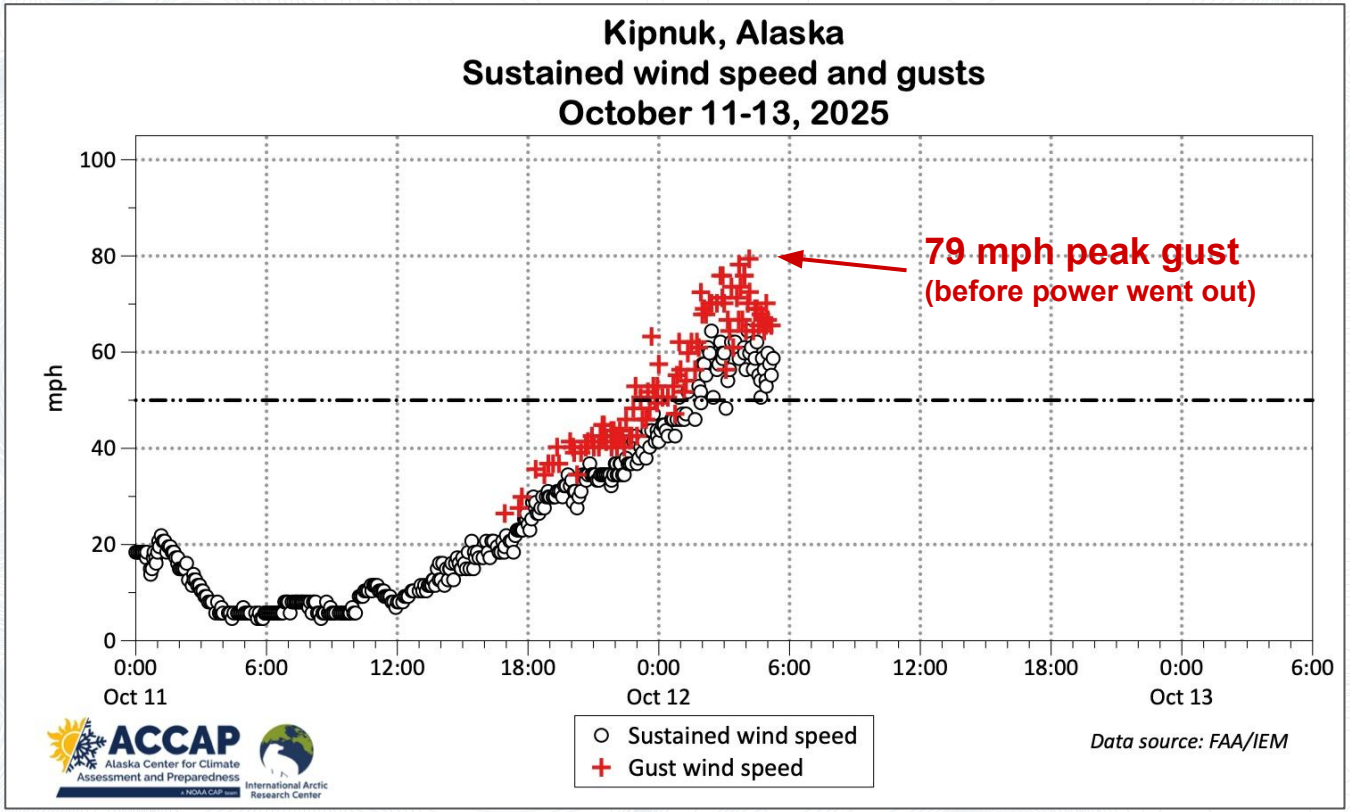
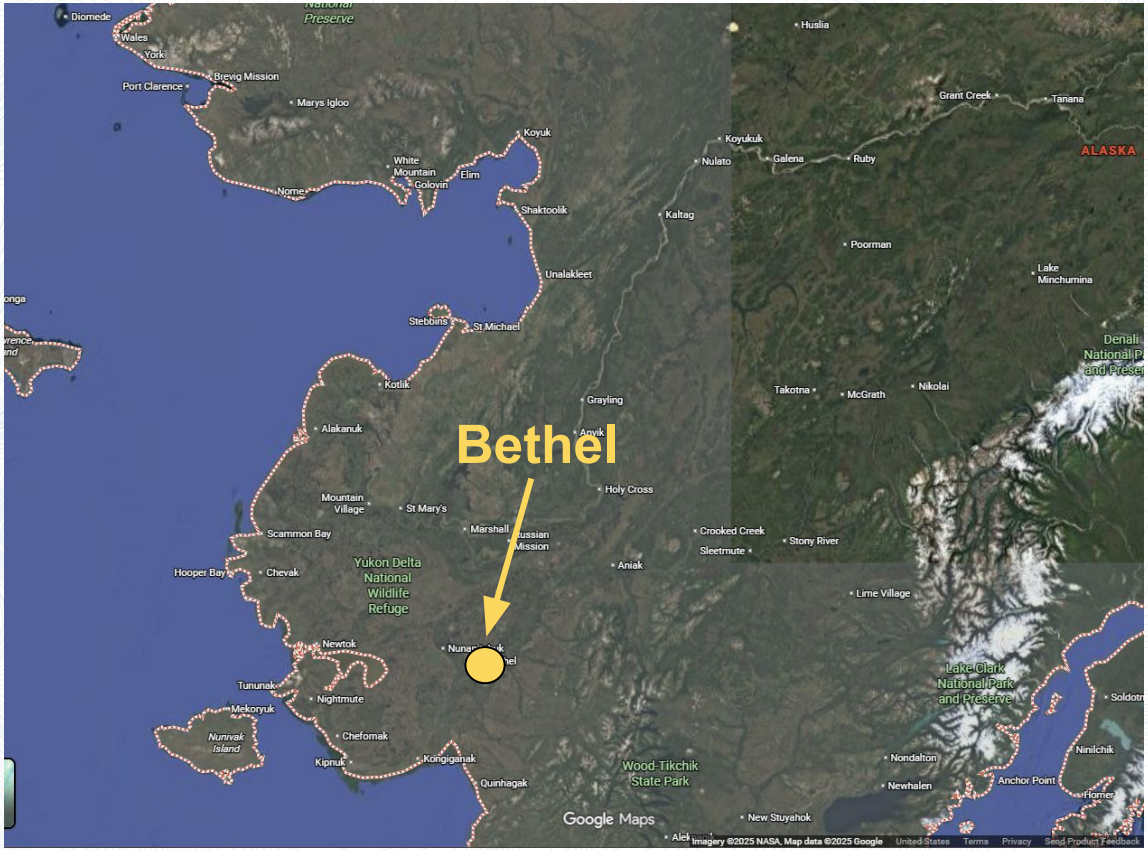
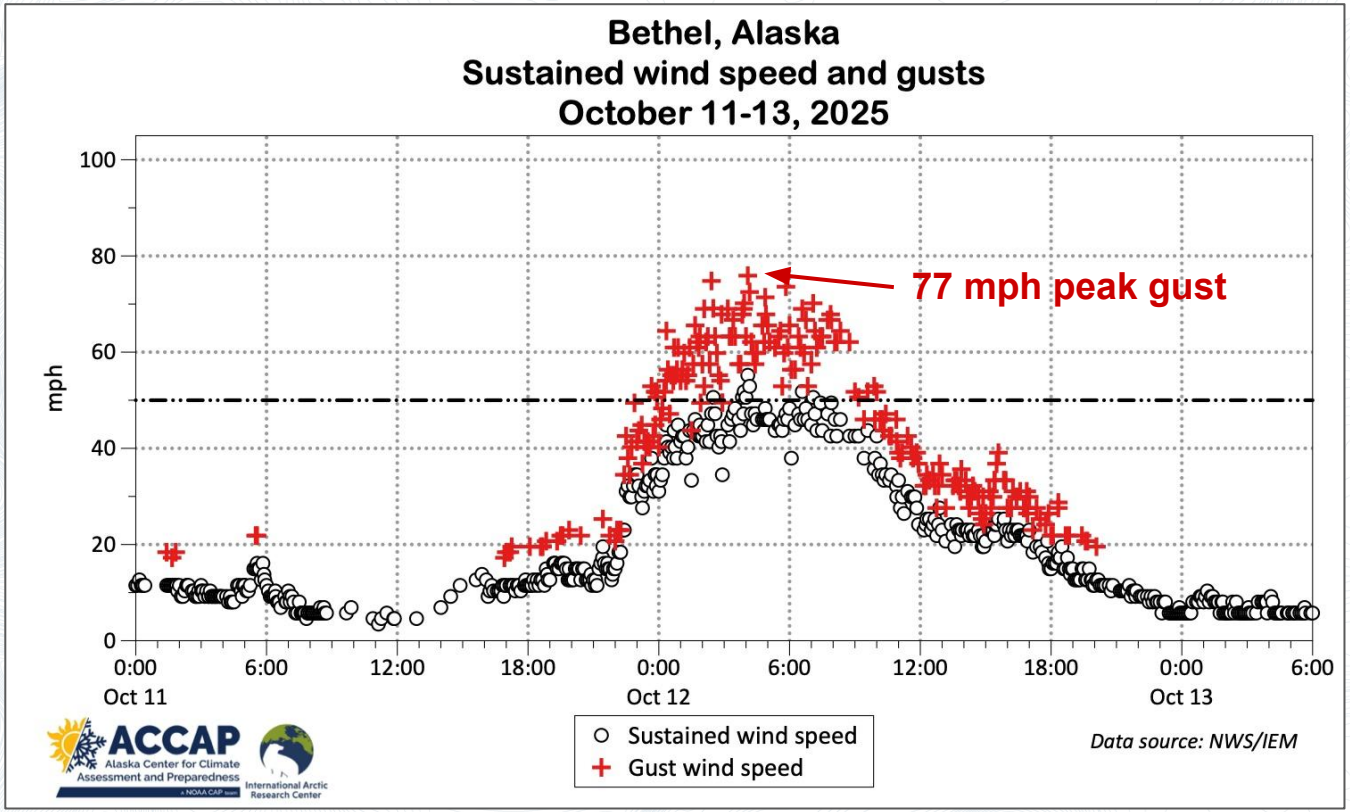


