NATIONAL WEATHER SERVICE

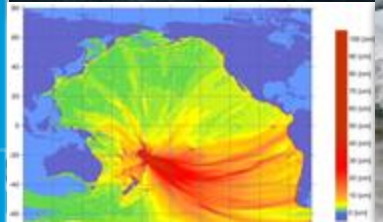
Supporting USCG and R/V Norseman II through Satellite Imagery

December 18, 2024

Presenter: Michael Lawson, NOAA NWS Alaska Sea Ice Program (ASIP)







Alaska Sea Ice Program (ASIP)

The ASIP has undergone significant advancement since its modest beginning in 1984 when a weather forecaster identified a need for ice charts in Alaska waters. As the climate continues to change, sea ice has become an even bigger focus for many people as they adapt.

SHORT HISTORY

Aug 1984
Earliest ASIP Ice Chart Archived. Charts created M, W, F

Apr 2007
First GIS Shapefile Available

Nov 2010
Full Color Ice Charts Begin

Jun 30, 2014
Daily Ice Charts Begin

Oct 1, 2015
SIPAS and WMO-Standard Ice Charts Begin

SEASONAL FISHING BOAT CALLS

*Generally late December through April

2019-2020	138	
2020-2021	206	
2021-2022	178	*Opilio Crab Quota Cut 88%
2022-2023	7	*Opilio Crab Season Cancelled

NUMBER OF ANALYSTS

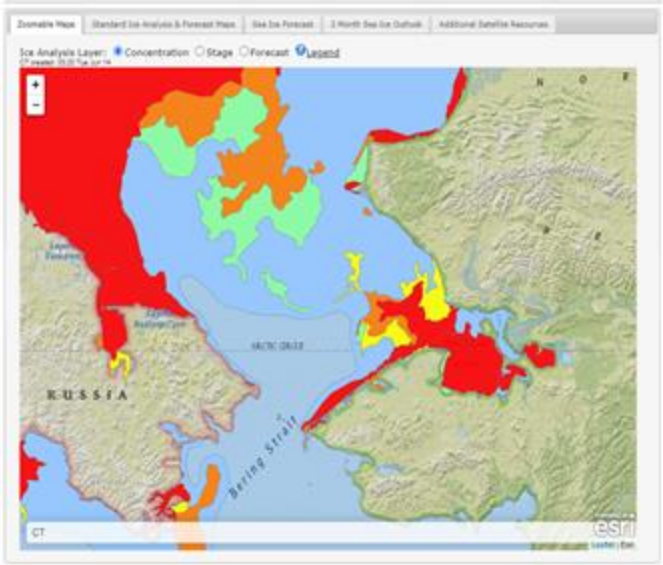
YEAR: 1984	YEAR: 2011	YEAR: 2022
1	2	3

CONTACT

weather.gov/afc/ice
nws.ar.ice@noaa.gov
1-907-266-5138
@NWSAlaskaSeaIce

Routine Sea Ice Products

- NWS Alaska Sea Ice Program website
  - weather.gov/afc/ice
- Daily Static ASIP Sea Ice Charts
  - Sea Ice Concentration
  - Sea Ice Thickness
  - Sea Ice Forecast
  - Sea Surface Temperatures
- Text 5-day Forecast
  - Posted each Monday, Wednesday, and Friday
- Text 3-month Outlook
  - Posted on the 4th Thursday of each month



R/V Norseman II

- Left Nome 31 May to study Pacific Walrus abundance in the Bering and Chukchi Seas
- Began drifting within ice pack 4 June
  - Rudder damaged by ice
- Last support from NWS sent on 18 June as vessel reached open water
  - vessel headed to Nome for repairs

The Nome Nugget

Alaska's Oldest Newspaper

• USPS 958-000 • Single Copy Price - 50 Cents in Nome •

HOME / NEWS / RESEARCH VESSEL EN ROUTE TO NOME AFTER TRAPPED IN ICE FOR 14 DAYS

Photo courtesy NOAA

GO WITH THE FLOE — R/V Norseman II is pictured caught in pack ice on June 8, 2024 in the northern Bering Sea.

Research Vessel En Route To Nome After Trapped In Ice For 14 Days

BY: COLIN A. WARREN

After having been caught in dense sea ice for 14 days, the research vessel Norseman II is on its way back to Nome, to undergo repairs.

The ship had been drifting with the ice off the northern coast of the Seward Peninsula since June 4, 2024 with its crew and 14 scientists on board. As of Tuesday morning, June 18, the vessel appeared to have made it out of the ice and was navigating through open waters.

The 115-foot privately-owned research vessel leased by U.S. Fish and Wildlife Service and the U.S. Geological Survey, set sail from Nome on Friday, May 31 for a study to determine

Click for SUBSCRIPTIONS!

View This Week's Paper Online

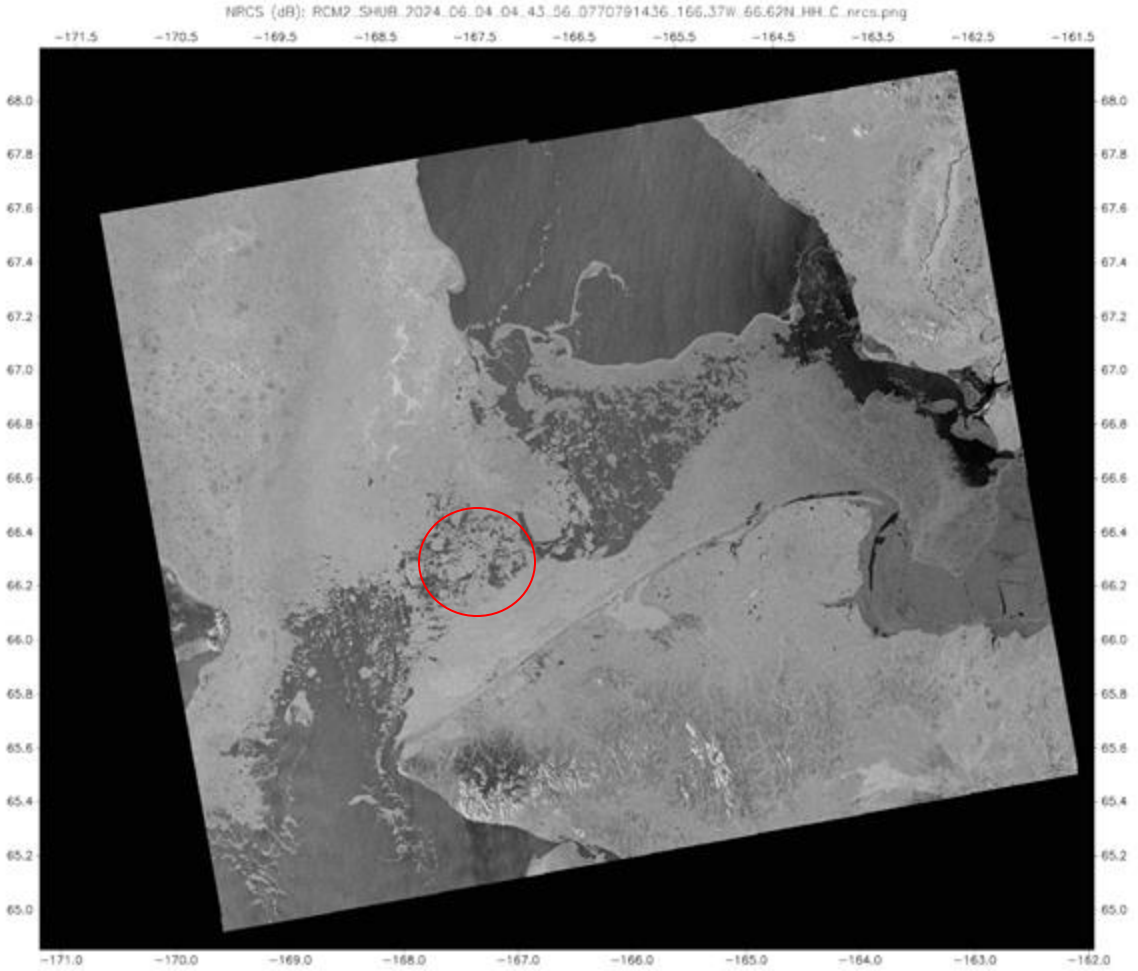
June 27, 2024

Visitor's Guide

Nome Visitor Guide

Antecedent sea ice conditions

Lat/Lon: 66°19.1’N 167°21.6’W



Operations Timeline: June 3 1100pm

Date: 6/4/24

Time UTC: 0800

Lat/Lon: 66°19.1'N 167°21.6'W

Air Temp: 24.3°F

Sea Temp: 28.04°F

Wind Direction: 358°

Wind Spd: 33.6 Kn Gust: 44.8 Kn

Baro: 1,003mb

Wx: Cldy, Vis: 4nm

Sea/Swell: 1'/0'

Ice Coverage: 6/10

Norseman II weather observations

Operations Timeline: June 4 11:57 am

US F&WS and USGS on Norseman II? External

Alaska Sea Ice Program

I saw this KNOM Facebook post that mentions USF&WS and USGS are currently on the Norseman II. I'd like to reach out to them and see if they need any OSS as they're in the sea ice. I know this is beyond NOAA, but do you happen to have a point of contact I could reach out to?

KNOM Radio Mission

Photo of the Day: The Norseman II floats in the home harbor on Friday, May 31 as a skiff makes numerous round trips loading cargo and passengers. The vessel departed later in the day for a four-week expedition led by researchers from the US Fish and Wildlife Service and US Geological Survey. The team of scientist's objective is to conduct genetic analyses on walrus skin samples to estimate population size.

Ben Townsend photo.

Operations Timeline: June 4 2:19pm

NWS AK Region

[redacted] Are you on or associated with this cruise? our Ice Program leads would like to make contact with the PIs and Captain.

USGS

Jun 4, 2024, 2:19 PM

Great to hear from you!

Yes. Our colleagues [redacted] leading this cruise. They have email contact aboard the Norseman II and have been generally responsive despite the high winds this week. Please let me know if you have any trouble contacting them by email and I can look into alternative contact options.

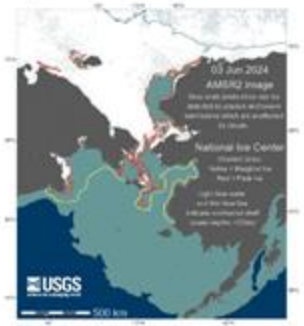
Operations Timeline: June 4 2:42pm

USGS

This offer would be especially appreciated now, given the current situation of the vessel just west of Shishmaref.

Lat: 66.242495 Lon: -167.572596

And, given the current ice charts.



Operations Timeline: June 4 5:17pm

US Fish and Wildlife Service

- Do you have any bounds of an area you're operating in? If not, what general area are you planning to be within?

Our goal is to get to the NE Chukchi Sea, north of Cape Lisburne. So to find a suitable passage there would be ideal for us. However, while we are waiting for the passage to clear up, we are considering spending some time just north of the Bering strait to see whether there are any walruses there. I am attaching an image here where a blue polygon shown an area where we are thinking to wait for ice to break up and the yellow arrow shows where we ultimately want to go. As you can see there's still quite a bit of ice between here and there.

Once we get past Cape Lisburne we will be staying along north coast Alaska over the continental shelf, following the ice edge there.

- How long will you be out there?

Our cruise ends on June 28th. We will likely stop working and head back to Nome on the 25th.

- Is there a specific concentration of sea ice that you need/want to stay below? Or a certain thickness of ice that is important?

5 tenths to 6 tenths is the maximum we can navigate through. Walruses like to be in 2 tenths to 6 tenths.

We are not an icebreaker and cannot break any ice, except for very-very thin. But we can maneuver though small leads (5 m wide) between larger polynyas.

- Is a daily email a good frequency for you?

Daily would be great but twice a day would be even better.

- Are there any other people you'd like included in these emails? We'll remove Amy and Tony after this email.

Operations Timeline: June 4 1012pm

NWS Fairbanks

Forecast is based on forecast start time of 2200 AKDT on June 04.
If conditions become unrepresentative...contact the National Weather Service.

.DISCUSSION...
Near gale force north winds diminish towards morning to less than 25 knots. Snow squalls continue through the night.
Stronger north currents weaken Wed morning. Winds turn northwesterly and will generally be around 20 knots Wed and Wed night.
Currents weaken and switch to a southwest direction 0.1 to 0.3 kts Wed night and Thu.

.REST OF TONIGHT...
Sky/weather.....Cloudy (95-100 percent). Snow showers and squalls.
Min temperature.....Around 28.
Surface winds (kts).Windy. North winds 25 to 31 knots diminishing to 20 to 24 knots toward morning.
Surface Currents(kts). From the northeast 0.5 to 1 kts.

.WEDNESDAY...

Sky/weather.....Cloudy (85-95 percent) then becoming partly sunny (55-65 percent). Slight chance of snow in the morning.
Max temperature.....Around 32.
Surface winds (kts).North winds 20 to 22 knots diminishing to 16 to 18 knots in the afternoon.
Surface Currents(kts). From the north 0.1 to 0.5 kts.

.WEDNESDAY NIGHT...

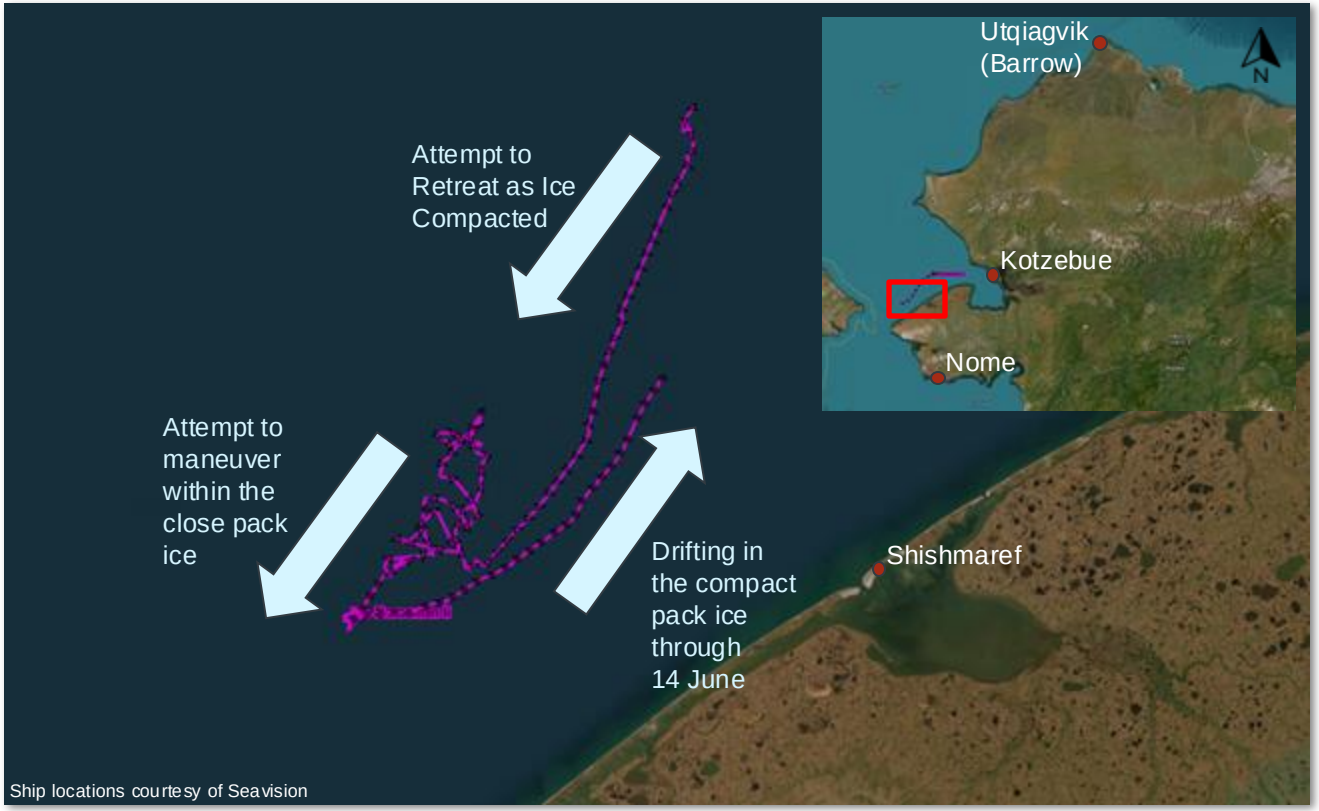
Sky/weather.....Partly cloudy (40-50 percent).
Min temperature.....Around 30.
Surface winds (kts).North-Northwest winds 17 to 20 knots.
Surface Currents(kts). From the north 0 to 0.3 kts switching to variable less than 0.1 kts.

