

SmartICE tools to support Hudson Bay Search & Rescue

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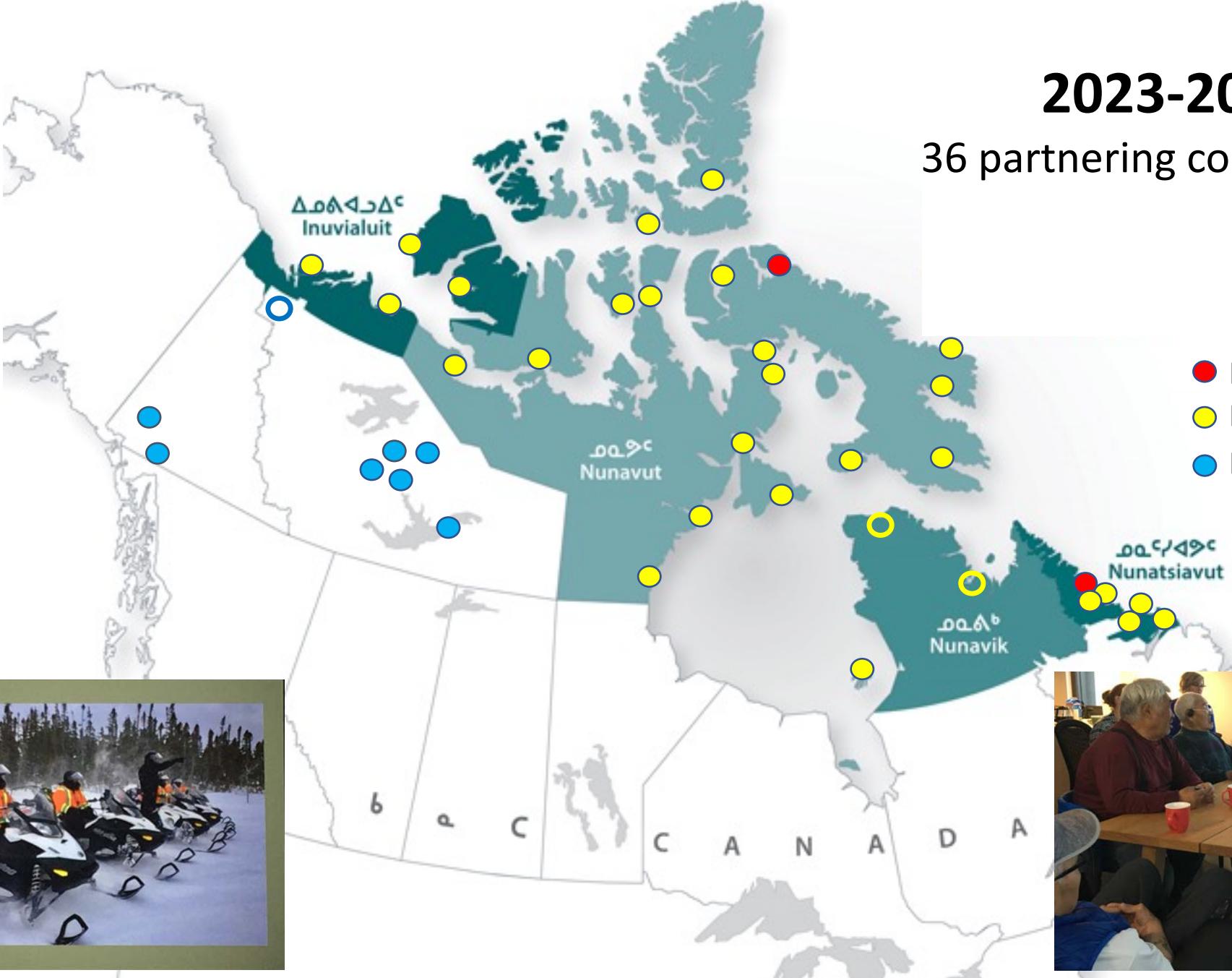