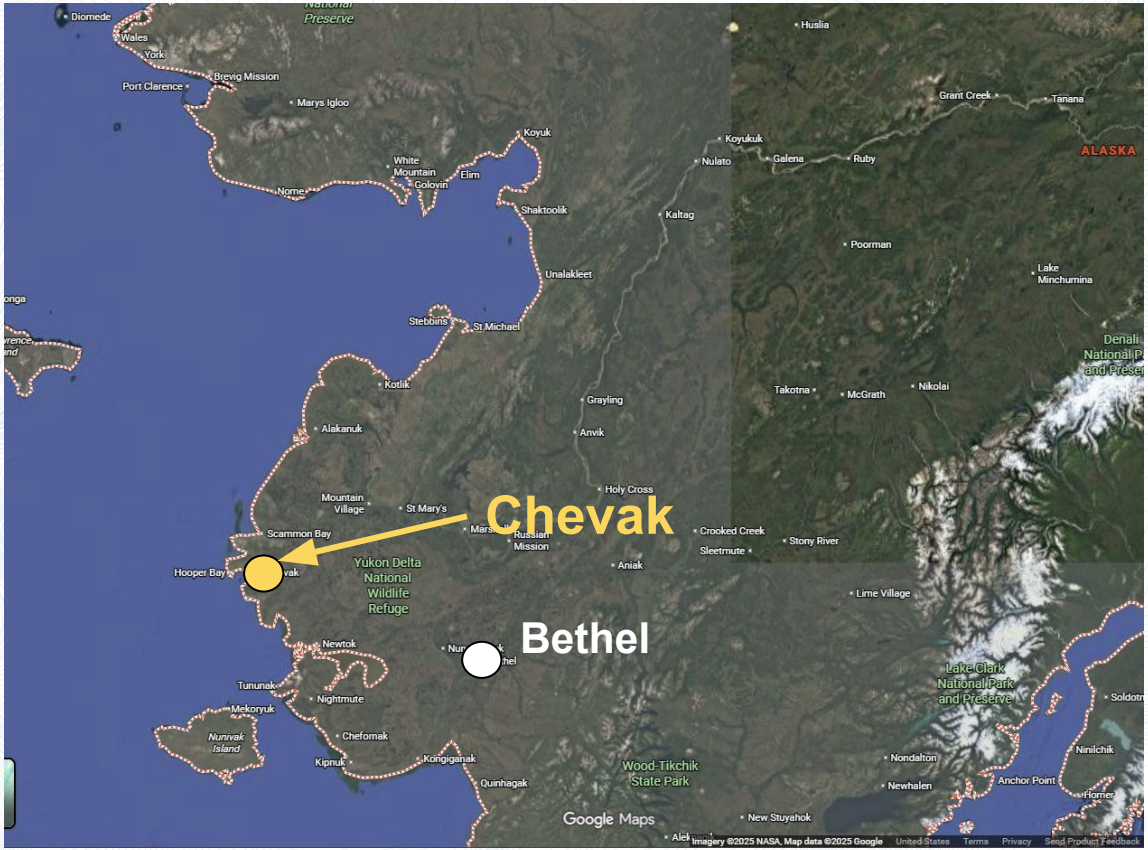
Bethel winds



Bethel winds



Chevak winds



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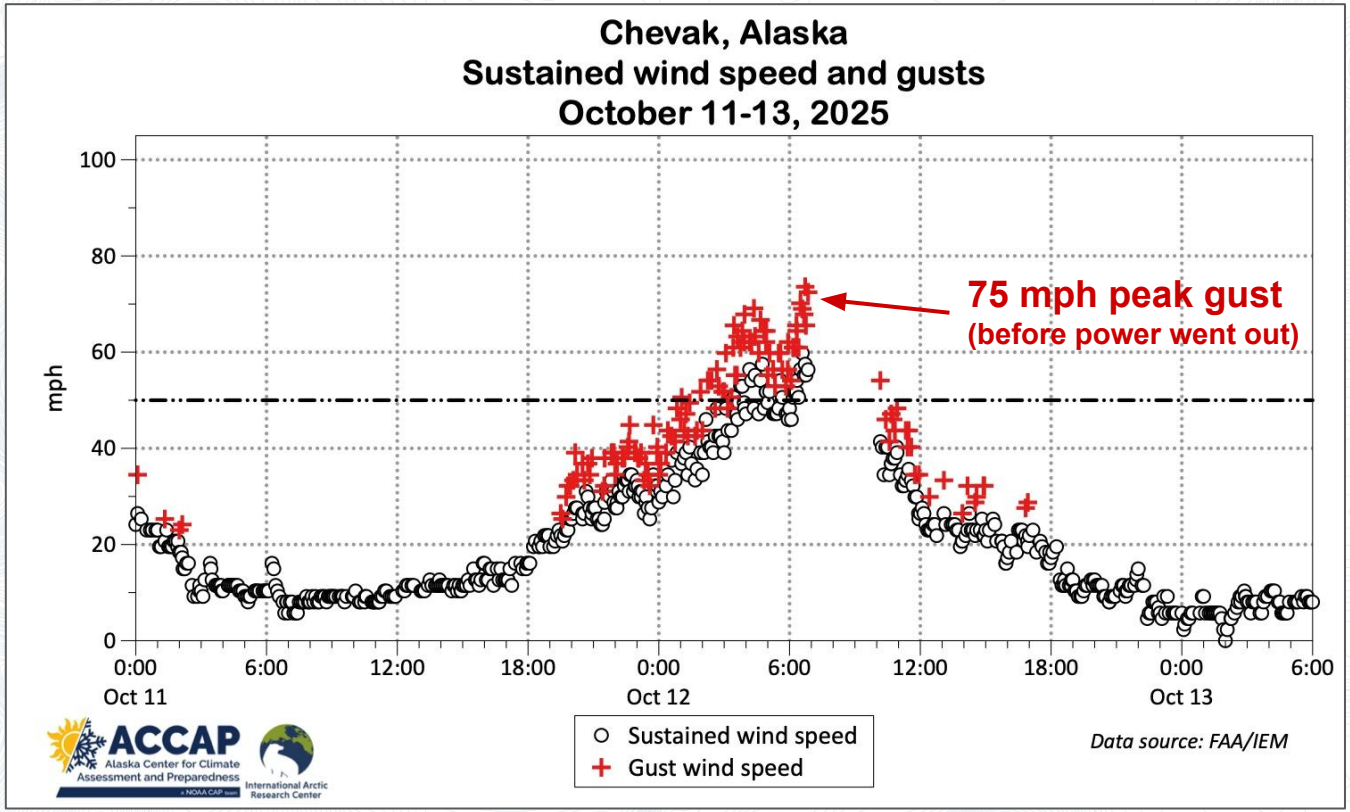
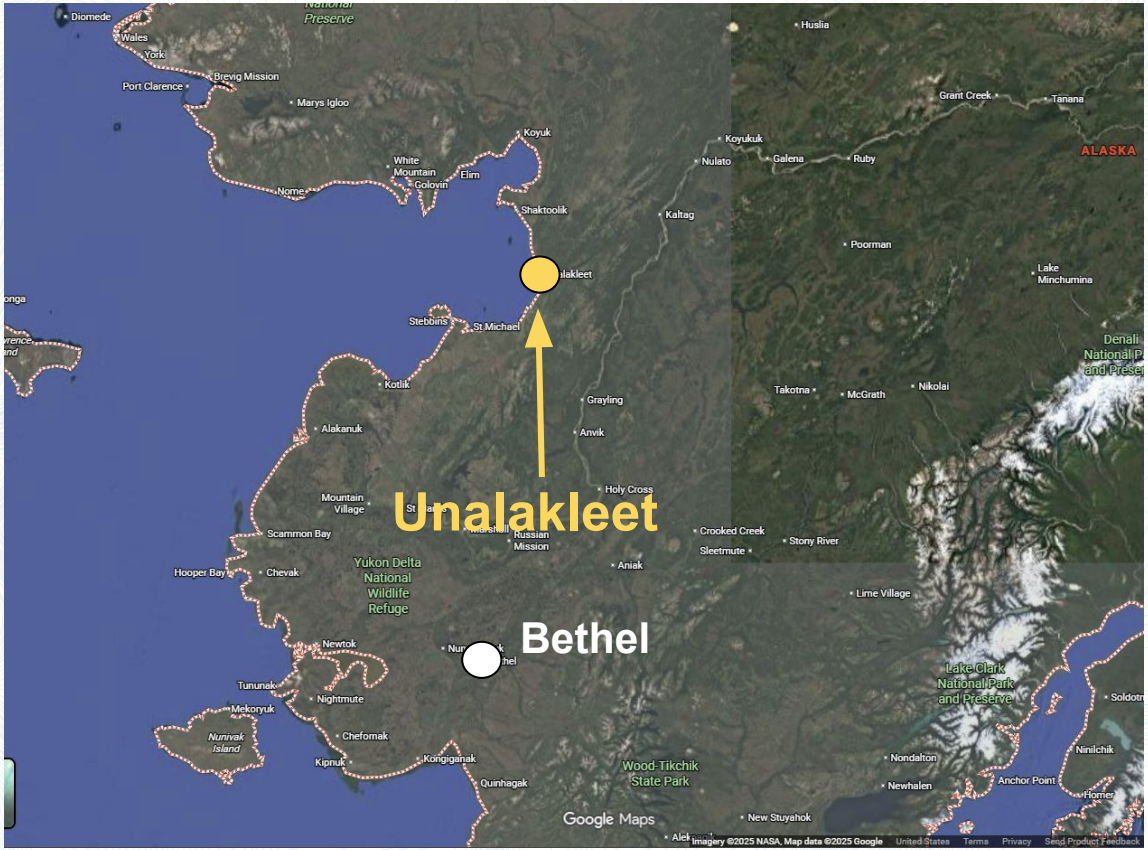