.THURSDAY...

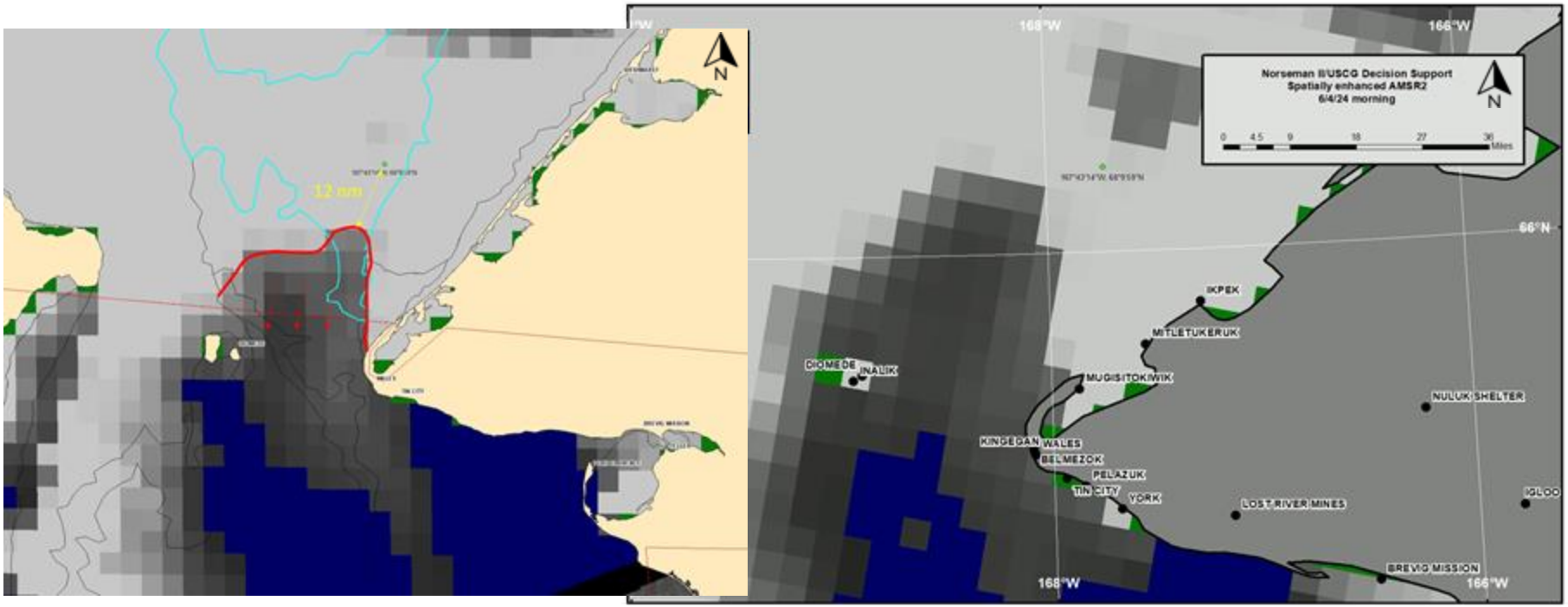
Sky/weather.....Partly sunny (50-60 percent).
Max temperature.....Around 34.
Surface winds (kts).Northwest winds 18 to 20 knots.
Surface Currents(kts). From the southwest 0.1 to 0.3 kts.

R/V Norseman II Drift Course

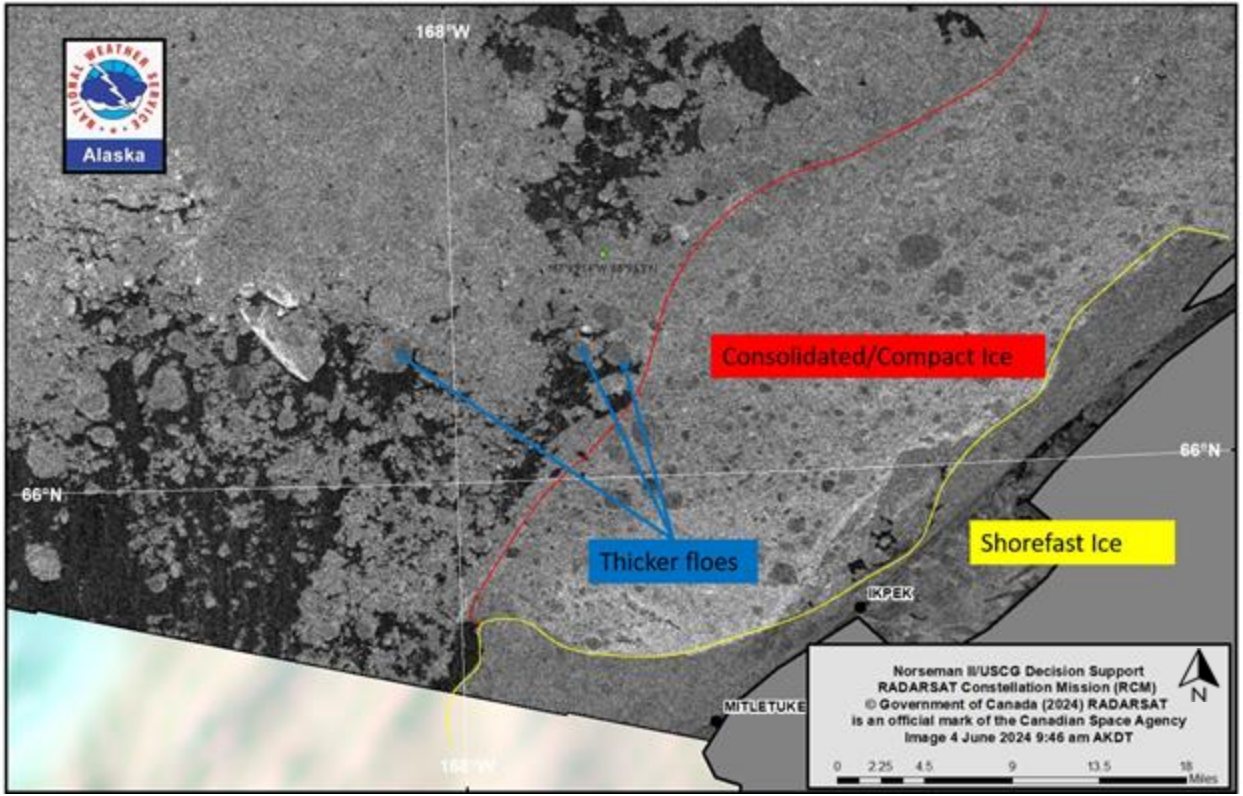
- Ice pack was open when they started out
- Sea ice to the north and west began drifting southeast 3 June
- Vessel was stationary in ice for two weeks (4 June to 18 June)



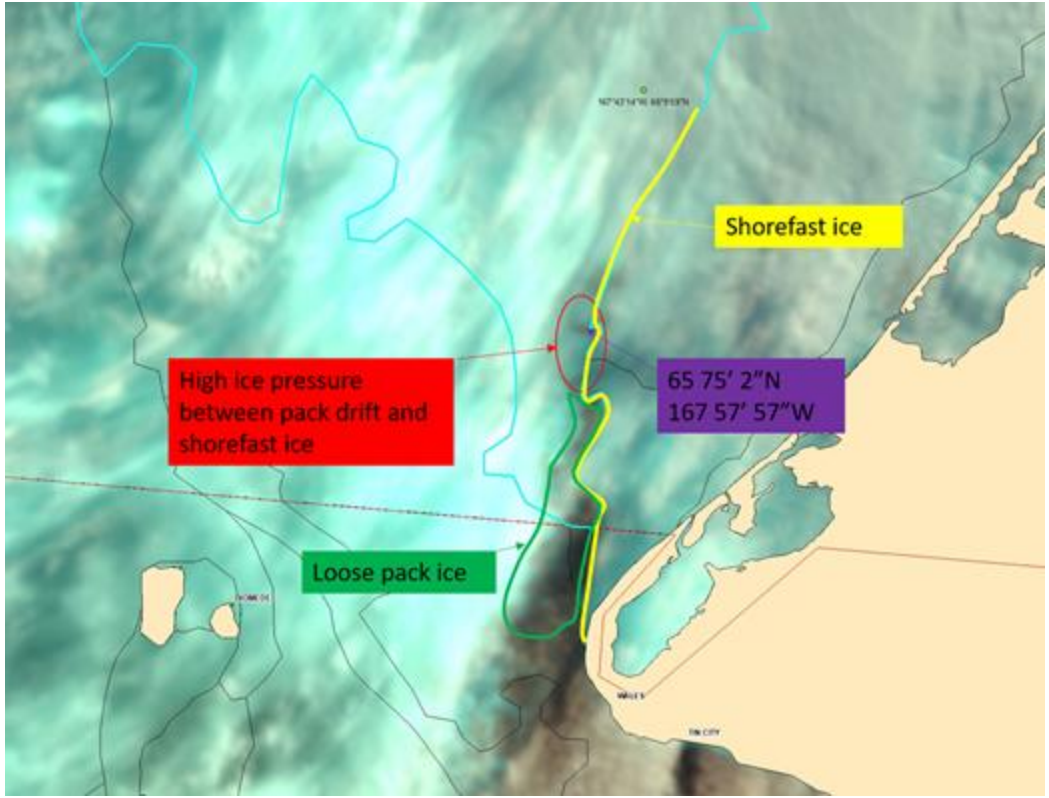
Spatially Enhanced AMSR2 - 4 June 2024



RCM SAR Imagery - 4 June 2024

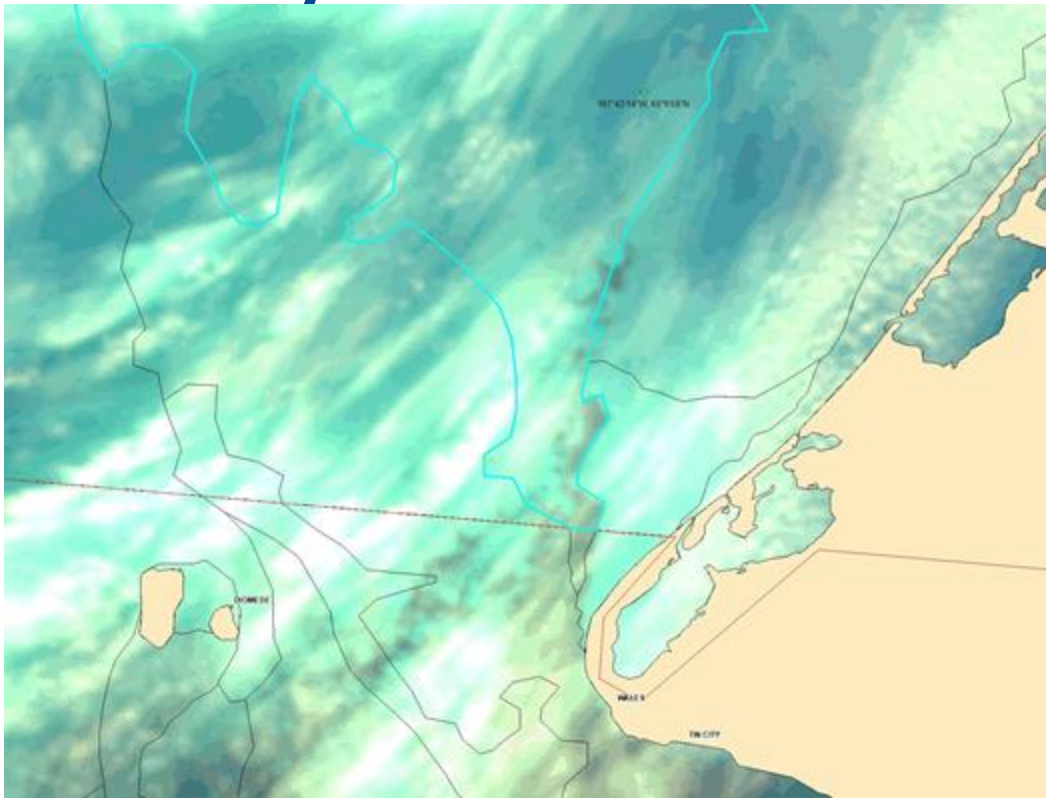


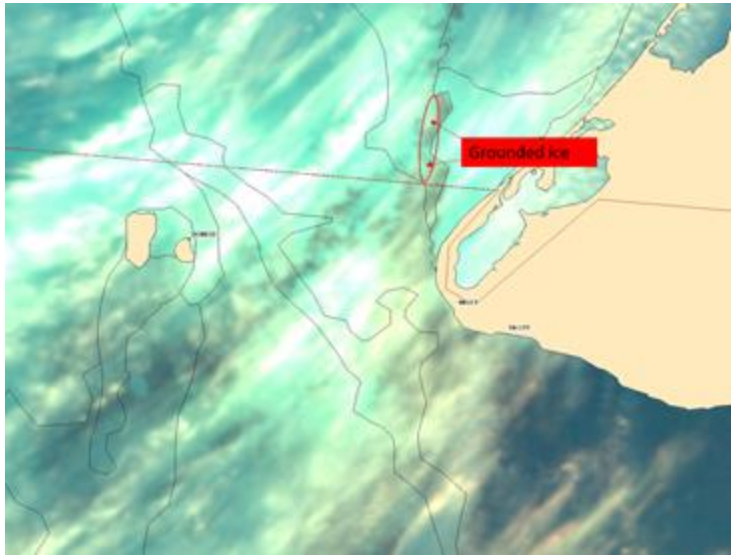
DayLandCloud June 5 morning



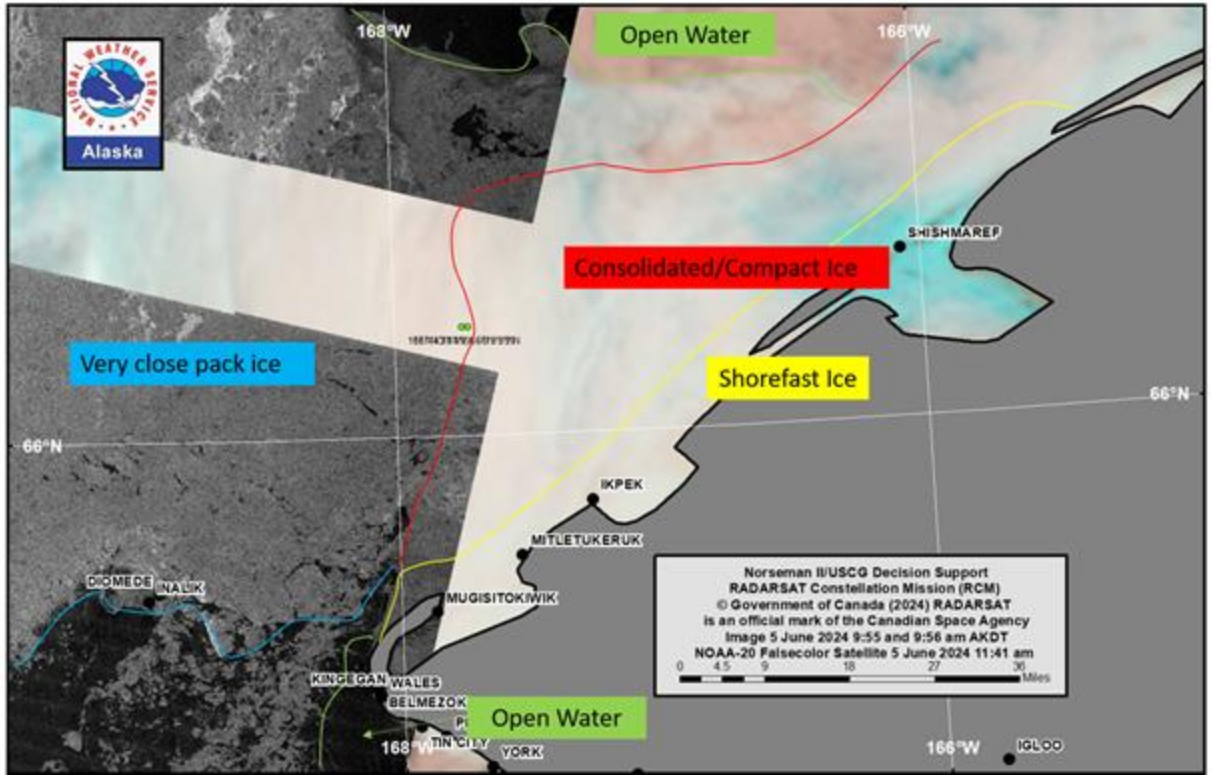
I used this Day Land Cloud image to make an animation to see the drift, and can see an opening/looser pack ice just off of the shorefast ice north of Wales, however it is directly south of a **pinch point where the drift is increasing ice pressure** against the shorefast ice.

DayLandCloud Imagery June 5





June 5th afternoon support



The RCM image below is from around 10am this morning. The pack ice has continued to consolidate in the vicinity of the ship. I suspect the ship is caught in the pack ice that is being pushed against the consolidated ice. I don't think that the area where the pack IS moving southward is very far to the west of the position of 66 10N 167 43W. I'm estimating that the pack is moving southward as close as around 5 nm to their west. The polynya to the north is 25 nm away and is open water. That area will continue to push southward for another day before winds lighten up.

Friday and Saturday, northerly winds will slacken and allow the pack ice to begin moving with tides and currents. When this happens look for the open water area near Wales to start to sneak up the east side of the Bering Strait toward the Norseman II position. Sunday into Monday, northerly winds will return and keep the pack consolidating and flowing southward.

The green dot to the west is the last reported position of 66 10N 167 43.098W

Norseman II obs June 5/6

Date: 6/6/24

Time UTC: 0800

Lat/Lon: 66°10.065’N 167°42.937’W

Air Temp: 28°F

Sea Temp: 27.24°F

Wind Direction: 327°

Wind Spd: 14.3 Kn Gust: 21.8 Kn

Baro: 1,008mb

Wx: Overcast, Vis: 3nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/6/24

Time UTC: 1400

Lat/Lon: 66°10.054’N 167°42.968’W

Air Temp: 26.2°F

Sea Temp: 27.59°F

Wind Direction: 323°

Wind Spd: 16.4 Kn Gust: 22.6 Kn

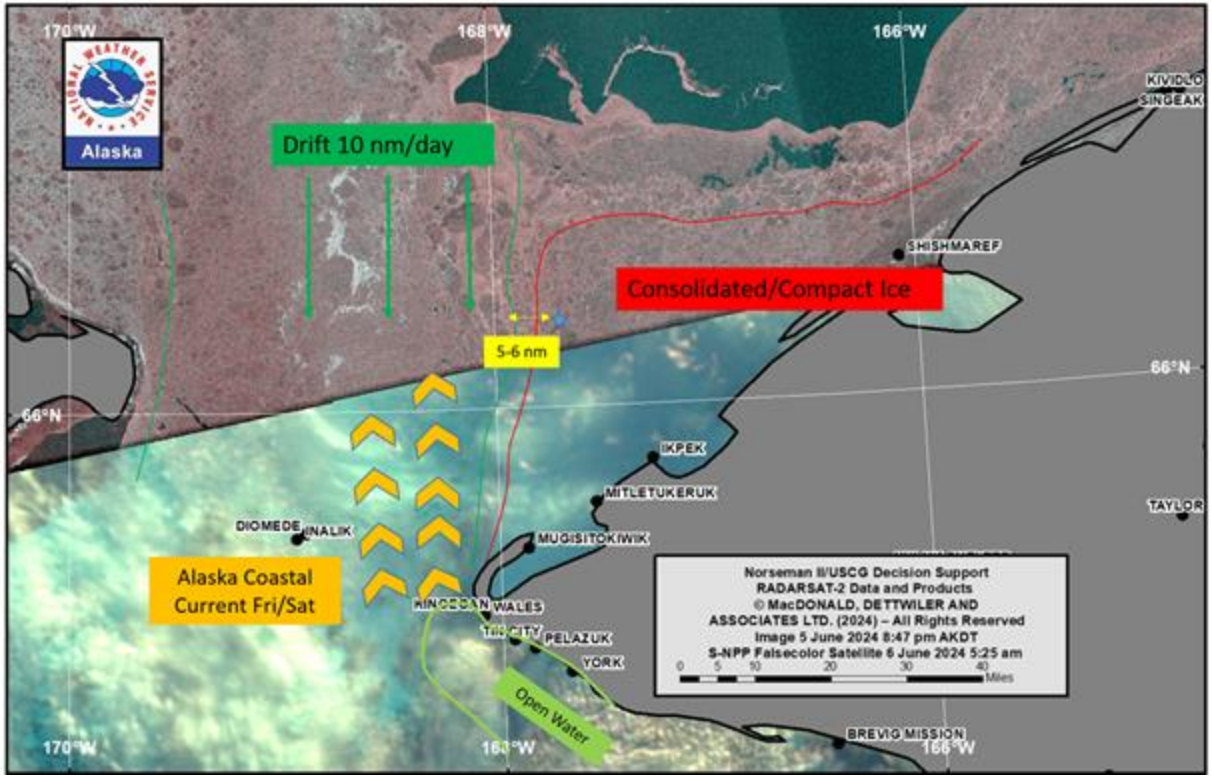
Baro: 1,010mb

Wx: Overcast, Vis: 4nm

Sea/Swell: NA

Ice Coverage: 10/10

June 6 morning support



I had some time to analyze yesterday's and today's imagery to get a handle on the ice and weather situation. The star in the image below is the Norseman II position at the time of this image, 8:47 pm last evening.

Norseman II is currently either in the consolidated pack ice from the persistent northerly winds or right on the edge of it.

I have tracked **individual ice floes** in the green corridor to be moving **10 nm/day** not far from the Norseman II's position.

Winds will begin to lay down today into Friday which should stop the pack from drifting southward and consolidating against the coast.

When the winds become lighter, the **Alaska Coastal Current** should begin to have more of an effect on the ice underneath the orange chevrons and **bring the open water area back northward.**

The Norseman II may still be too far to the east to see much of this effect but I would think they will no longer be completely locked in.

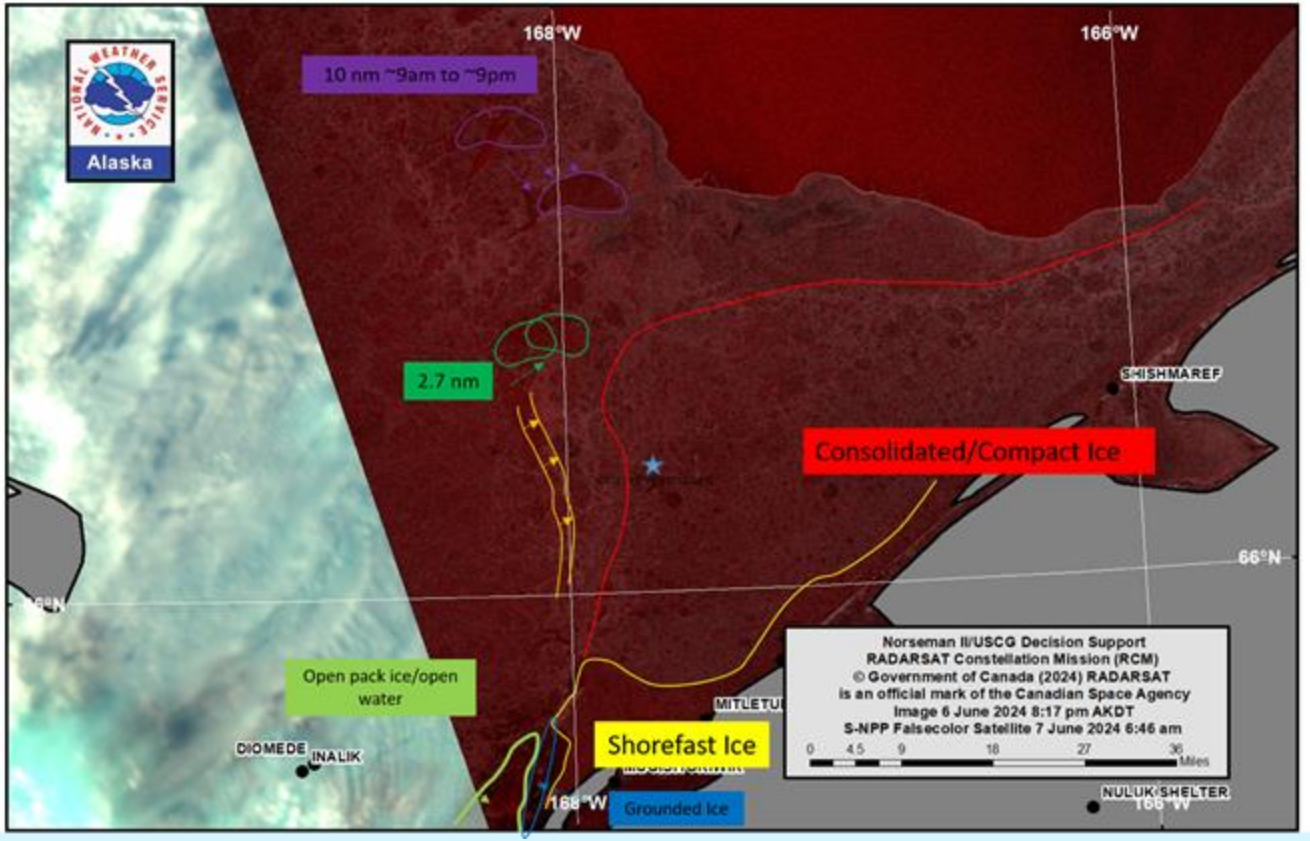
The **best chance for ice to open up is Friday and Saturday**, as we progress further into the day **Saturday northerlies return** which may return a compacting effect to the area.

If you have any questions feel free to call me to discuss 907-266-5133

Sea Ice Update

LAST UPDATE: 10:00 AM 06-07-24

- Movement lines are from yesterday morning to evening
- It is evident that tides and currents are beginning to be the dominant moving force of the ice pack through the Bering Strait
- The area where the pack is moving continues to be 5-6 nm west of the Norseman II
- Currents look to increase over the next 36 hours
- Saturday evening currents and winds will oppose each other which will complicate the pack opening up



Norseman II obs June 6/7

Date: 6/7/24

Time UTC: 0800

Lat/Lon: 66°10.335'N 167°42.375'W

Air Temp: 28.9°F

Sea Temp: 27.93°F

Wind Direction: 278°

Wind Spd: 10.5 Kn Gust: 14.1 Kn

Baro: 1013mb

Wx: Overcast, Vis: 2nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/7/24

Time UTC: 1400

Lat/Lon: 66°10.718'N 167°41.696'W

Air Temp: 28.9°F

Sea Temp: 28.18°F

Wind Direction: 232°

Wind Spd: 4.1 Kn Gust: 7.2 Kn

Baro: 1015mb

Wx: Overcast, Vis: 1nm, Fog

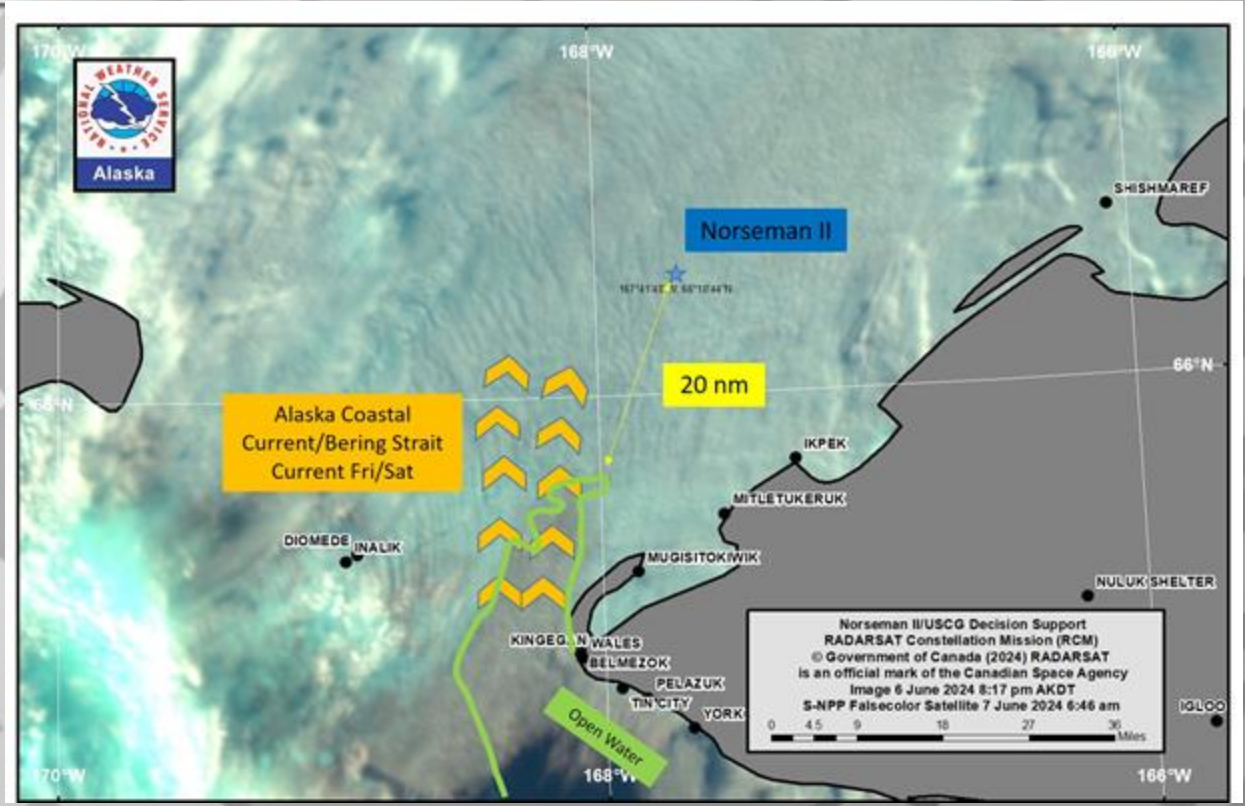
Sea/Swell: NA

Ice Coverage: 10/10

Sea Ice Update

LAST UPDATE: 10:00 AM 06-07-24

- Open water is beginning to progress northward past Wales.
- There may be open pack ice in that area, it is difficult to tell underneath the low cloud deck.
- Currents still look favorable to continue to push this boundary northward over the next 36 hours.
- High confidence in a return to compacting ice conditions late Saturday through mid-week