Unalakleet winds



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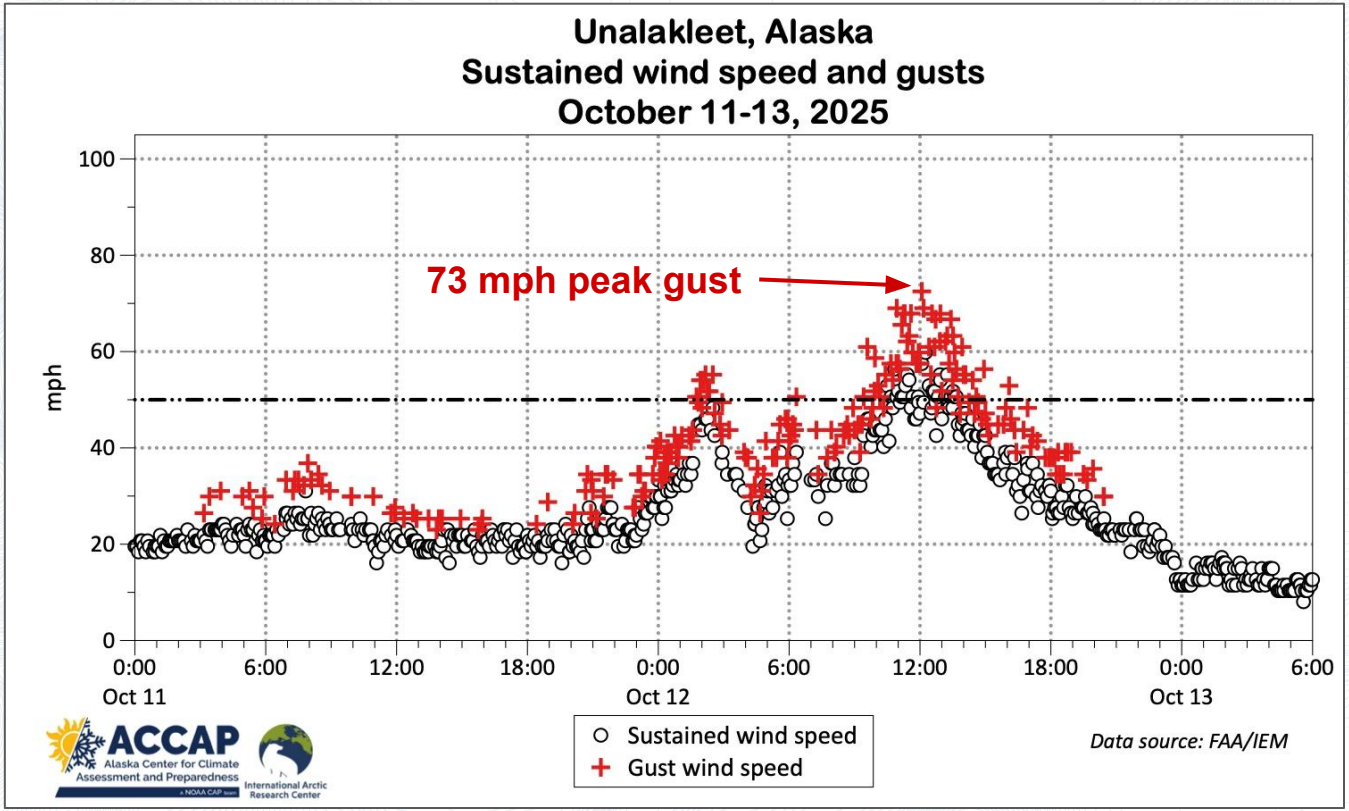
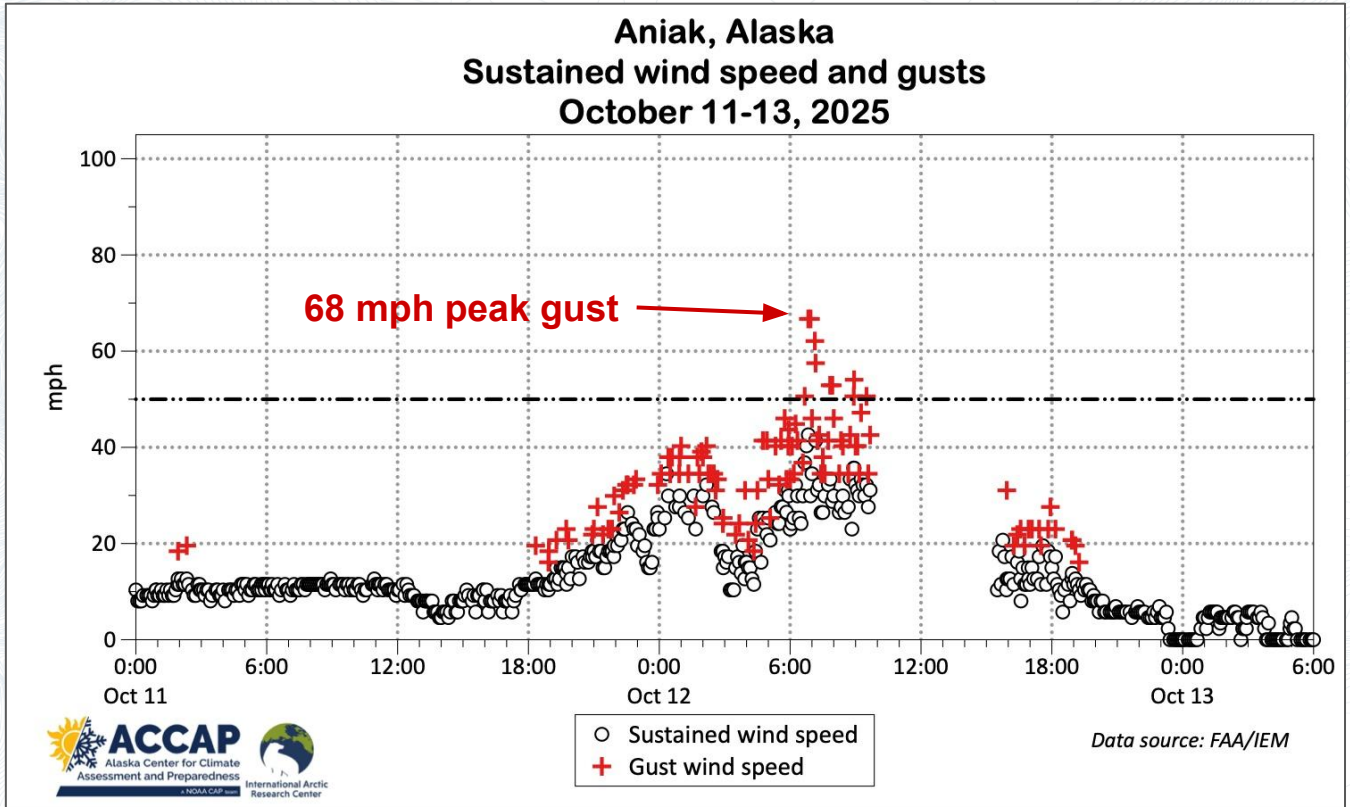


Aniak winds


Aniak
Bethel
Diomede
Wales
York
Brevig Mission
Port Clarence
Marys Igloo
Koyuk
White Mountain
Golovin
Elim
Nome
Shaktoolik
Unalakleet
Stebbins
St Michael
Kotlik
Alakanuk
Mountain Village
St Mary's
Scammon Bay
Hooper Bay
Chevak
Marshall
Russian Mission
Yukon Delta National Wildlife Refuge
Newtok
Tununak
Nightmute
Mekoryuk
Nunivak Island
Chefornak
Kipnuk
Kongiganak
Quinhagak
Wood-Tikchik State Park
Google Maps
New Stuyahok
Huslia
Grant Creek
Tanana
Koyukuk
Nulato
Galena
Ruby
ALASKA
Kaltag
Poorman
Lake Minchumina
Grayling
Anvik
Takotna
McGrath
Nikolai
Holy Cross
Crooked Creek
Sleetmute
Stony River
Lime Village
Lake Clark National Park and Preserve
Nondalton
Newhalen
Anchor Point
Homer
Ninilchik
Soldotna

Aniak winds


Aniak, Alaska
Sustained wind speed and gusts
October 11-13, 2025
68 mph peak gust
mph
100
80
60
40
20
0
0:00
6:00
12:00
18:00
0:00
6:00
12:00
18:00
0:00
6:00
Oct 11
Oct 12
Oct 13
Sustained wind speed
Gust wind speed
Data source: FAA/IEM
ACCAP
Alaska Center for Climate Assessment and Preparedness
International Arctic Research Center

Huslia winds

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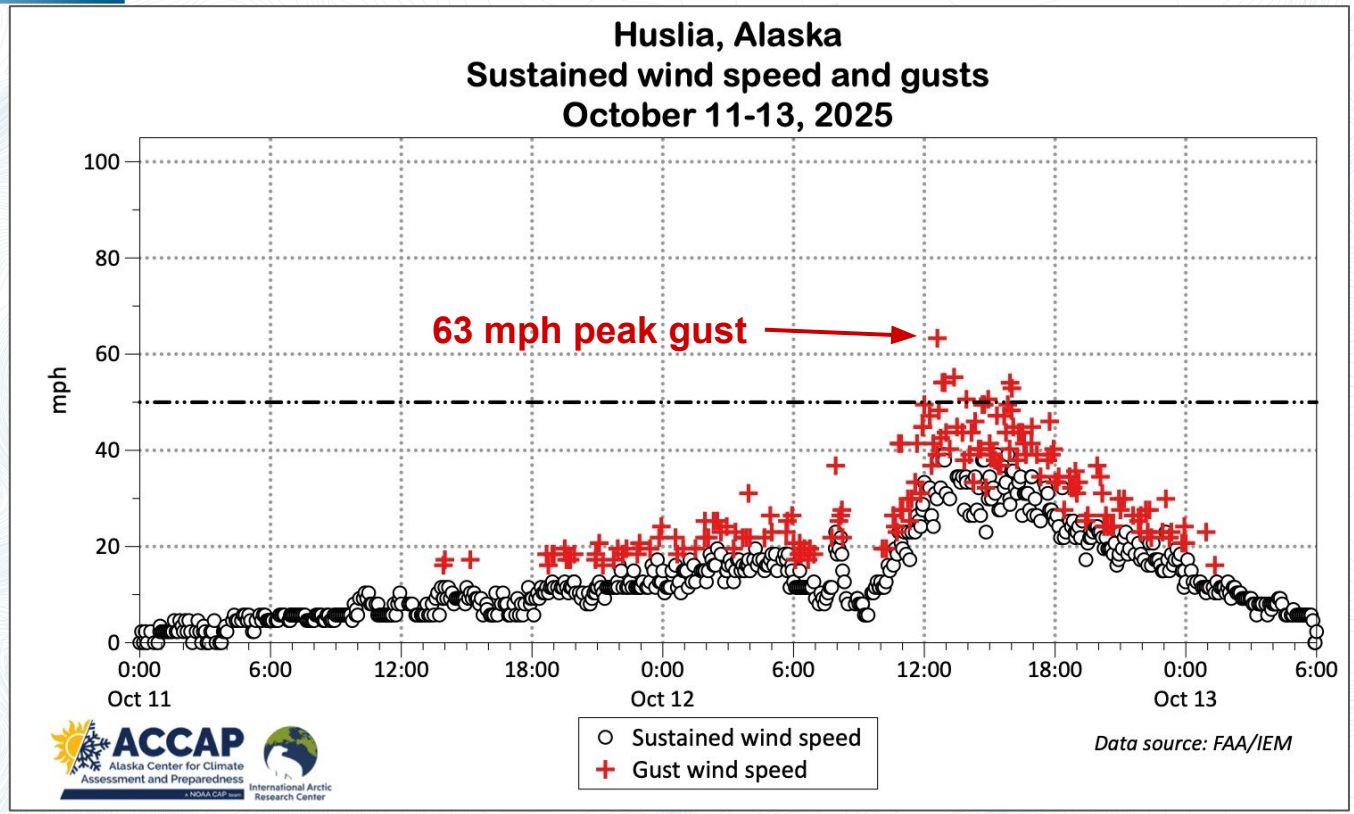


Storm Surge Terminology

Mean Higher High Water (MHHW) = Normal High Tide Line

Storm surge in Alaska is described as how high (vertically) water will reach above the normal high tide line. It doesn't necessarily imply the depth of water in your community.

Halong Storm Surge

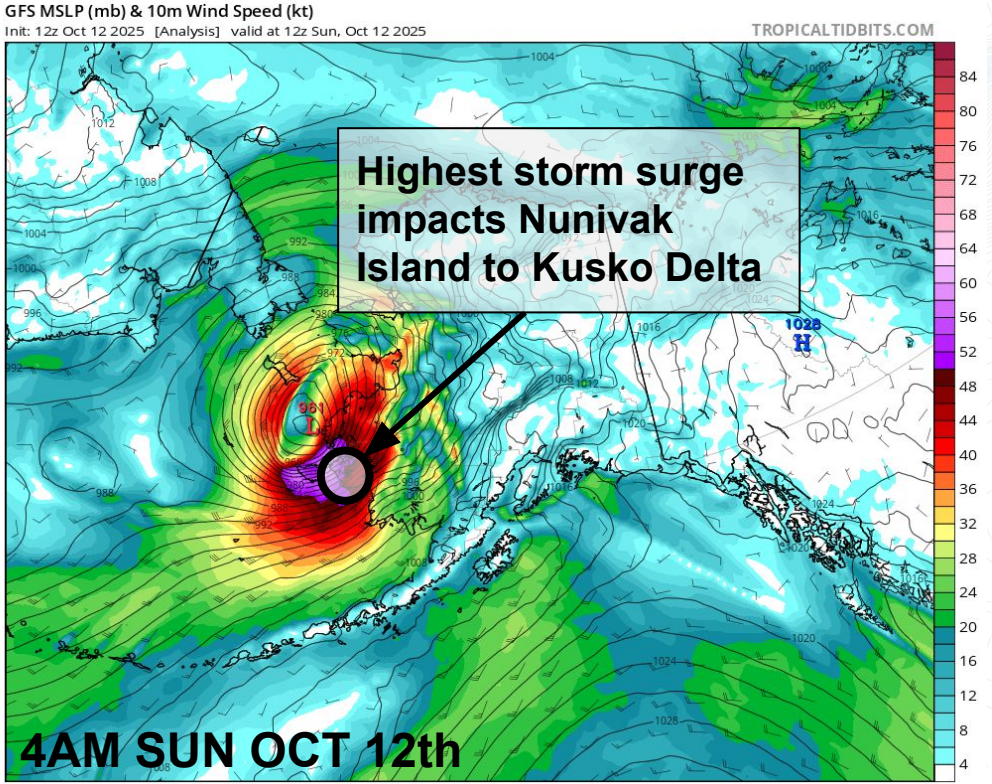
Highest storm surge pushed into SW AK from Nunivak Island to Kuskokwim Delta