Norseman II obs June 7

Date: 6/7/24

Time UTC: 2000

Lat/Lon: 66°10.829'N 167°41.464'W

Air Temp: 37°F

Sea Temp: N/A°F

Wind Direction: 213°

Wind Spd: .8 Kn Gust: 1.3 Kn

Baro: 1019mb

Wx: Clear, Vis: 6nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/8/24

Time UTC: 0200

Lat/Lon: 66°11.033'N 167°41.733'W

Air Temp: 46°F

Sea Temp: 27.86°F

Wind Direction: 275°

Wind Spd: 3.6Kn Gust: 5.1 Kn

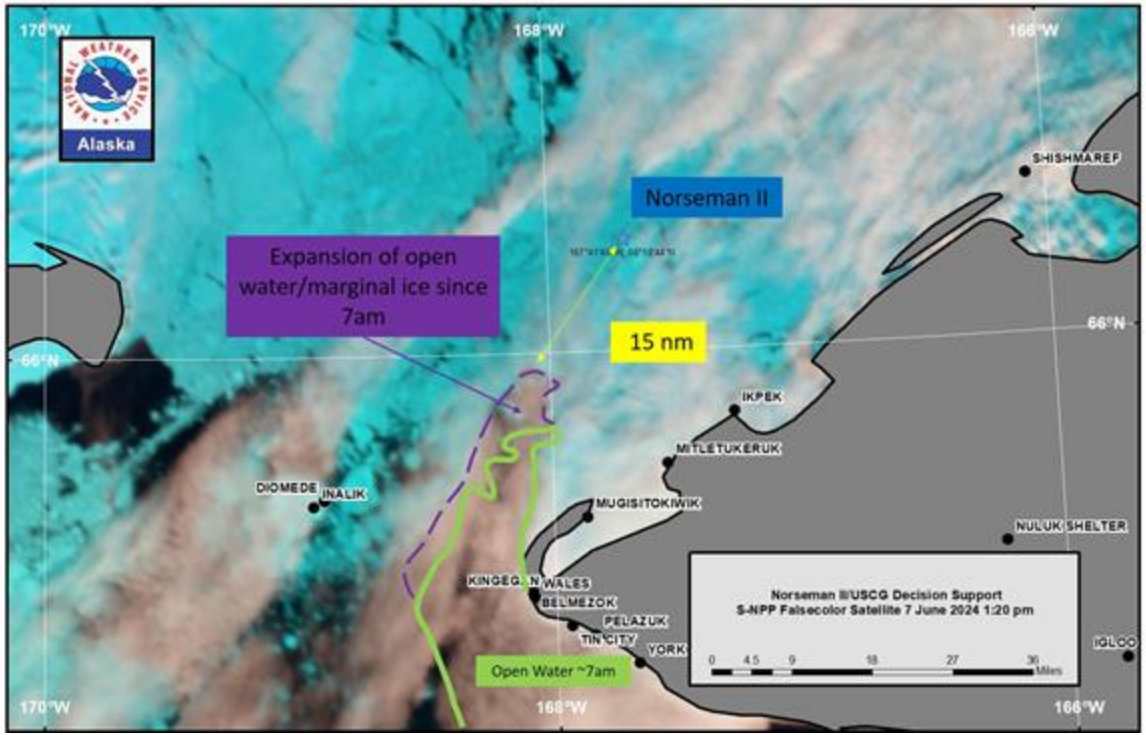
Baro: 1021mb

Wx: Lt Overcast, Vis: 8nm

Sea/Swell: NA

Ice Coverage: 10/10

June 7 afternoon support



Afternoon ice update:

- It is evident even in GOES (geostationary weather satellite) that the currents are expanding the marginal ice zone northward.
- The open water/marginal ice area has continued to work northward and is now 15 nm miles southwest of Norseman II (the position as of last evening)
- The Norseman II is drifting northeast with the pack ice, around 1 nm since last evening by my estimation.
- The forecast rationale from this morning remains the same, this marginal ice/open water area will continue to expand northward through Saturday afternoon.

Norseman II obs June 7/8

Date: 6/8/24

Time UTC: 0800

Lat/Lon: 66°11.194’N 167°41.982’W

Air Temp: 32.2°NF

Sea Temp: 28.69°F

Wind Direction: 343°

Wind Spd: 6.6Kn Gust: 8.9 Kn

Baro: 1022mb

Wx: Clear, Vis: 8nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/8/24

Time UTC: 1400

Lat/Lon: 66°11.514’N 167°41.584’W

Air Temp: 30.7°F°F

Sea Temp: 28.35°F

Wind Direction: 356°

Wind Spd: 10.2Kn Gust: 12.2 Kn

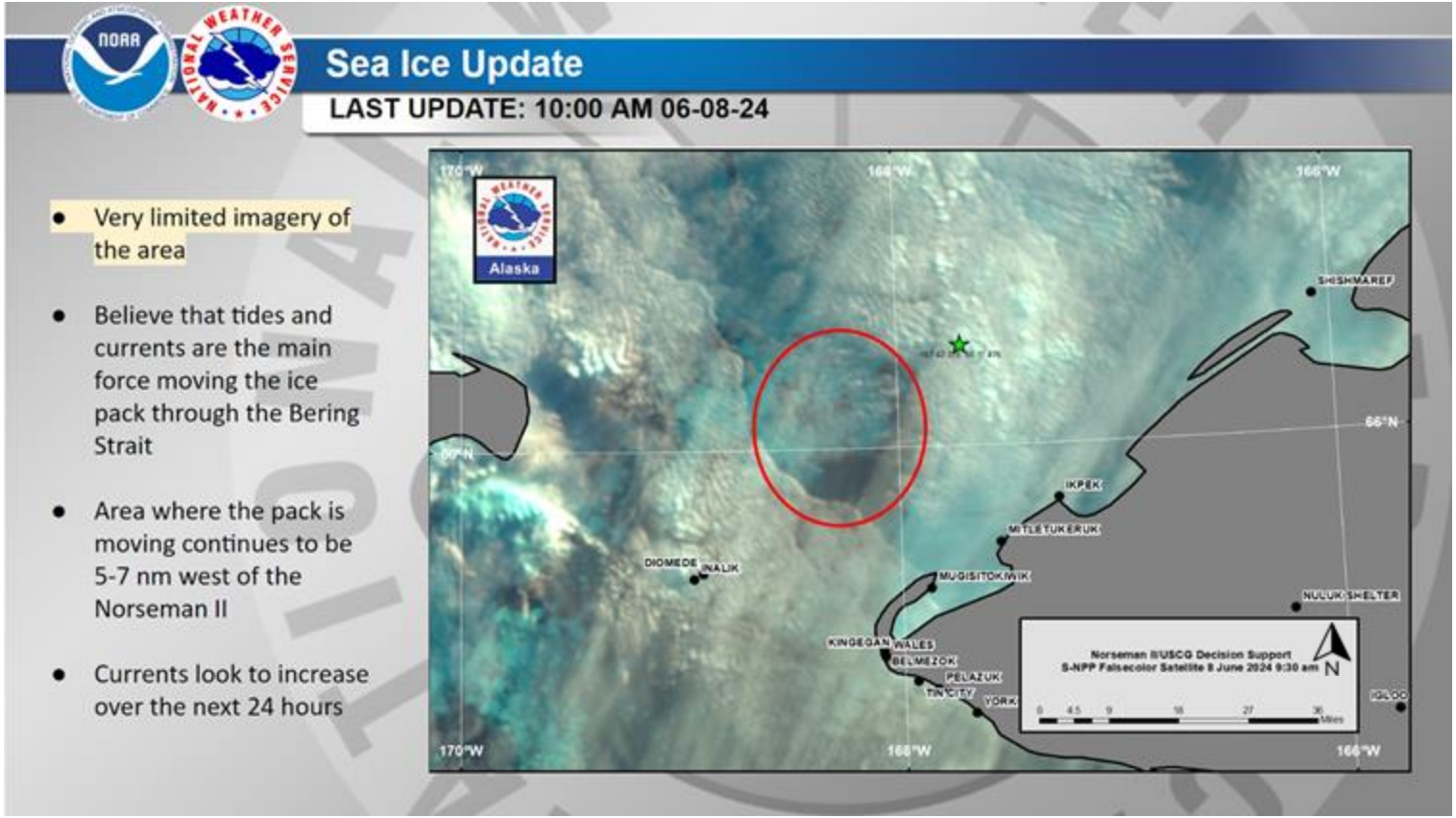
Baro: 1022mb

Wx: Mostly Cloudy, Vis: 8nm

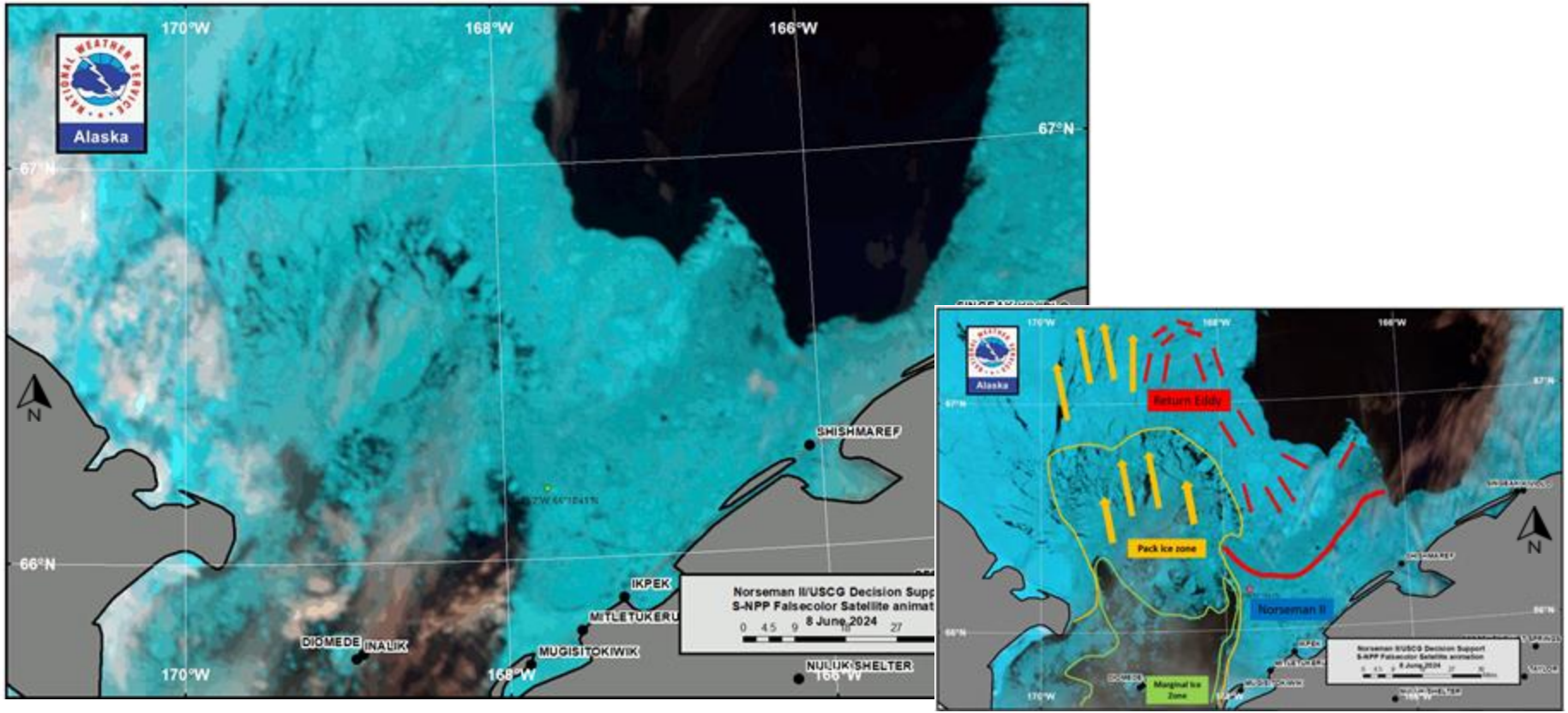
Sea/Swell: NA

Ice Coverage: 10/10

S-NPP DayLandCloud Imagery - 8 June 2024



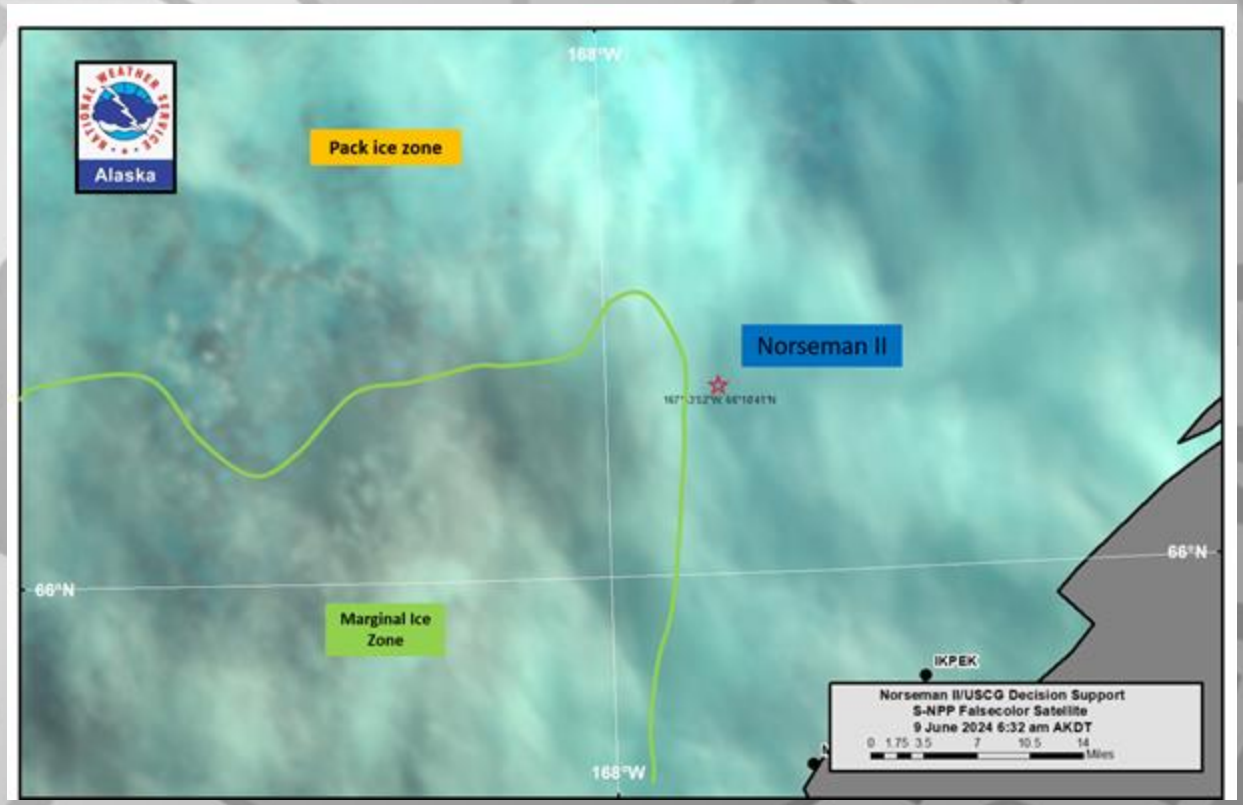
S-NPP DayLandCloud Imagery - 8 June 2024