Peak surge coincided Sun AM high tide

Daily tidal range is large in the Kusko region (6 to 12 feet or more)relative to areas from the Yukon Delta northward

Storm center tracking near Hooper/Scammon Bay kept highest surge mainly south of Nunivak Is

Nunivak Island protected Nelson Island from strongest winds but storm surge was able to sneak around to the south and impact locations like Nightmute

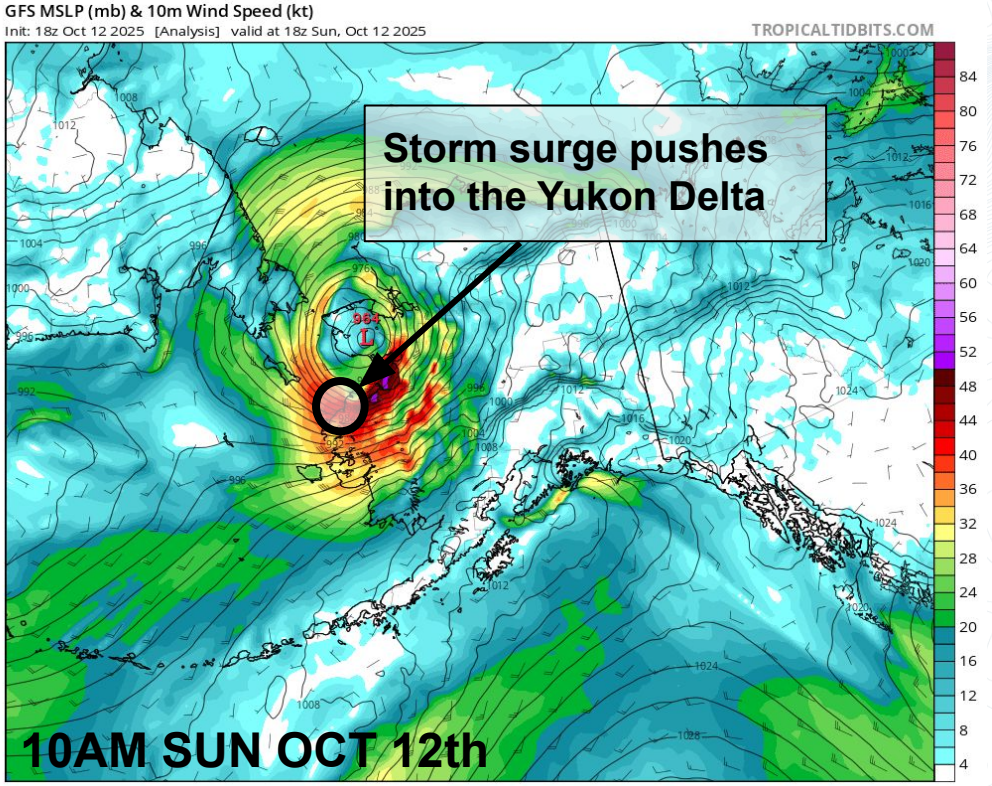


Halong Storm Surge

Extensive overland flooding between Nelson Island to just south of Hooper Bay.

Yukon Delta and Norton Sound initially had offshore winds until storm center moved to the Seward Peninsula

Water levels from Nome westward did not experience significant rises



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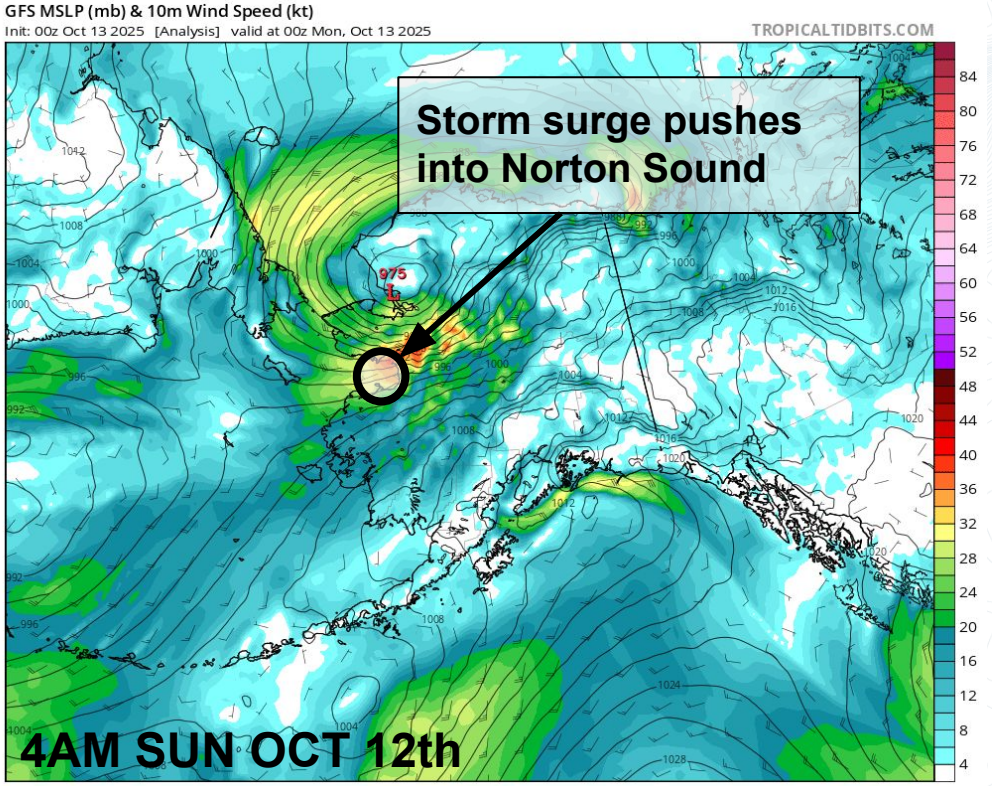
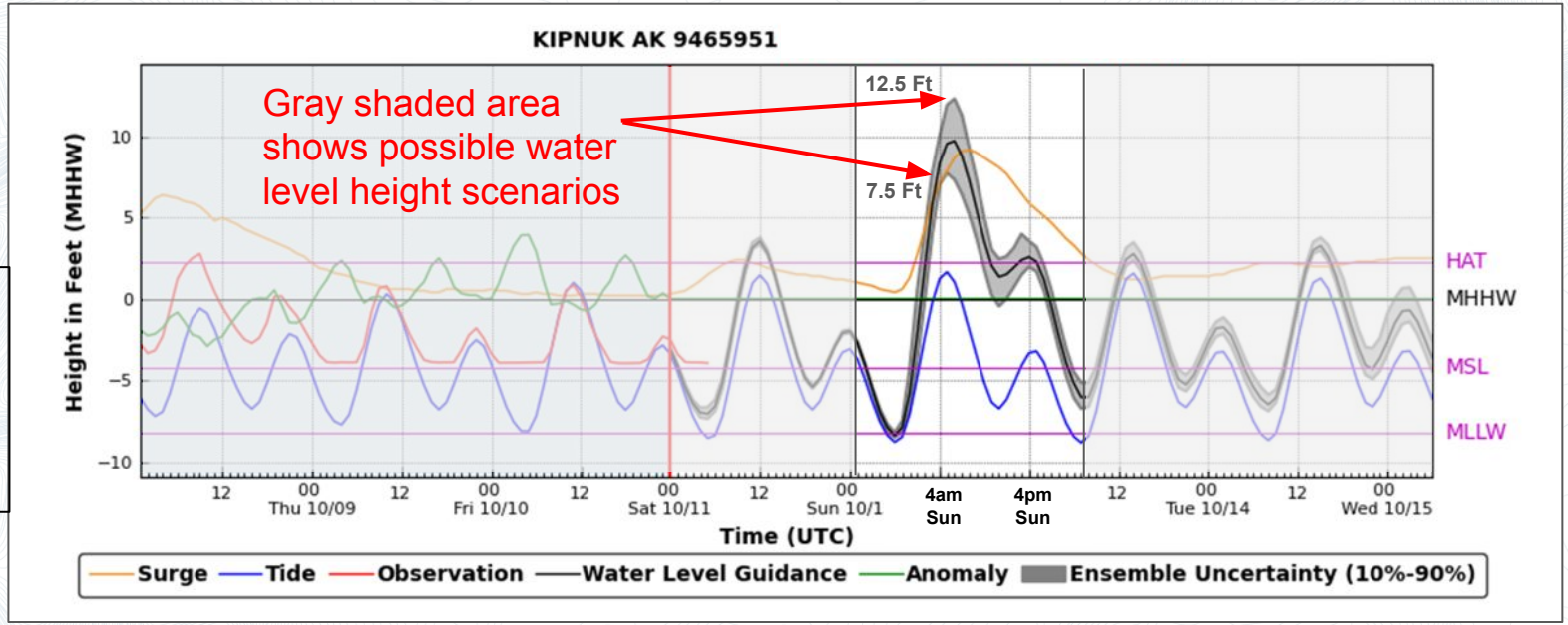


Kipnuk Storm Surge Forecast

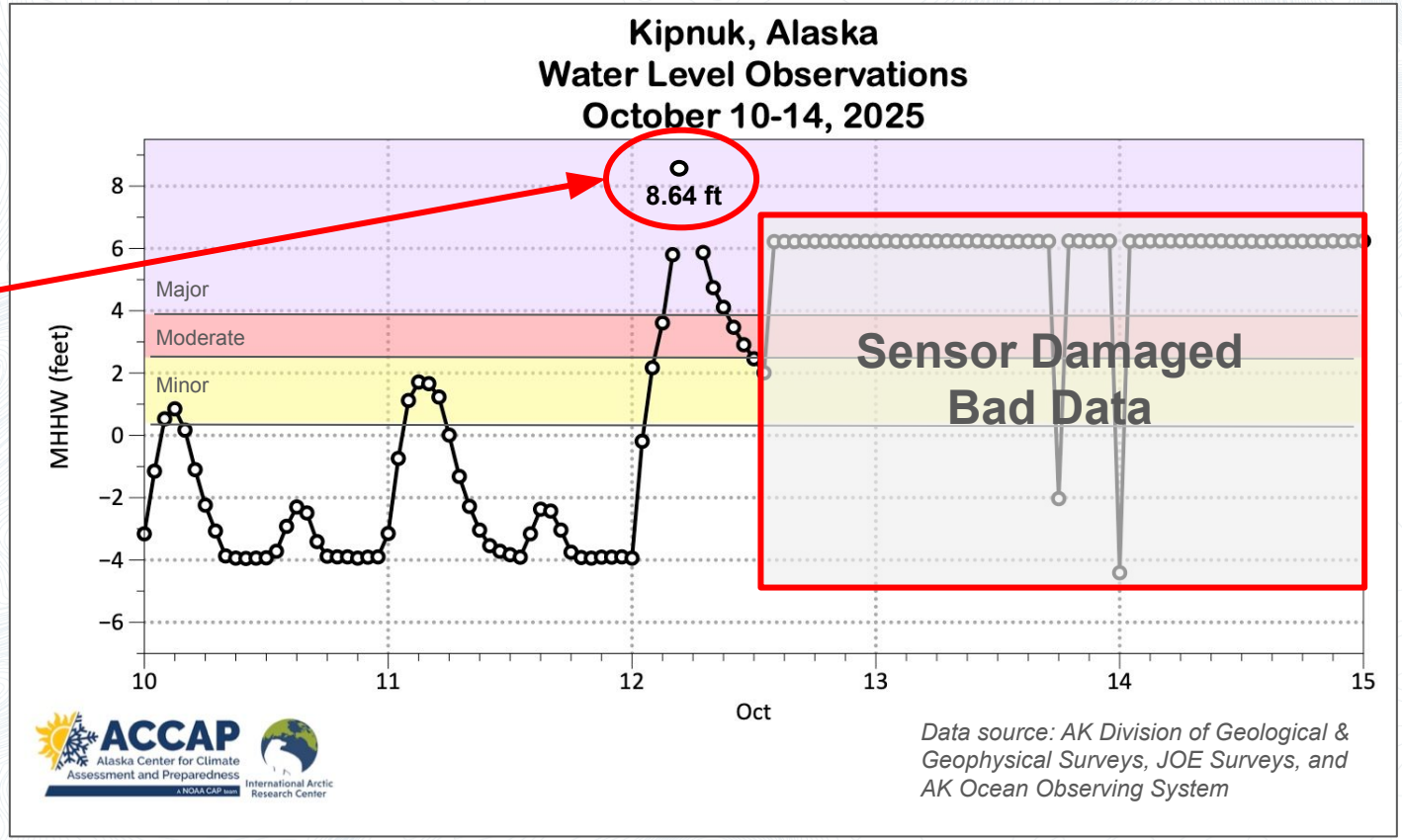
Peak surge occurred with the high tide and at night



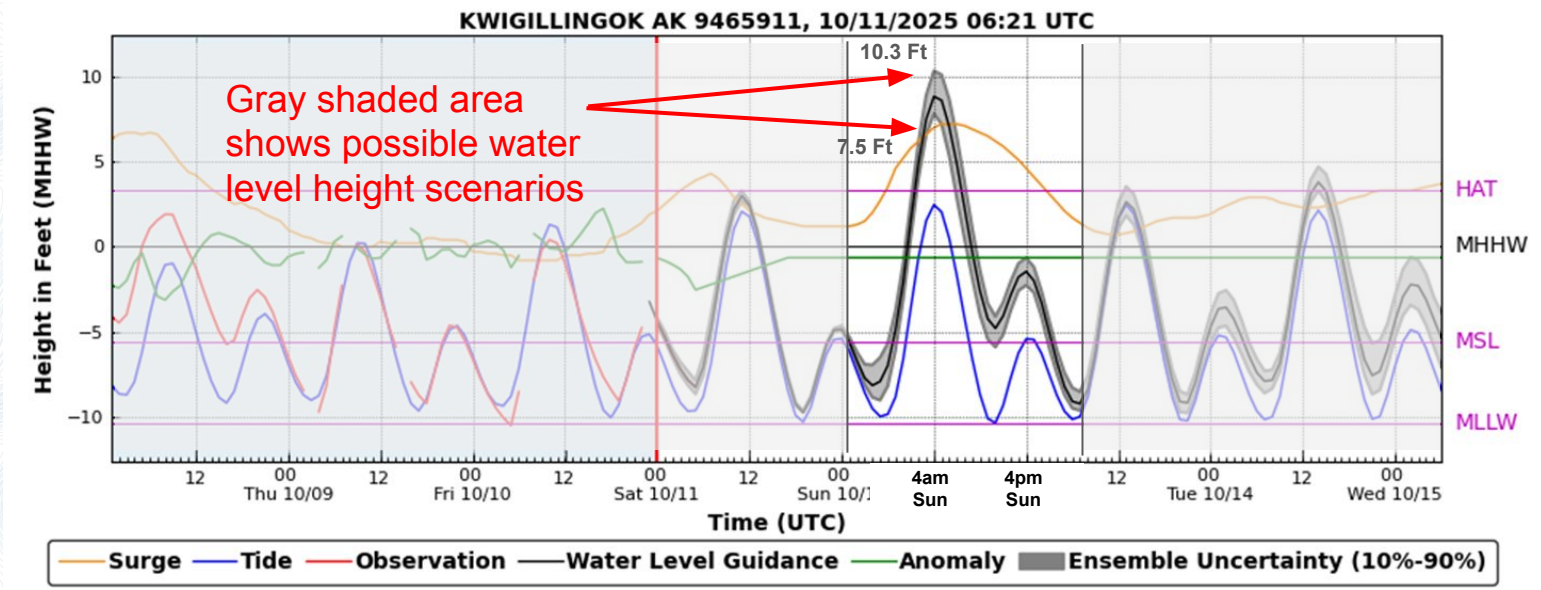
Storm surge forecast models indicated high water early Sun morning, but showed ~ 5 foot difference between possible peak water levels (7.5 feet and 12.5 feet)

Kipnuk Water Level

Preliminary (**unofficial**) water level crest based on average of surveyed high water marks



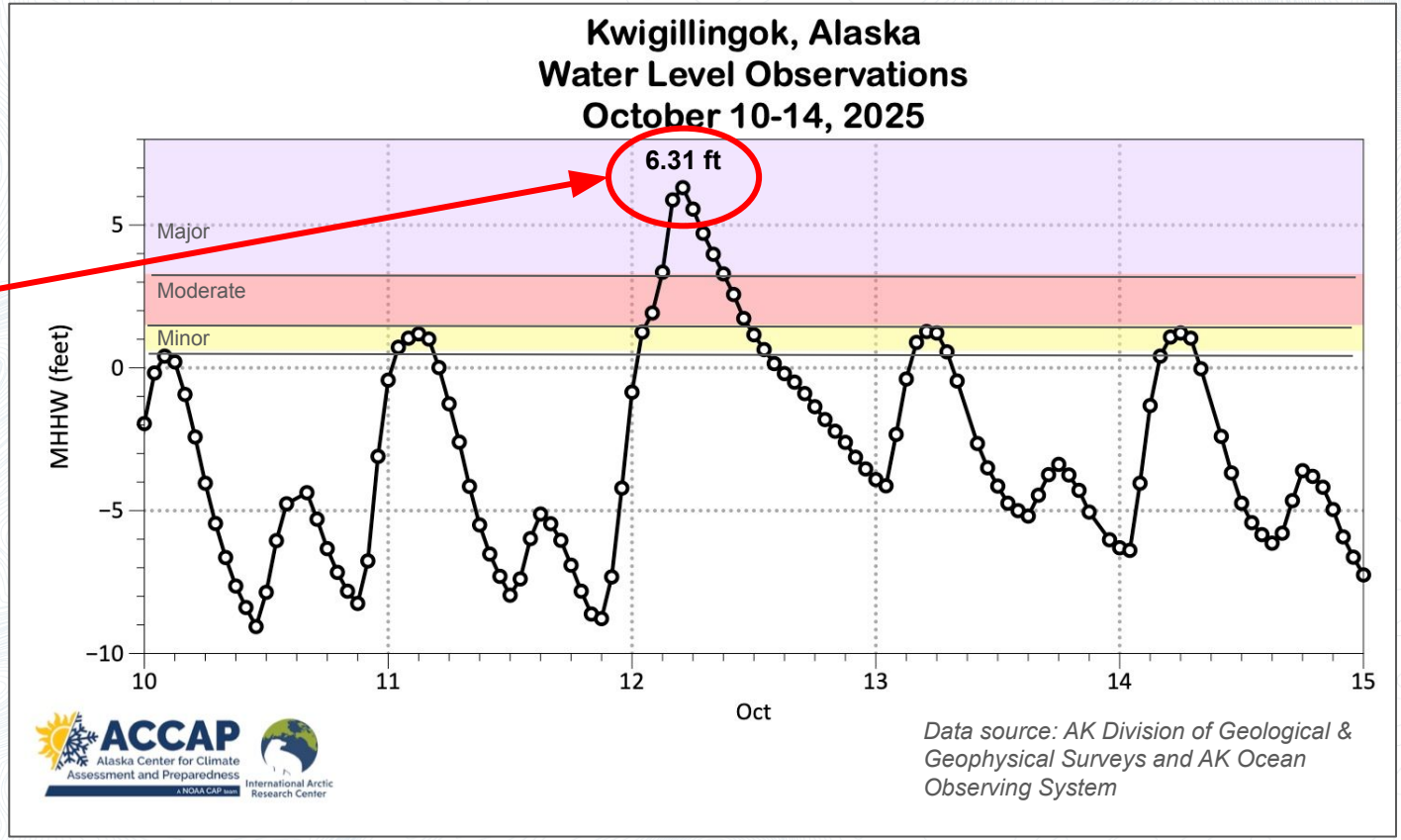
Kwigillingok Storm Surge Forecast



Storm surge forecast models indicated high water early Sun morning, but showed nearly a 3 foot difference between possible peak water levels (7.5 feet and 10.3 feet)

Kwigillingok Water Level

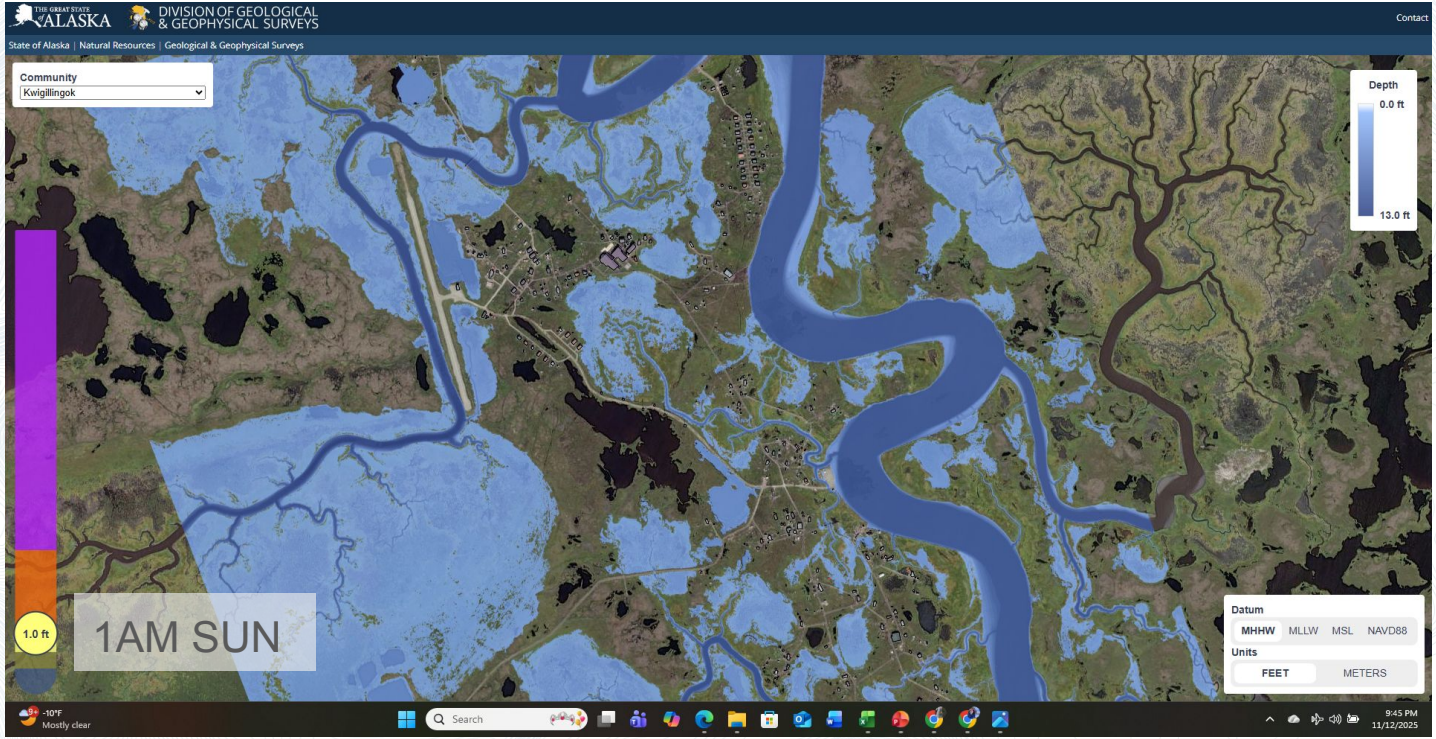
Preliminary (**unofficial**) water level crest from automated water level sensor