Sea Ice Update

LAST UPDATE: 10:00 AM 06-09-24

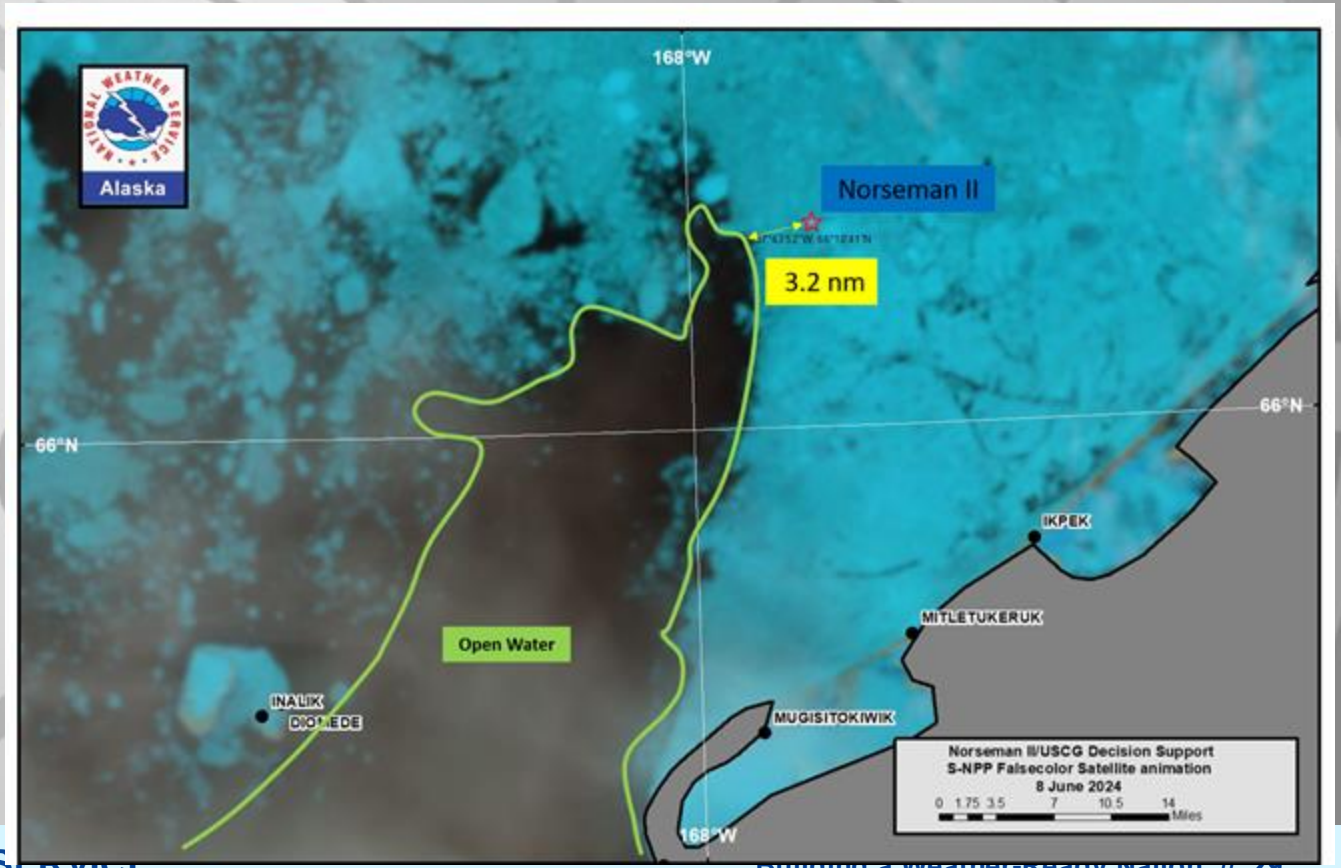
- The marginal ice zone has continued to progress northward but will likely stall out begin to drift back southward today
- Forecasted winds will keep pack ice compacting toward the Norseman II through Tuesday
- Another window of light winds on Wed/Thur will allow currents to open the pack again



Sea Ice Update

LAST UPDATE: 10:00 AM 06-09-24

- Image from June 8th 3:57 pm
- Open water is 3.2 nm to the west



Norseman II obs June 8/9

Date: 6/9/24

Time UTC: 0200

Lat/Lon: 66°11.204’N 167°42.875’W

Air Temp: 33.3°NF

Sea Temp: 27.36°°F

Wind Direction: 339°

Wind Spd: 16.7Kn Gust: 18.4Kn

Baro: 1017mb

Wx: Clear, Vis: 7nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/9/24

Time UTC: 0800

Lat/Lon: 66°10.888'N 167°43.976'W

Air Temp: 32.5°F

Sea Temp: NA

Wind Direction: 345°

Wind Spd: 16.1Kn Gust: 22.4Kn

Baro: 1013mb

Wx: Clear, Vis: 7nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/9/24

Time UTC: 1400

Lat/Lon: 66°10.784'N 167°43.623'W

Air Temp: 30.9°F

Sea Temp: NA

Wind Direction: 338°

Wind Spd: 15.2Kn Gust: 21.6Kn

Baro: 1009mb

Wx: Mostly Clear, Vis: 5nm

Sea/Swell: NA

Ice Coverage: 10/10

Norseman II obs June 9/10

Date: 6/9/24

Time UTC: 2000

Lat/Lon: 66°10.587'N 167°43.963'W

Air Temp: 31.1°F

Sea Temp: N/A°F

Wind Direction: 340°

Wind Spd: 19.2Kn Gust: 21.3Kn

Baro: 1007mb

Wx: O'cast, Haze, Vis: 5nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/10/24

Time UTC: 0200

Lat/Lon: 66°10.513'N 167°43.566'W

Air Temp: 32.4°F

Sea Temp: N/A°F

Wind Direction: 339°

Wind Spd: 13.5Kn Gust: 21.2Kn

Baro: 1006mb

Wx: Mostly Clear, Vis: Haze, 4nm

Sea/Swell: NA

Ice Coverage: 10/10

Date: 6/10/24

Time UTC: 1400

Lat/Lon: 66°11.067'N 167°39.947'W

Air Temp: 27.3°F

Sea Temp: N/A°F

Wind Direction: 327°

Wind Spd: 11.4Kn Gust: 13.3Kn

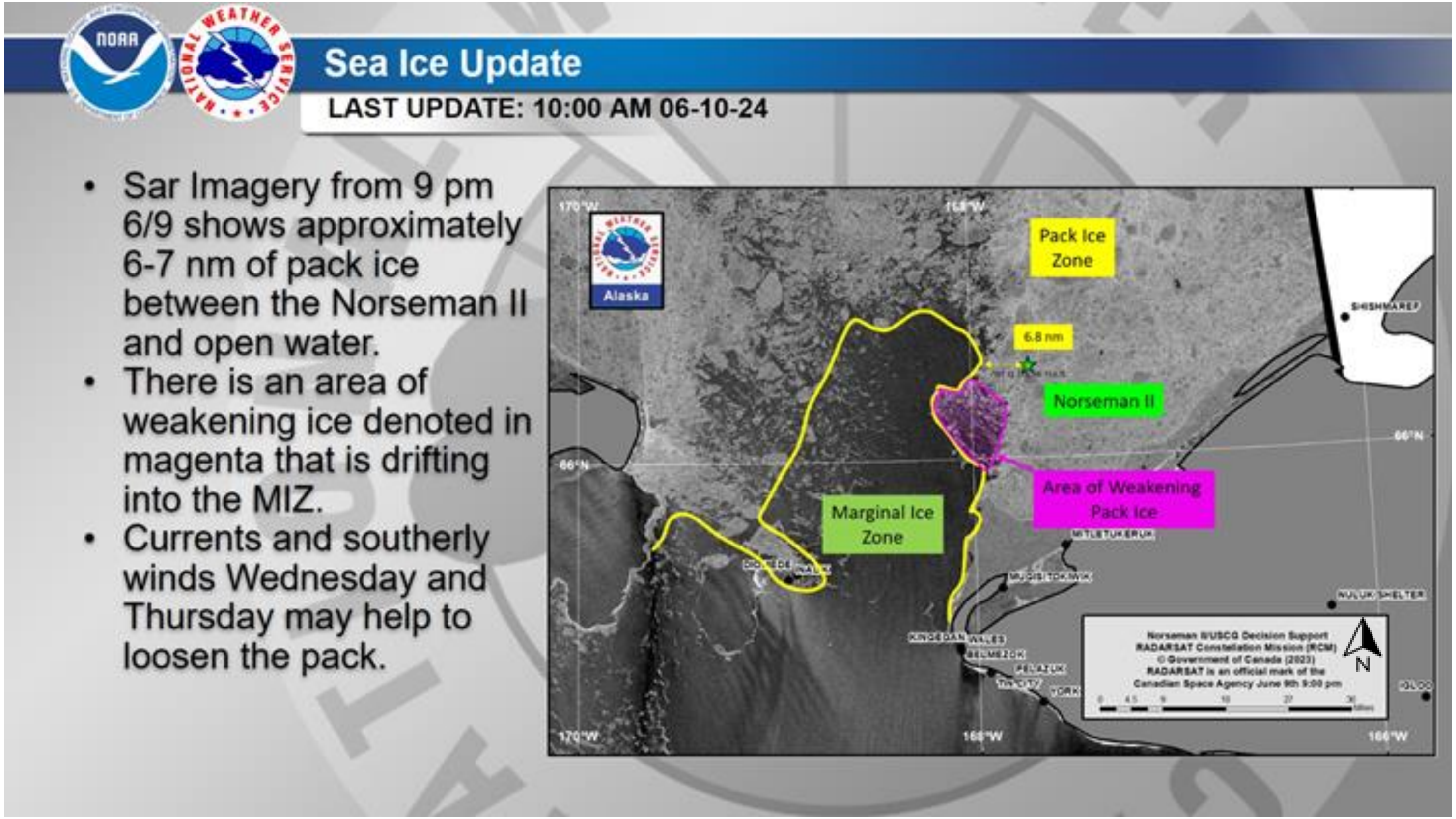
Baro: 1008mb

Wx: O'cast, Fog, Vis: 0.25nm

Sea/Swell: NA

Ice Coverage: 10/10

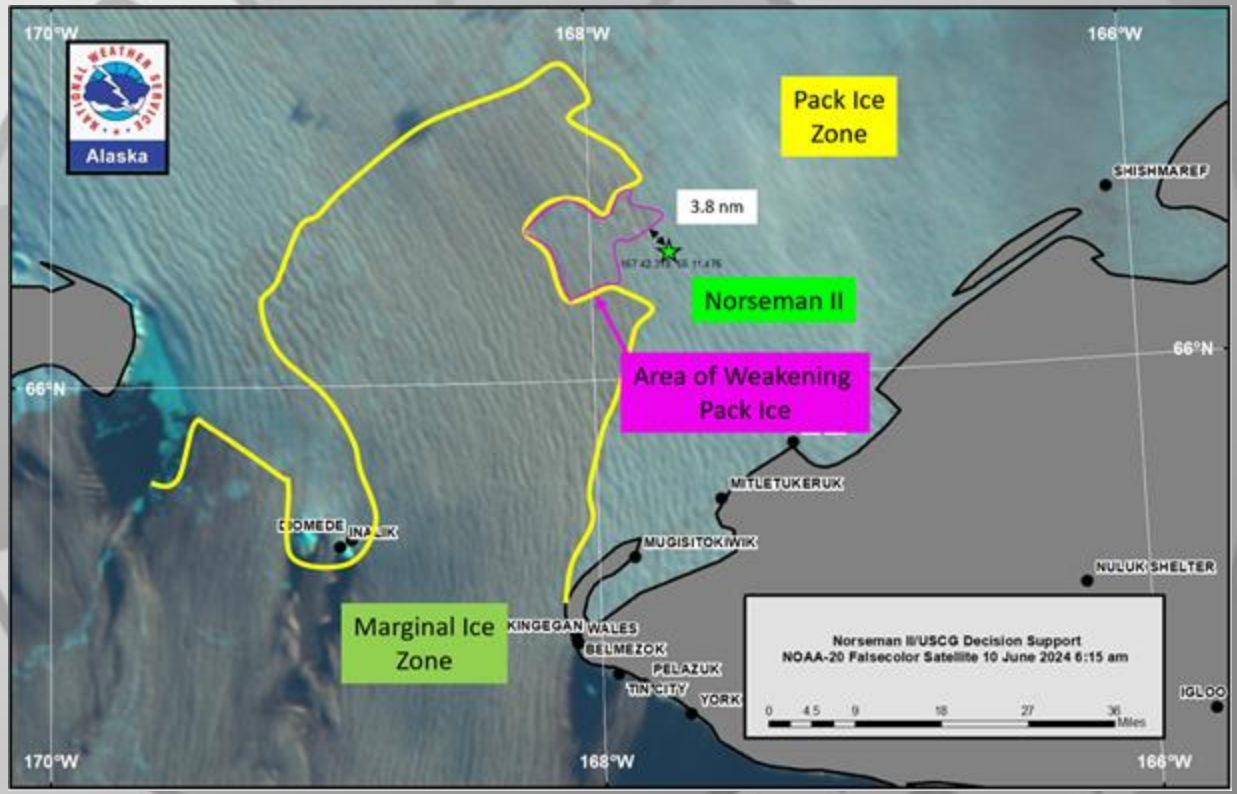
RCM SAR Imagery - 10 June 2024



Sea Ice Update

LAST UPDATE: 10:00 AM 06-10-24

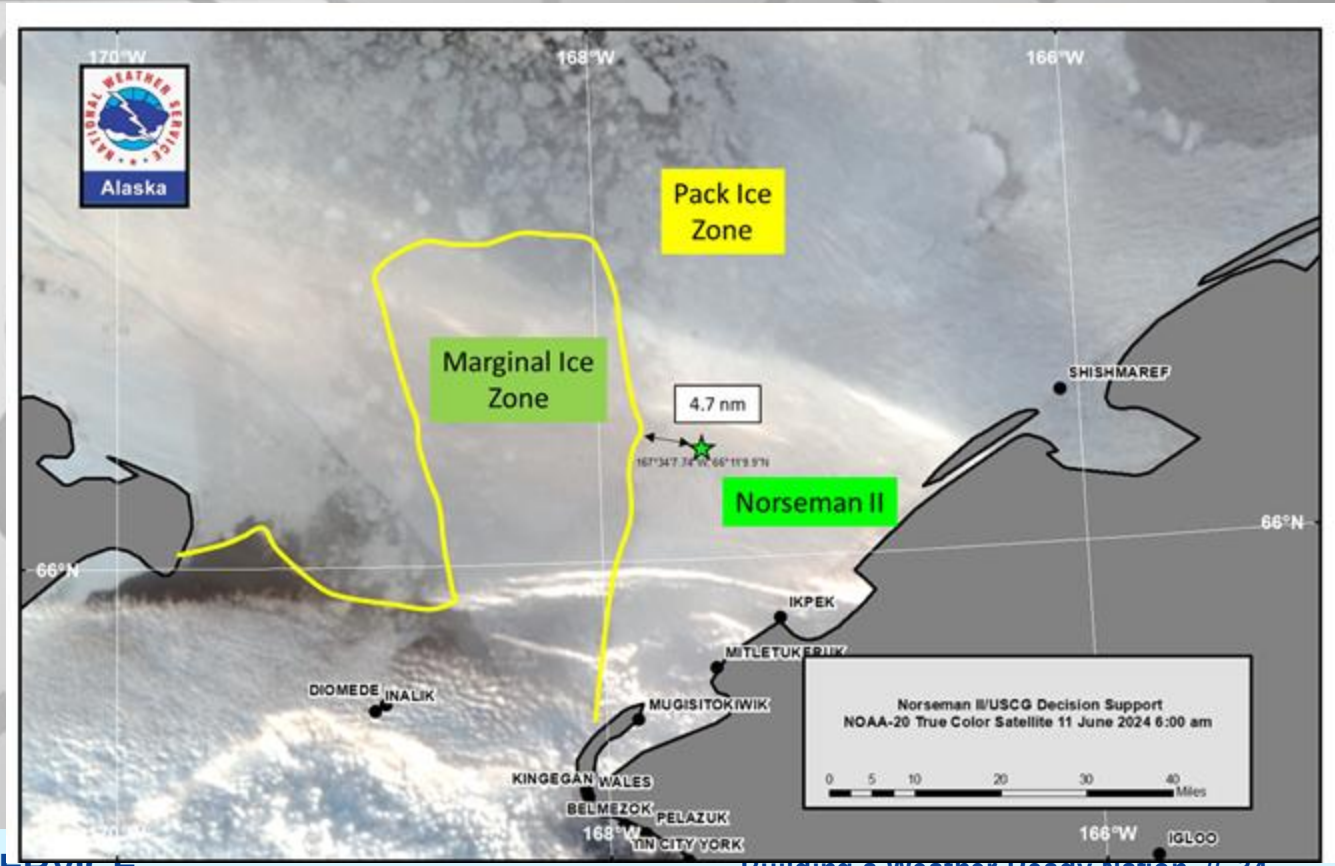
- The marginal ice zone (MIZ) has expanded over recent days, but generally north to west winds will keep the pack consolidated and may bring down pack ice from the north.
- Overnight there was some pack breaking off and moving into the MIZ west of the Norseman II, which has lessened the distance between the vessel and open water and/or the MIZ.
- Imagery from 6:15 am 6/10 shows approximately 4 nm of pack ice between the Norseman II and open water and/or the MIZ.



Sea Ice Update

LAST UPDATE: 10:00 AM 06-11-24

- Imagery from 6:00 am 6/11 shows approximately 5 nm of pack ice between the Norseman II and open water and/or the Marginal Ice Zone (MIZ).
- North and west winds have kept ice compacted around the vessel.
- Currents and southerly winds starting Wednesday may help to loosen the pack around the vessel.



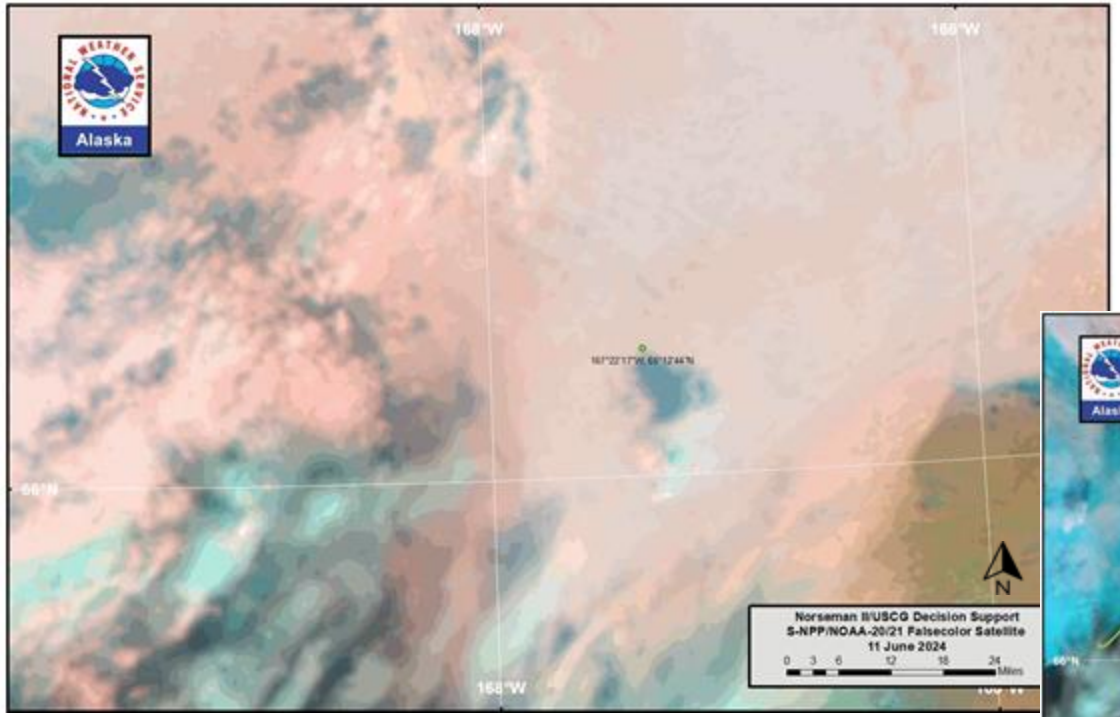
Norseman II obs June 10/11/12

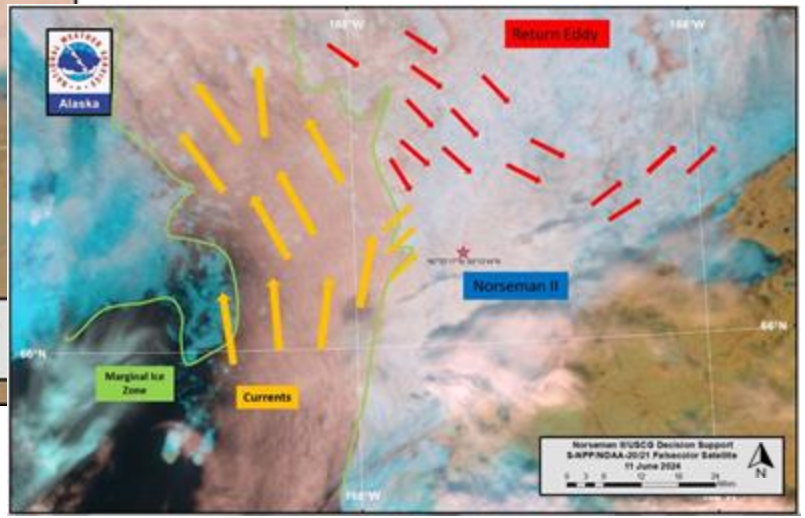
Date: 6/11/24
Time UTC: 0200
Lat/Lon: 66°11.153'N 167°37.786'W
Air Temp: 29.5°F
Sea Temp: N/A°F
Wind Direction: 327°
Wind Spd: 17.5Kn Gust: 22.2Kn
Baro: 1006mb
Wx: O'cast, Fog, Vis: 0.50nm
Sea/Swell: NA
Ice Coverage: 10/10

Date: 6/11/24
Time UTC: 0800
Lat/Lon: 66°11.103'N 167°36.301'W
Air Temp: 27.5°F
Sea Temp: N/A°F
Wind Direction: 321°
Wind Spd: 13.6Kn Gust: 19.1Kn
Baro: 1005mb
Wx: O'cast, Fog, Vis: 0.50nm
Sea/Swell: NA
Ice Coverage: 10/10

Date: 6/12/24
Time UTC: 1400
Lat/Lon: 66°12.579'N 167°23.079'W
Air Temp: 28.2°F°F
Sea Temp: N/A°F
Wind Direction: 334°
Wind Spd: 4.2Kn Gust: 9.7Kn
Baro: 1010mb
Wx: O'cast, Fog, Vis: 2nm
Sea/Swell: NA
Ice Coverage: 10/10

S-NPP DayLandCloud Imagery - 11 June 2024

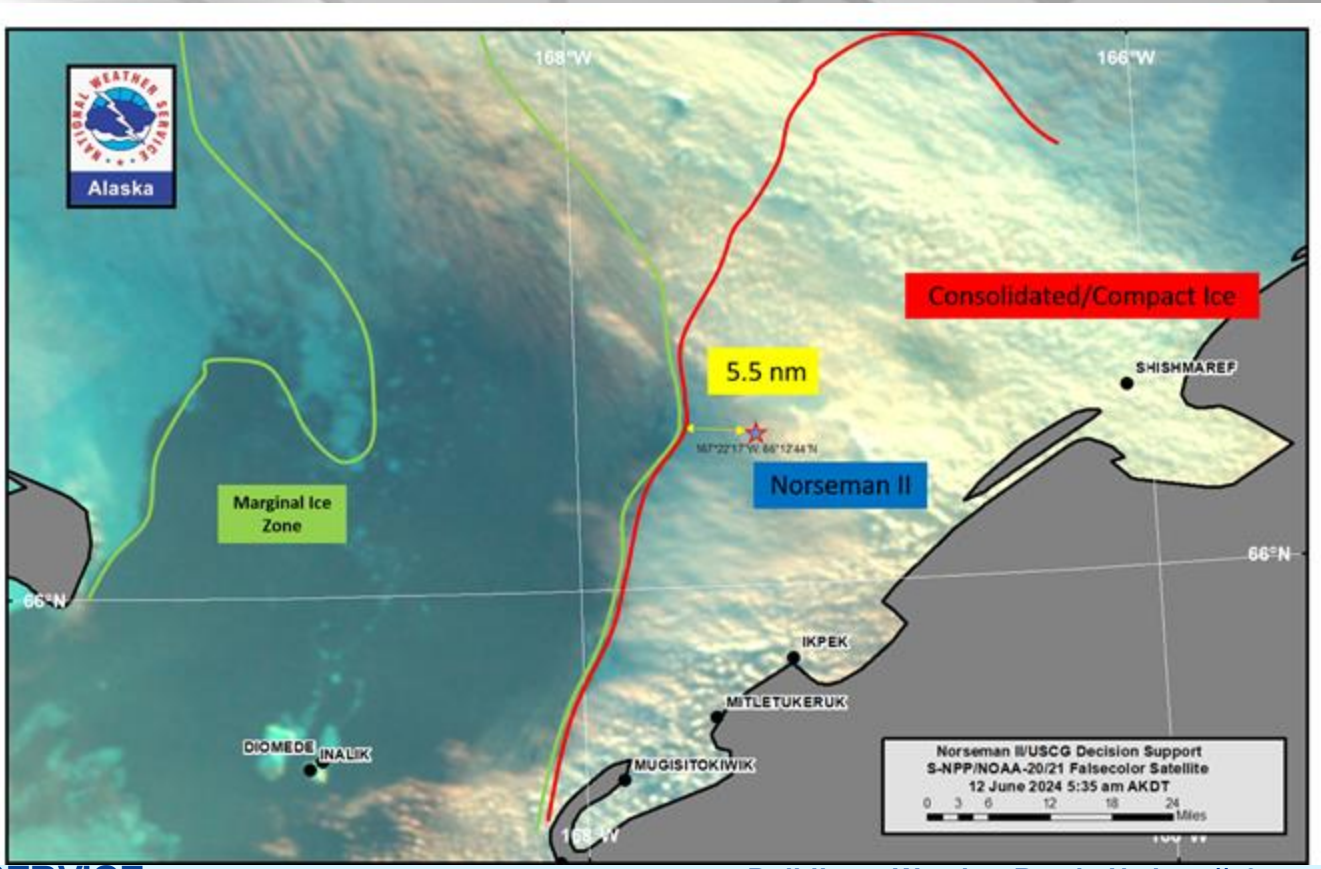




Sea Ice Update

LAST UPDATE: 10:00 AM 06-12-24

- Norseman II is drifting with the compact ice to the northeast
- Currents remain favorable to open the pack up in the area, however Norseman is likely to keep drifting NE with the pack
- Winds remain favorable through Saturday to help loosen the pack up in the vicinity of the ship



Norseman II obs June 12

Date: 6/12/24
Time UTC: 2000
Lat/Lon: 66°12.998’N 167°21.646’W
Air Temp: 29.8°F°F
Sea Temp: N/A°F
Wind Direction: 335°
Wind Spd: 3.7Kn Gust: 6.1Kn
Baro: 1012mb
Wx: O’cast, Fog, Vis: .25nm
Sea/Swell: NA
Ice Coverage: 10/10

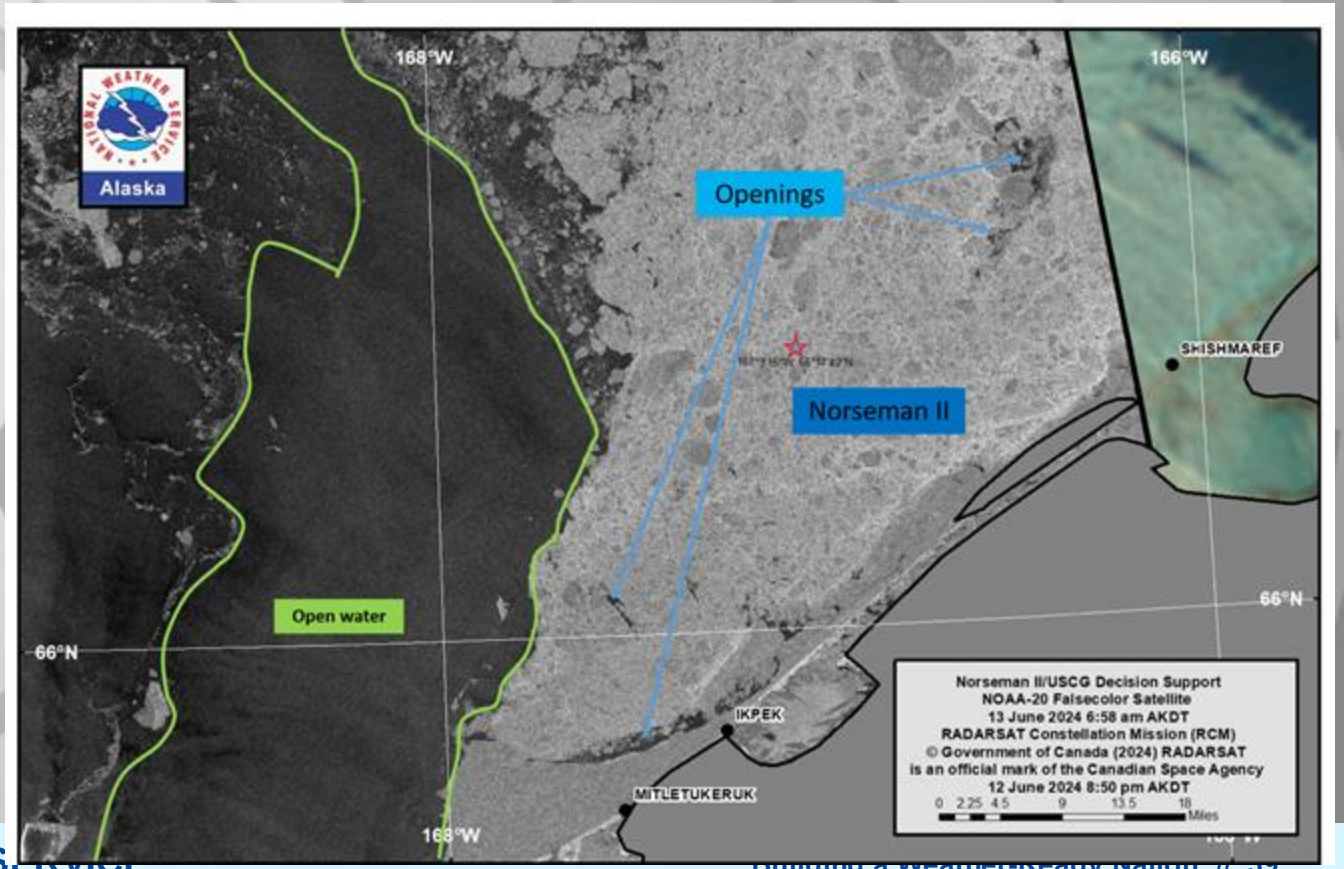
Date: 6/13/24
Time UTC: 0200
Lat/Lon: 66°13.855’N 167°17.684’W
Air Temp: 33.1°F
Sea Temp: N/A°F
Wind Direction: 320°
Wind Spd: 3.7Kn Gust: 6.1Kn
Baro: 1014mb
Wx: O’cast, Vis: 2nm
Sea/Swell: NA
Ice Coverage: 10/10

Sea Ice Update

LAST UPDATE: 9:00 AM 06-13-24

Synthetic Aperture Radar, last evening

- Norseman drifting east/northeast with the pack ice
- Small openings beginning to appear, especially in the “lee” of larger floes
- Pack ice is still consolidated in the area