Kwigillingok Flood Simulation

Div of Geological & Geophysical Surveys - AK Fit Online Tool

Link to DGGS AK Fit in resources slide at end of this presentation



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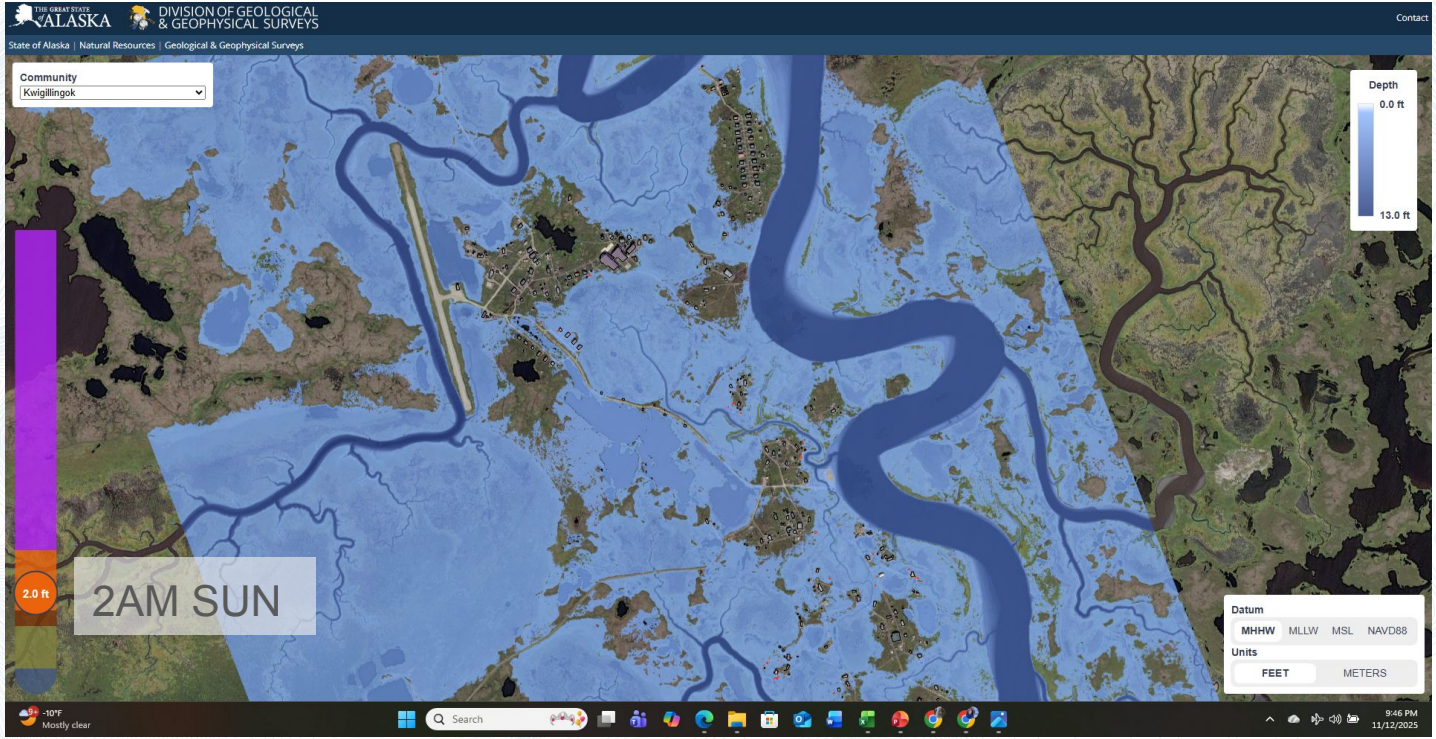

Kwigillingok Flood Simulation

Div of Geological & Geophysical Surveys - AK Fit Online Tool

Link to DGGS AK Fit in resources slide at end of this presentation

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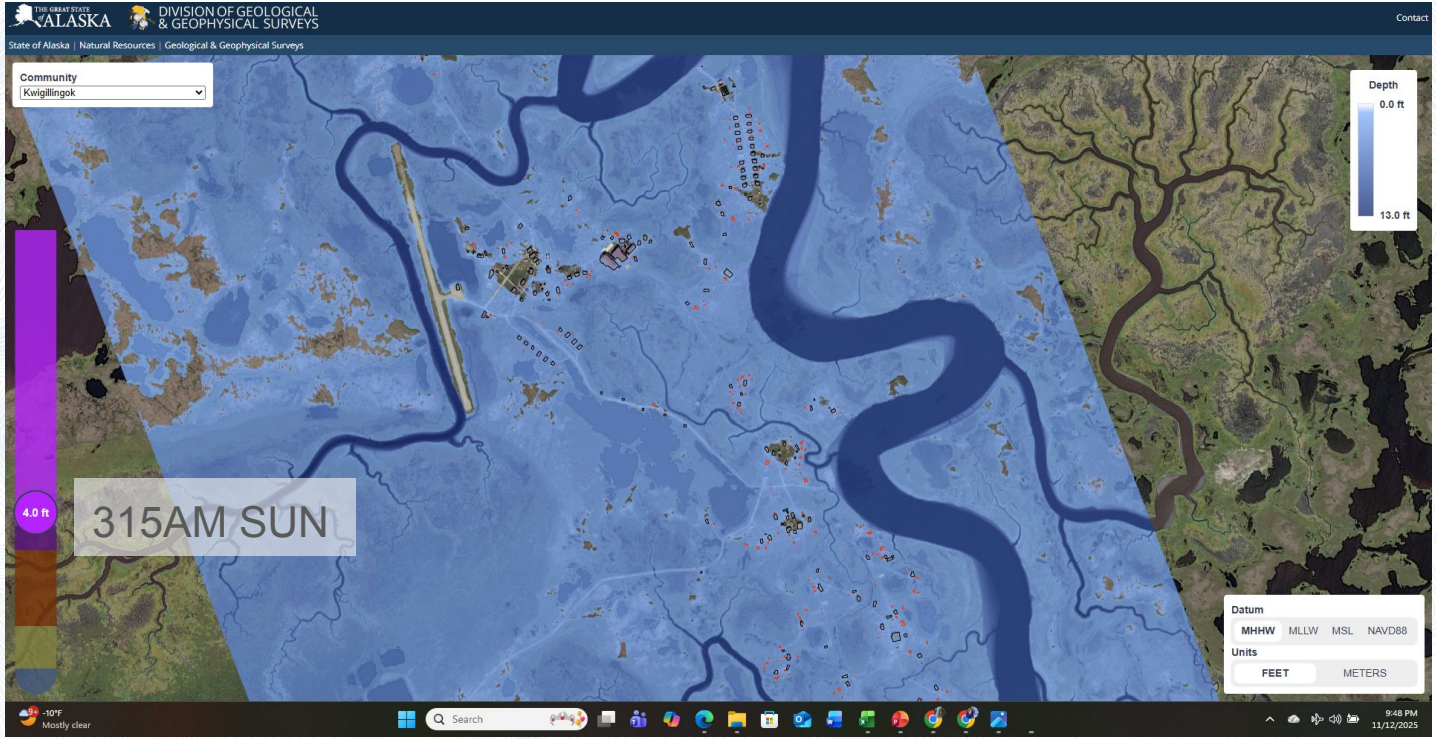

Kwigillingok Flood Simulation

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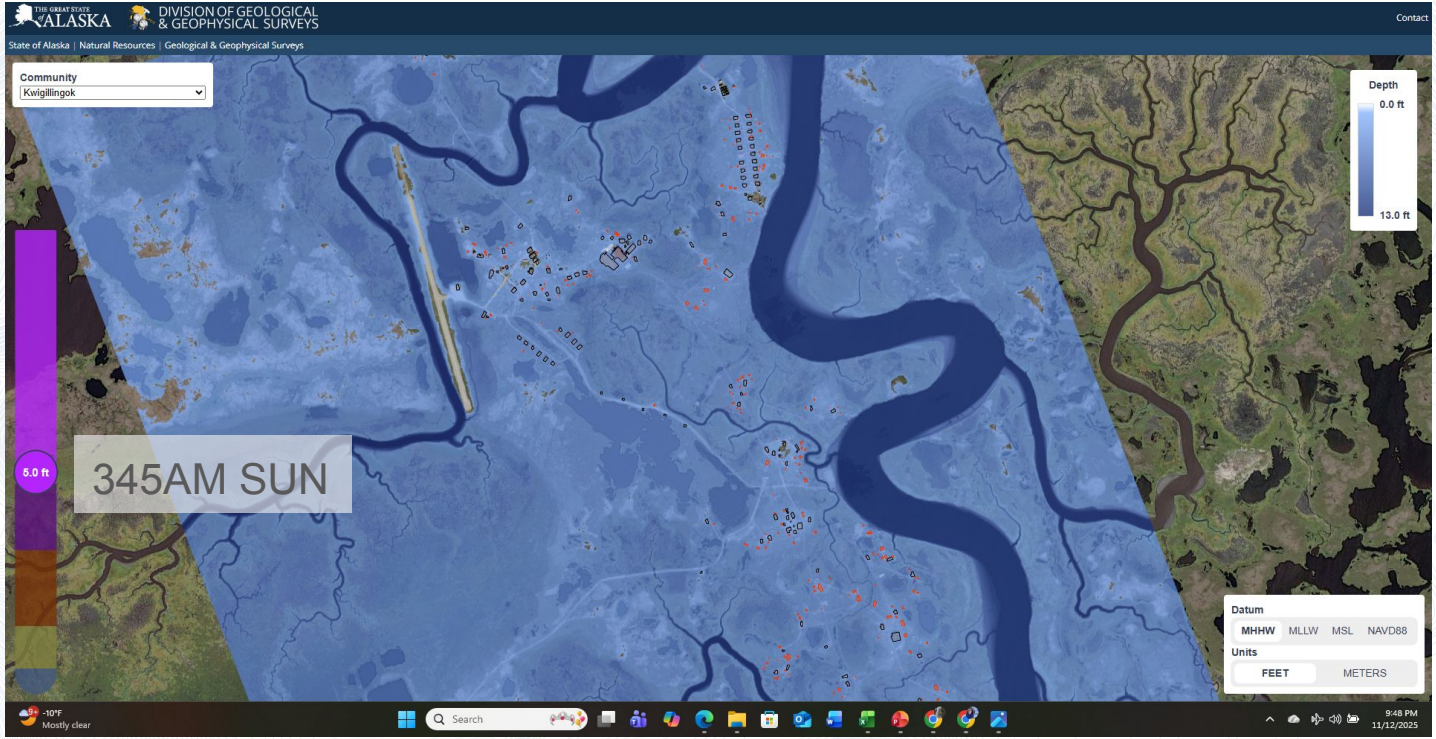

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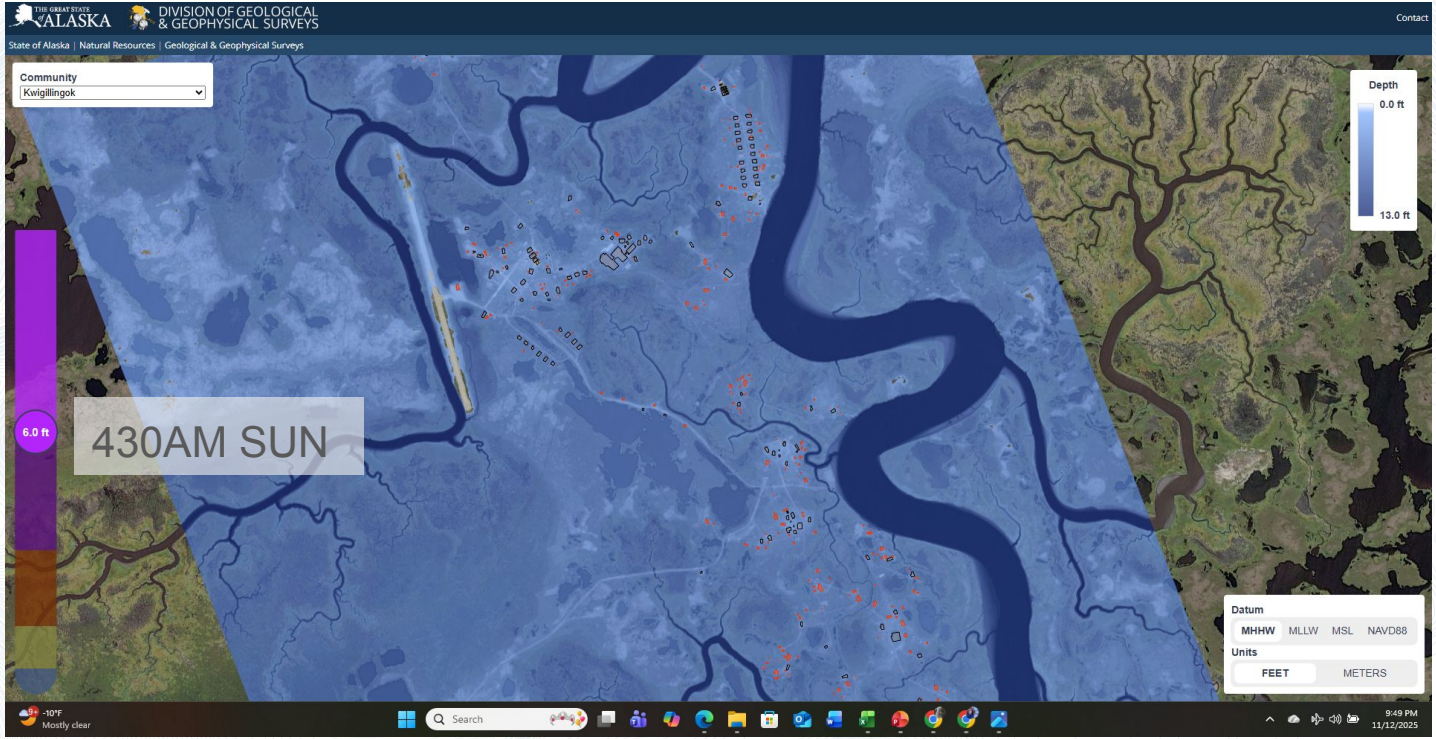

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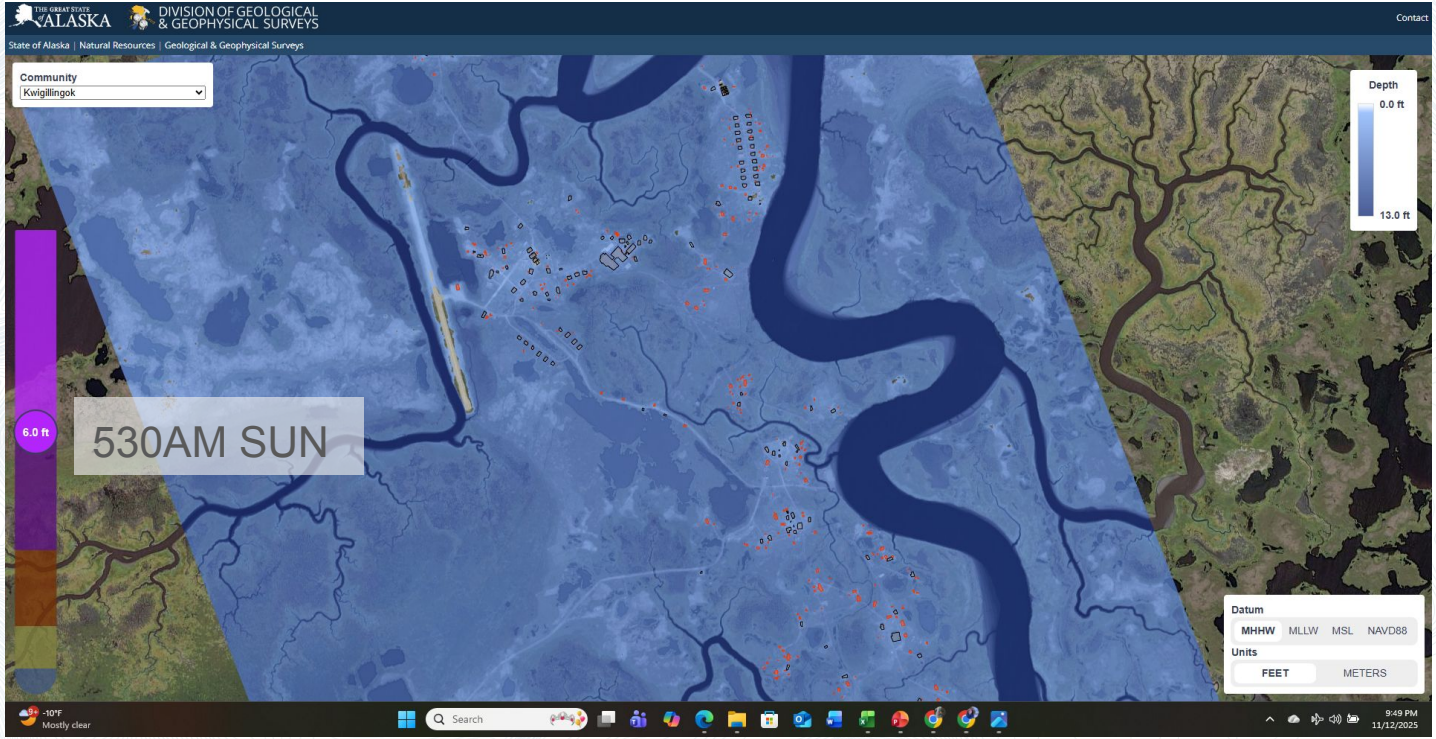
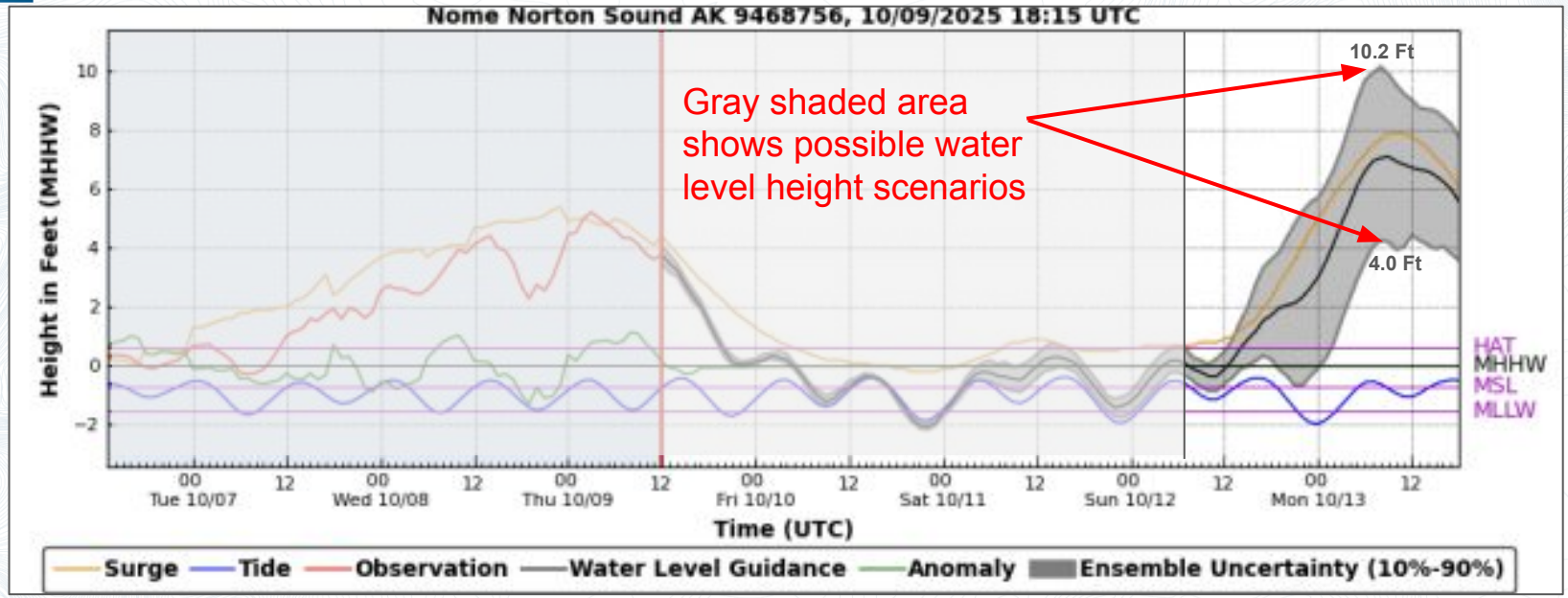