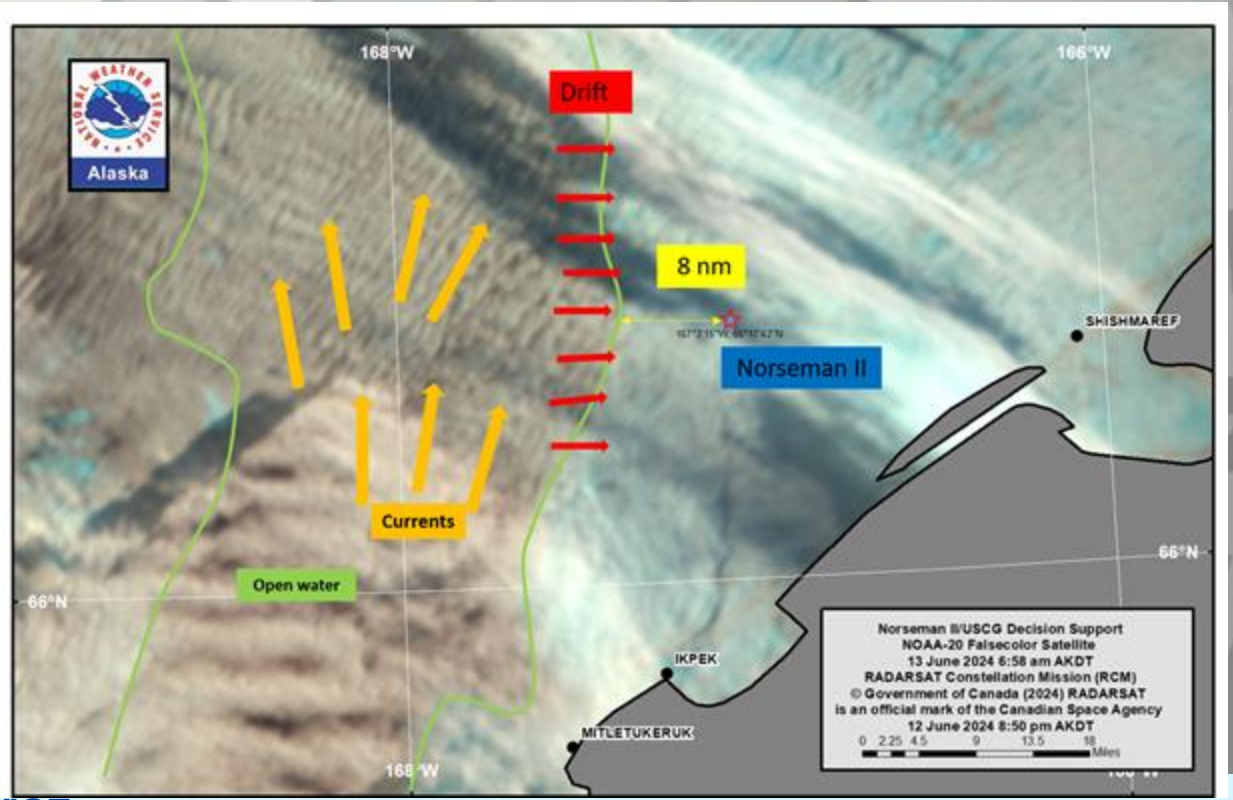


Sea Ice Update

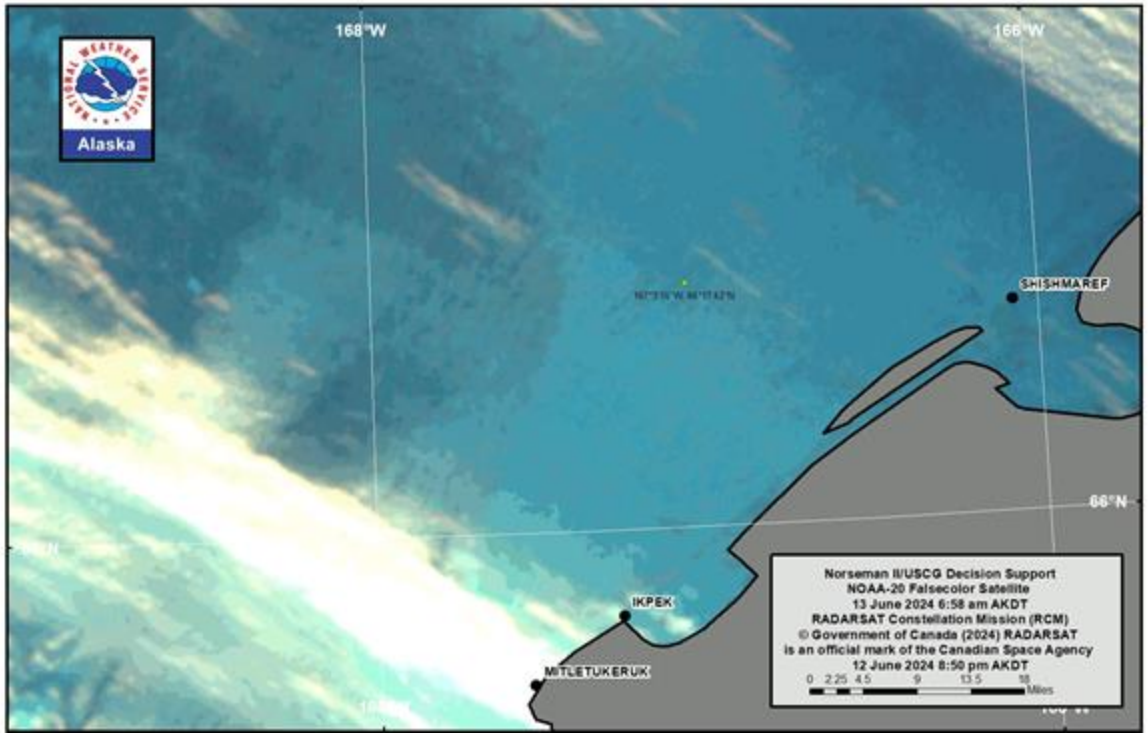
LAST UPDATE: 9:00 AM 06-13-24

Animation Companion

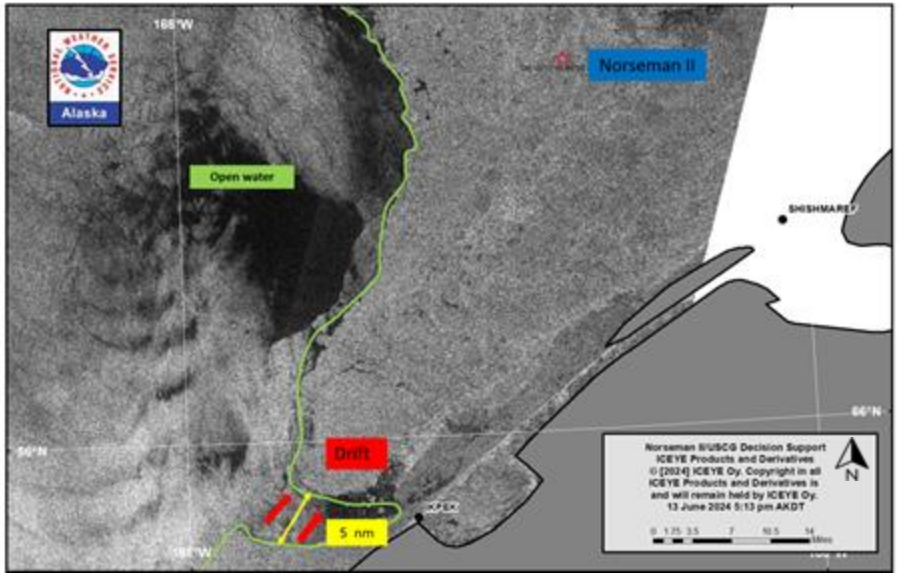
- Currents/winds are keeping open water in place to the west
- Open water/ice boundary drifting west to east
- It is very hard to see on the animation but it appears as if the openings shown in RCM imagery from last evening are growing larger
- Winds and currents remain favorable to loosen ice up for the next 48 hours, and even into the weekend as tides/currents will drive ice movement