Nome Storm Surge Forecast



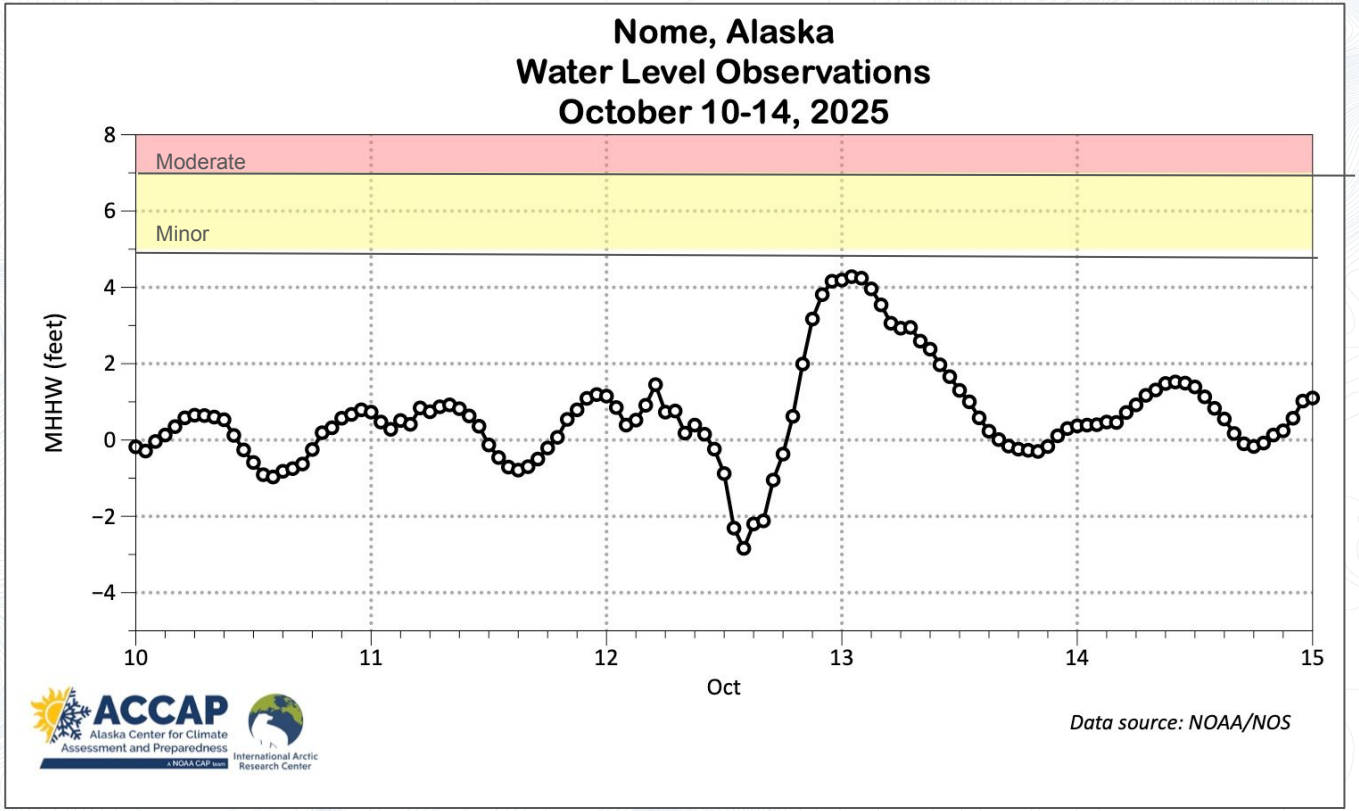
The initial storm track through the Bering Strait could have resulted in major flooding at Nome. The storm surge guidance showed a wide range of possible peak water levels from 4 ft to 10 ft above the normal high tide line.

Nome Water Level

The initial storm track would have resulted in a worst case scenario for flooding at Nome

Nome was spared the brunt of the storm with the storm track shifting east in the 24 hrs leading up to landfall

Nome experience high surf and elevated water levels, but no significant flooding from Halong.



ex-Halong impacts to Alaskans

- Flood and/or high wind damage in several dozen communities
- Kipnuk and Kwigillingok largely evacuated afterwards due to scale of damage
- People displaced to other communities in the region and across the state
- Recovery and what the looks like will take a long time

Kipnuk on October 12, 2025
Photo credit: Alaska National Guard

Summary and Resources

Ex-Halong summary

- Unprecedented storm surge and flooding northern Kuskokwim delta
- Third ex-typhoon to impact northern Bering Sea since 2022
- Rare track for an intense autumn storm

ACCAP homepage

https://uaf-accap.org/

ACCAP Resources

- Extreme events library
- Alaska's Changing Environment series
- Climate graphics

AOOS Resources

- YK Delta water levels:
  https://water-level-watch.portal.aoos.org/#default-data/5
- Western Alaska water levels:
  https://water-level-watch.portal.aoos.org/#default-data/1

DGGS Flood Resources

- AK Fit: https://maps.dggs.alaska.gov/akfit/
- Flood Observation FB Group
  https://www.facebook.com/groups/1583030649124051

Webinars through the end of the year

FRI
21

November 21 @ 12:00 pm to 1:00 pm AKST

November NWS Alaska Climate Outlook Briefing

Speaker: Rick Thoman, Climate Specialist, AK Center for Climate Assessment and Preparedness During this month's Climate Outlook Briefing, we will review recent and current climate conditions around Alaska, discuss forecasting tools, and finish up with the Climate Prediction Center's forecast for December and the remainder of the winter season. Join the gathering online to learn...

December 2025

THU
4

December 4 @ 11:00 am to 12:00 pm AKST

VAWS: Weather and Avalanche Forecasting in Southcentral Alaska

Speakers: Carson Jones, Lead Meteorologist, NWS Anchorage, and Mik Dalpes, Avalanche Specialist, Chugach National Forest Avalanche Centera About the webinar: This VAWS webinar examines the complexities of forecasting mountain weather in Alaska and its impacts on snowpack evolution, avalanche hazard, and operational forecasting. It will detail the analytical tools, model guidance, and observational networks used...

FRI
19

December 19 @ 12:00 pm to 1:00 pm AKST

December NWS Alaska Climate Outlook Briefing

Speaker: Rick Thoman, Climate Specialist, AK Center for Climate Assessment and Preparedness During this month's Climate Outlook Briefing, we will review recent and current climate conditions around Alaska, discuss forecasting tools, and finish up with the Climate Prediction Center's forecast for January and early spring. Join the gathering online to learn what's happened and what...

Quyanna Thank You

National Weather Service Alaska Region

Alaska Division Geological and Geophysical Surveys

Alaska Ocean Observing System

Mingshi Yang and Zhou Wang/U. Illinois

KYUK radio and Alaska Public Media

Ed Plumb ewplumb@alaska.edu

Rick Thoman rthoman@alaska.edu

ACCAP Alaska Center for Climate Assessment and Preparedness A NOAA CAP/RISA team

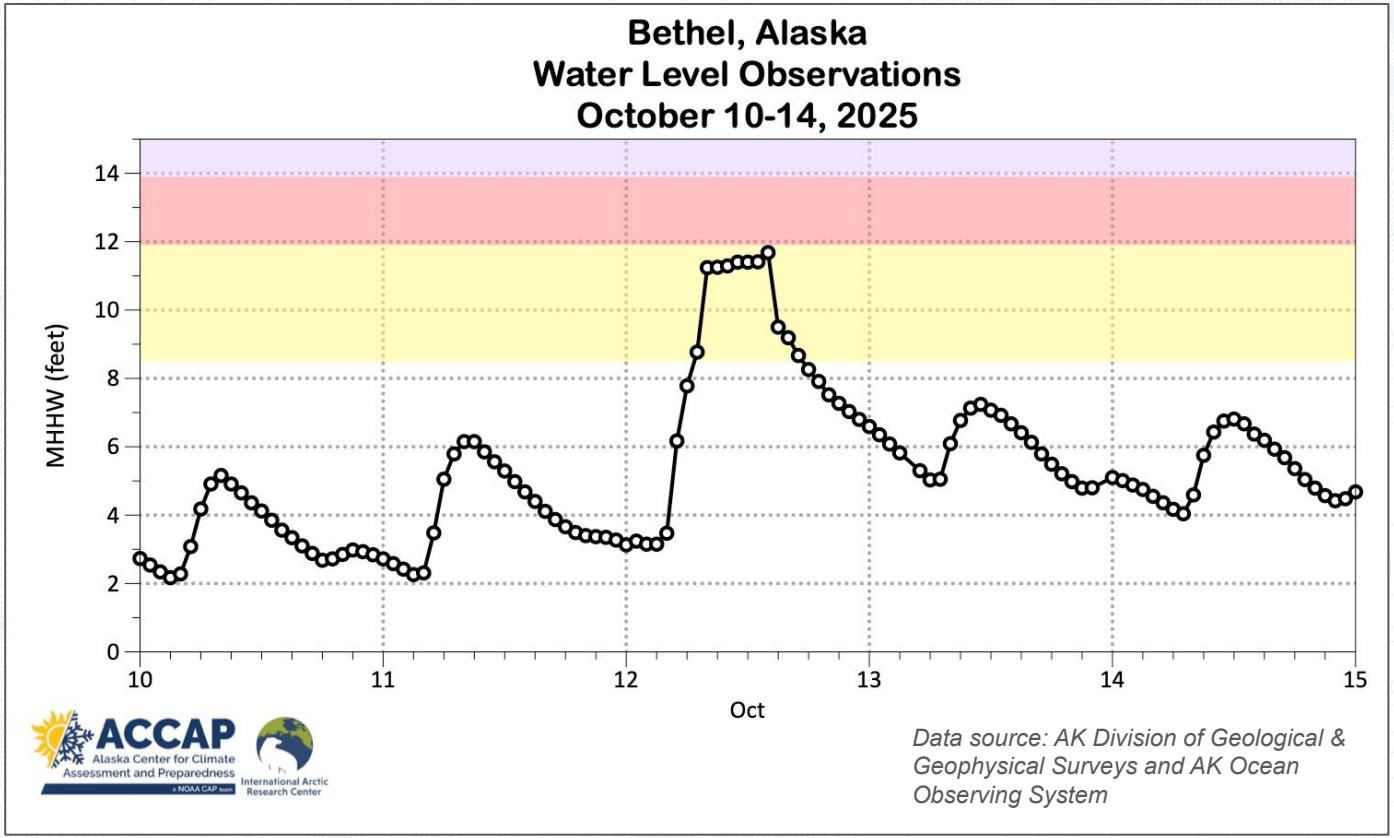
International Arctic Research Center

UAF University of Alaska Fairbanks

ACCAP is housed at the International Arctic Research Center on the University of Alaska Fairbanks Troth Yeddha' Campus

Bethel Water Level

Preliminary estimated (not official) crest is ~11.0 ft (gage was hit by a barge and shifted instrument, so gage is reading too high - DGGS surveys came up with preliminary not official crest)



Storm Surge Forecasts

Total water level (feet above MHHW). Entries are: Mean followed by (90%, 10% exceedance) to estimate range of uncertainty. Time is when the obs occurred and the guidance validated

Location	4AM Wed Oct 8th	4AM Thu Oct 9th	4AM Fri Oct 10th	4AM Sat Oct 11th	4AM Sun Oct 12th	Observed Peak Value	Time of Peak
Nome	NA	**7.1** (4.2, 9.9)	**6.2** (2.9, 8.9)	**7.9** (5.4, 8.9)	**4.3** (3.5, 4.9)	**4.3**	10/13 1AM
Kipnuk	**4.9** (1.2, 9.8)	**3.5** (1.1, 5.9)	**5.9** (2.5, 9.4)	**8.7** (7.3, 10.3)	**12.3** (11.1, 14.1)	**6? >5.87**	10/12 5AM
Kwigillingok	**6.3** (3.8, 9.1)	**5.9** (4.6, 6.8)	**6.8** (5.2, 8.5)	**9.2** (8.0, 10.3)	**9.9** (8.8, 11.0)	**6.31**	10/12 5AM