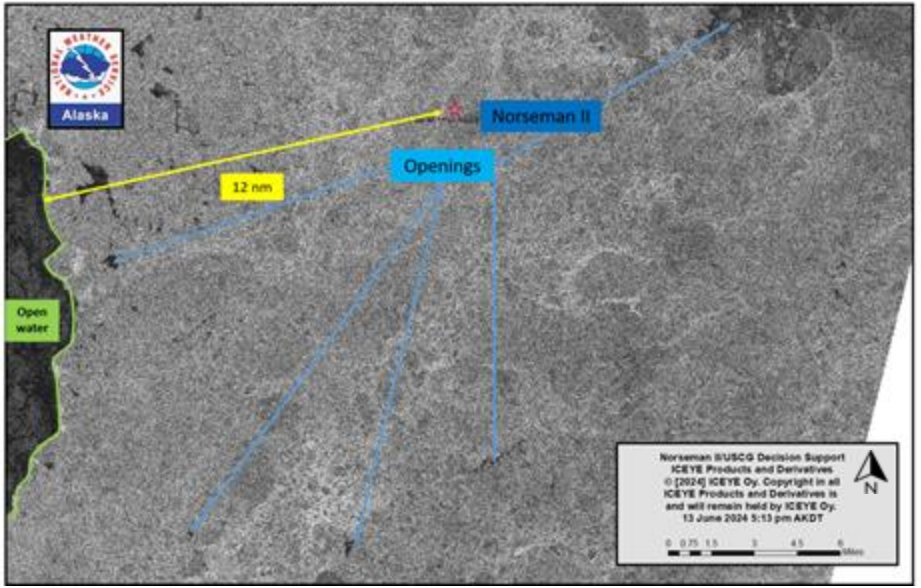


June 13 morning support

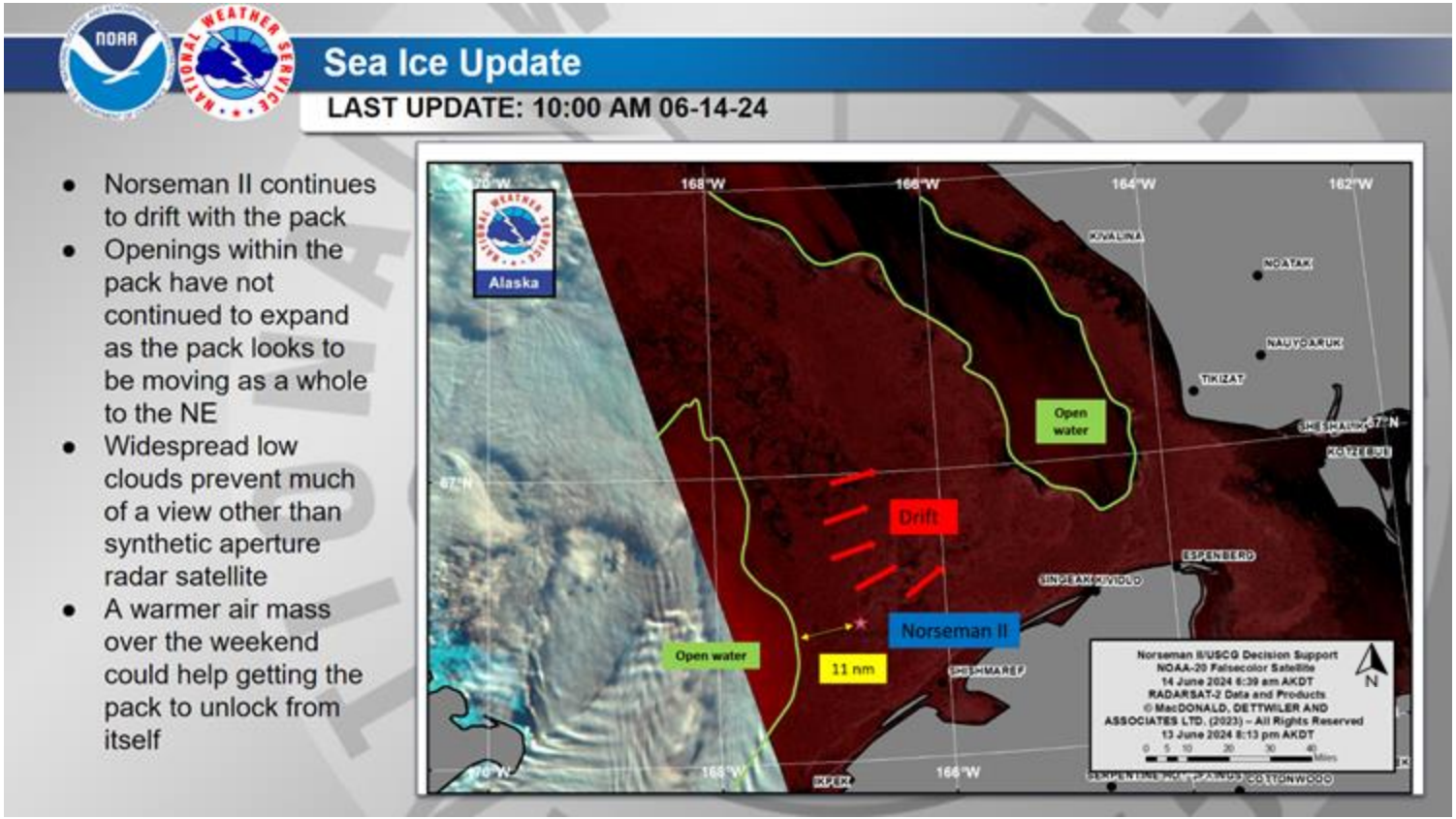


ICEYE SAR Imagery - 13 June 2024

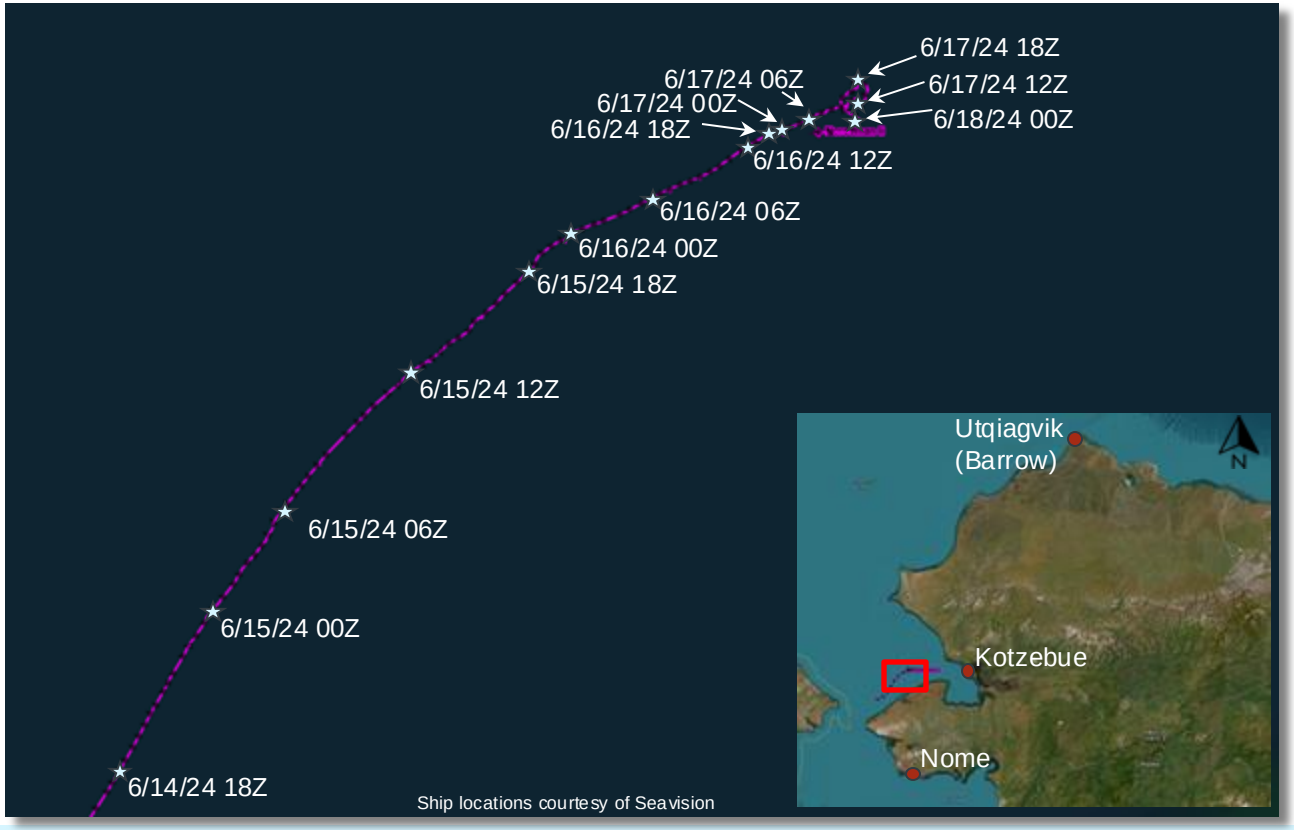




Radarsat2 SAR Imagery - 13 June 2024



R/V Norseman II Drift Course



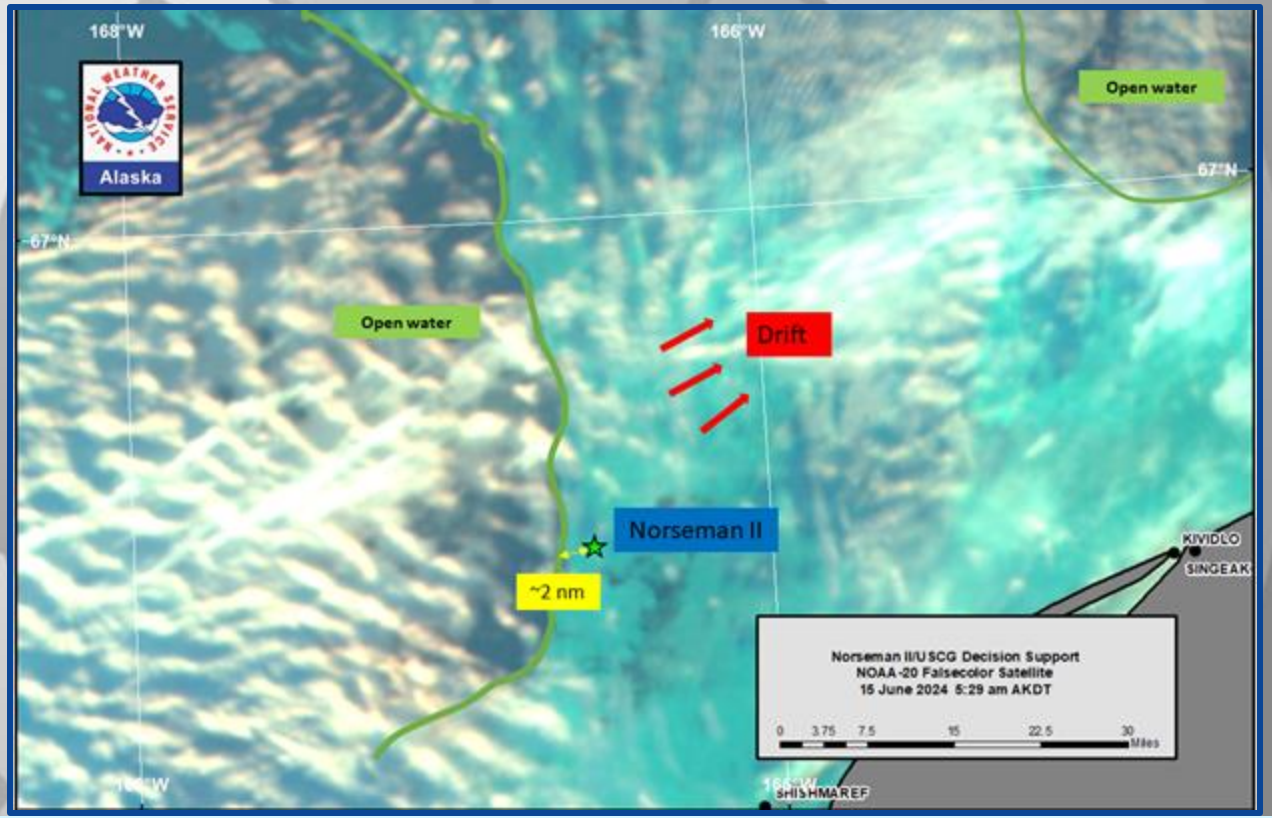
Sea Ice Update

LAST UPDATE: 10:00 AM 06-15-24

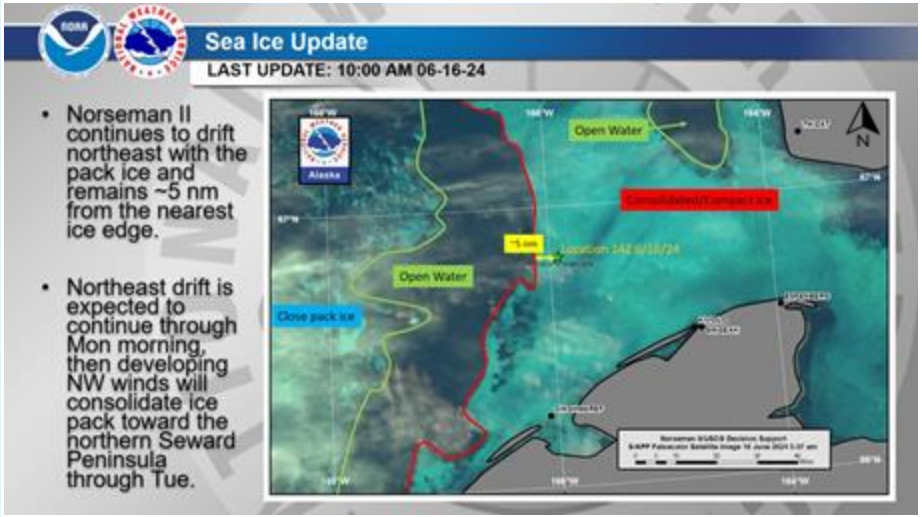
- Norseman continues drifting northeast with the pack ice, which is still consolidated in the area
- According to this False Color image (from 5:29 am AKDT this morning), open waters appear to begin only ~2 nm to the west of Norseman

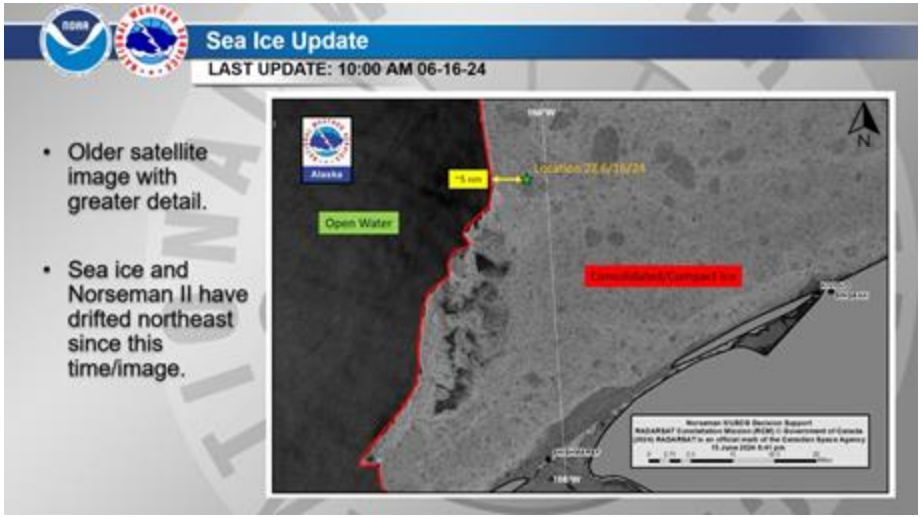
Edit: 10 nm not 2

- Lack of satellite imagery today, in addition to widespread low clouds, prevents us from seeing the finer details of ice pack vs open water areas

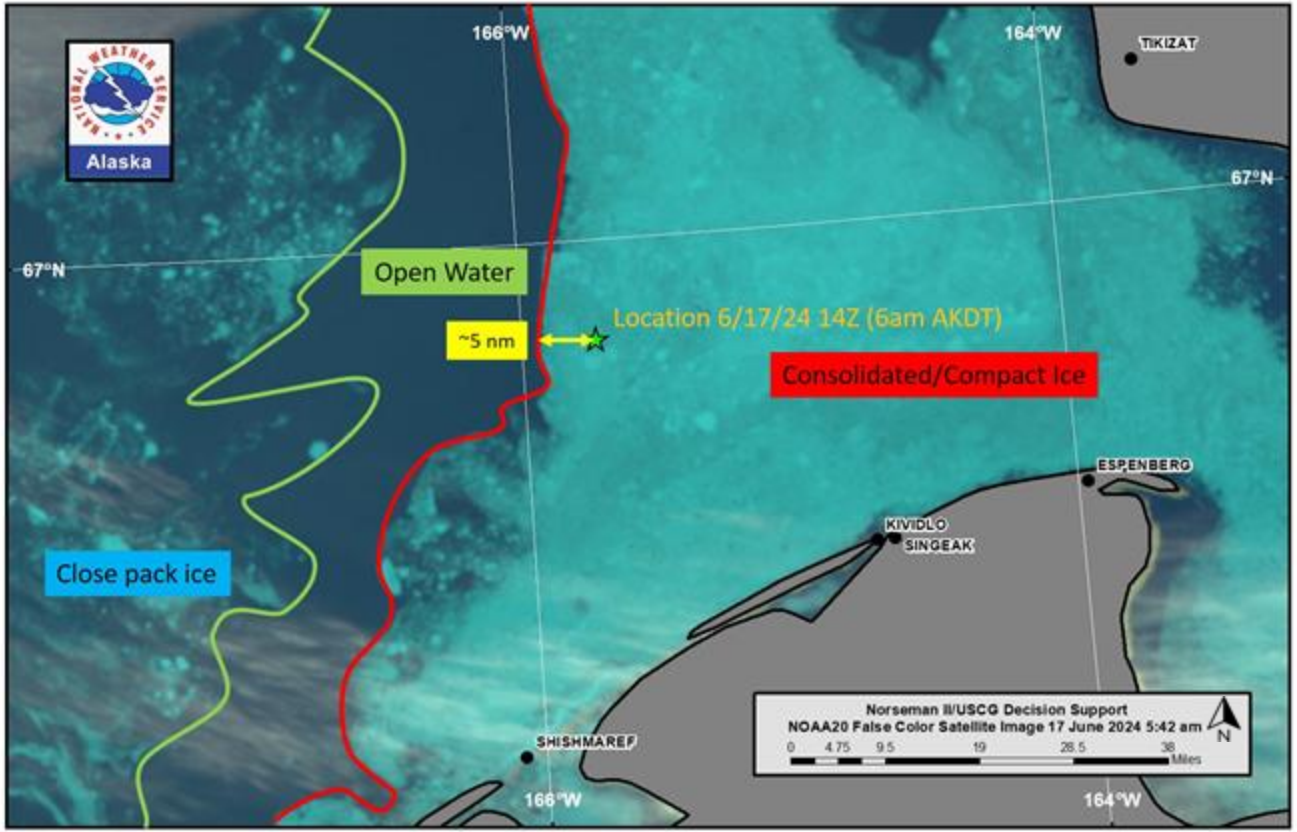


Comparing Imagery - 16 June 2024





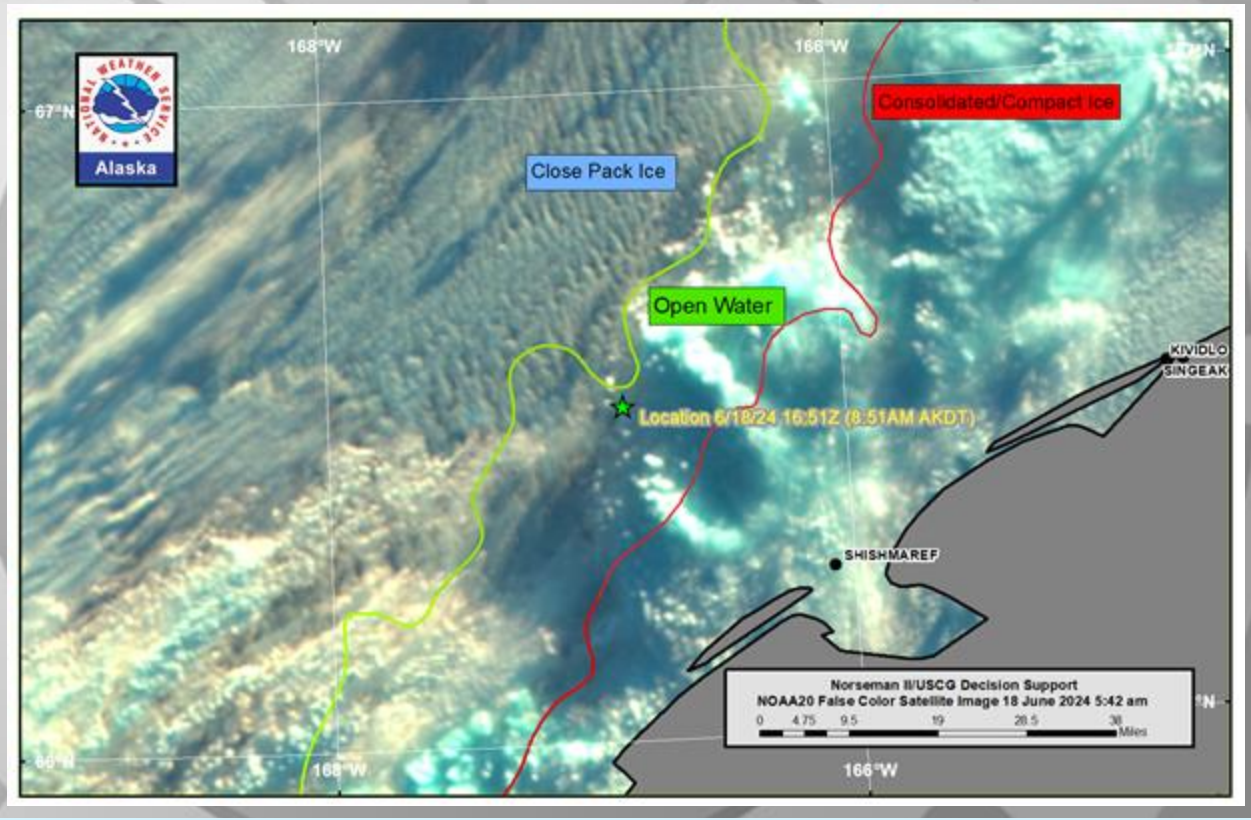
Last Update Before Open Water- 17 June 2024

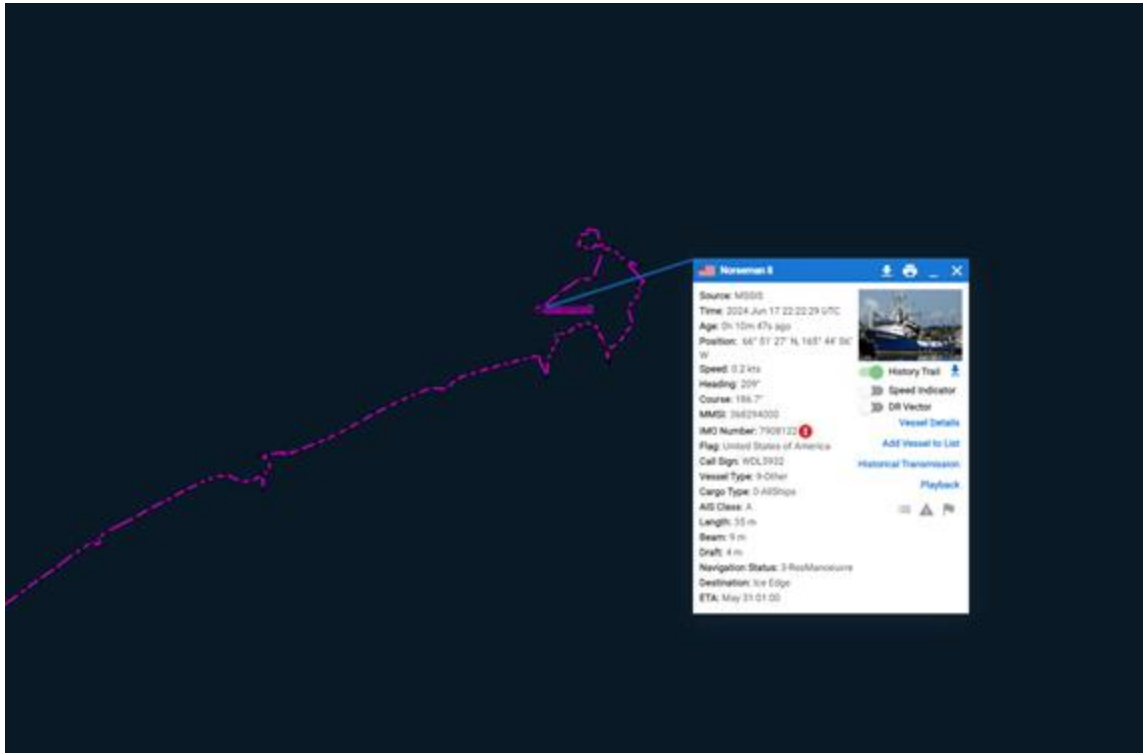


Sea Ice Update

LAST UPDATE: 10:00 AM 06-18-24

- Norseman is likely in open water
- No new imagery so far today without cloud cover





Ship able to maneuver and headed back to Nome!

Summary

Visible and Passive Microwave Satellite Imagery Used

- AMSR2
  - Lower resolution
  - Can “see through” clouds
- S-NPP, NOAA20, and NOAA21 DayLandCloud
  - Moderate resolution
  - Clouds obscure view

Active Radar Imagery Used

- In general this imagery can “see through” clouds and have a smaller footprint
- Radarsat Constellation Mission (RCM) Synthetic Aperture Radar (SAR)
  - Higher resolution
- Radarsat-2 SAR
  - Higher resolution
- ICEYE SAR
  - Highest resolution

Thank You!