SmartICE Sikulirijiit



2023-2024

36 partnering communities



Indigenous
Guardians





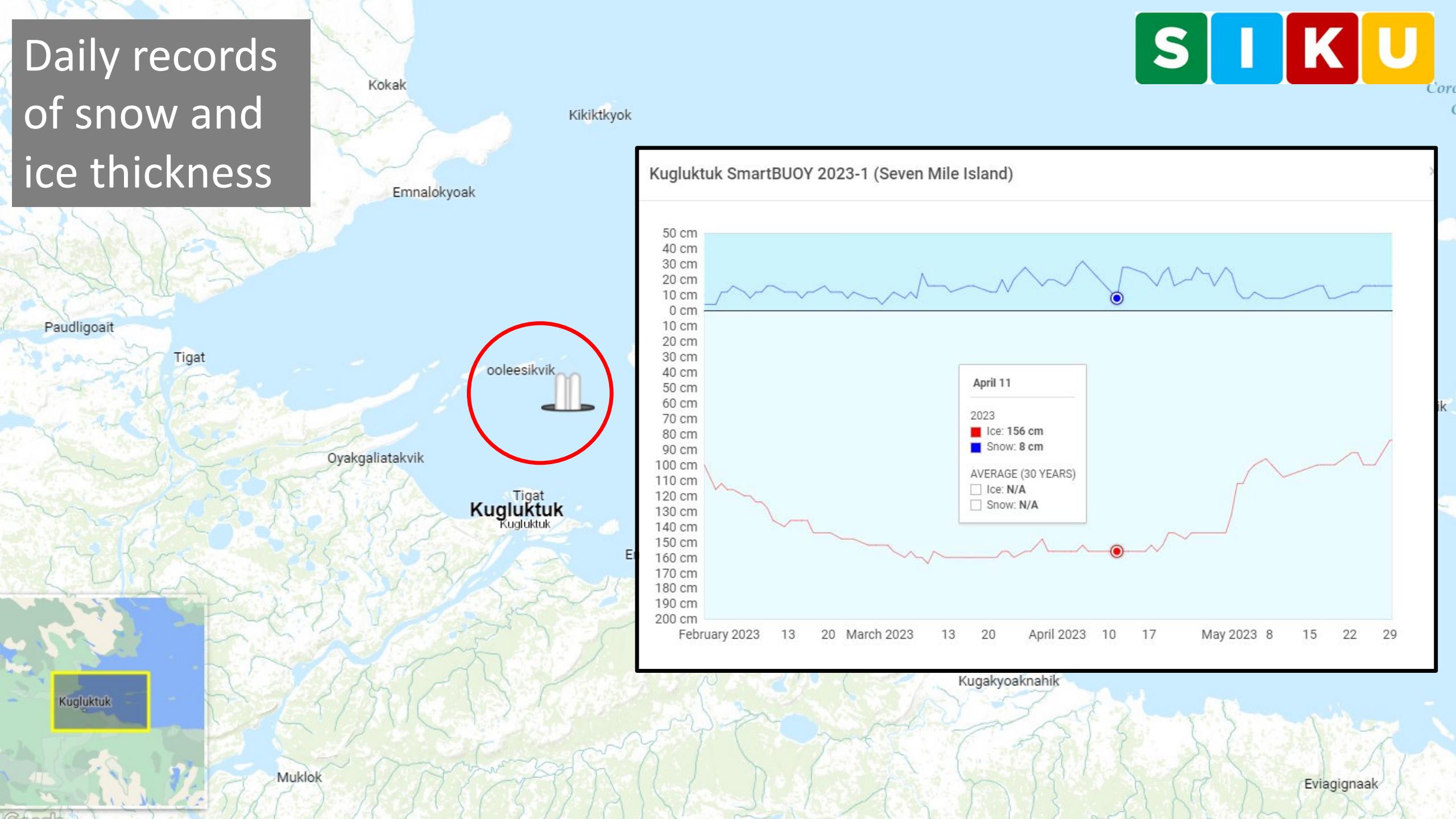
Sikuttiaq Qaujimajatuqangit

Good ice knowledge

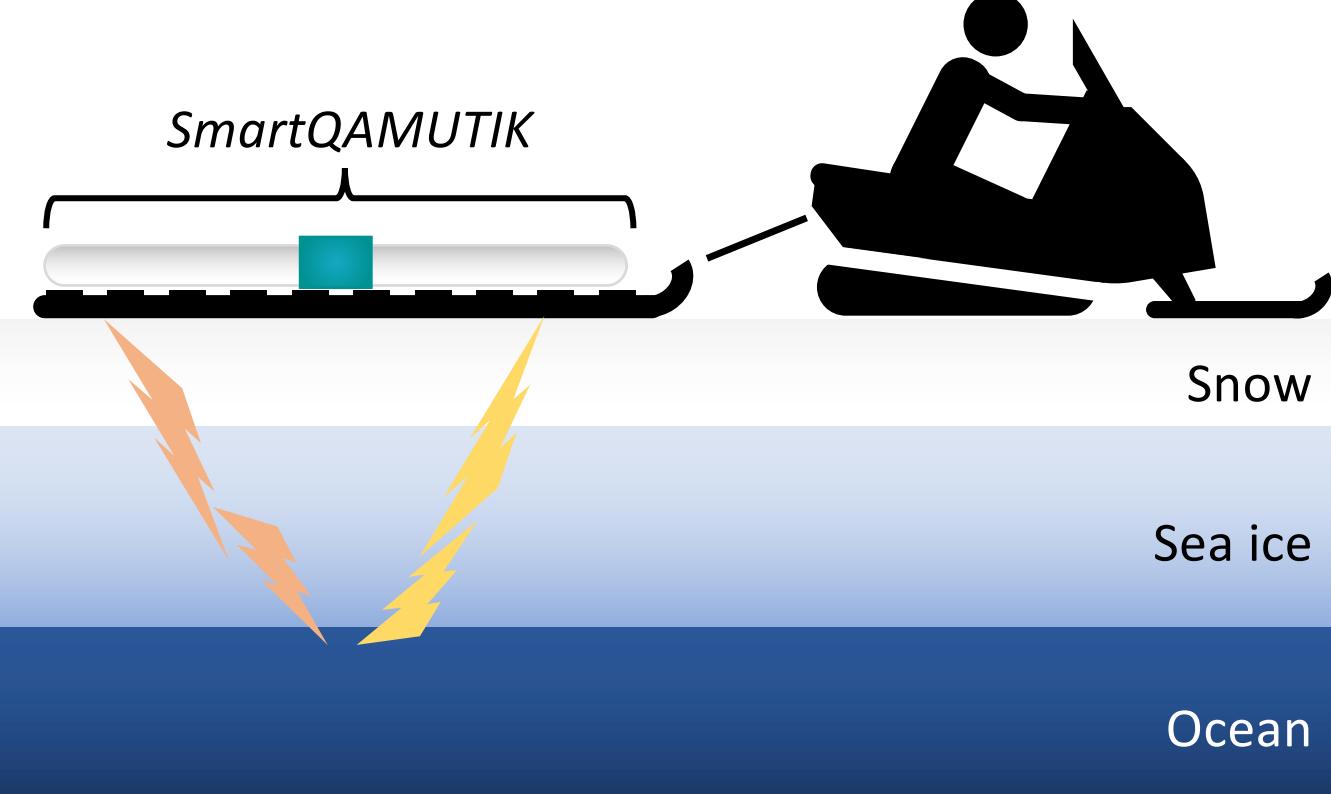
- Daily/weekly ice thickness monitoring *Sikulirijikkut Pilirijangit*
- Ice terminology *Sikuit Taigusinginnik*
- Ice travel safety posters *Qaujimajariaqartut Aularniaruvit Sikukkuurniaruvit*
- Seasonal IQ maps *Inuit Qaujimajatuqangit Sikukkut Igliniugajuktunut Sikunnguaq*
- Operational ice travel safety maps *Nunalimmik Sikunnguaq*



Daily records of snow and ice thickness



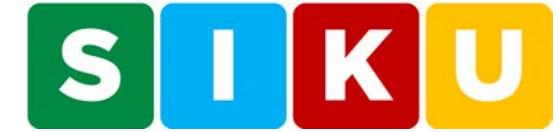
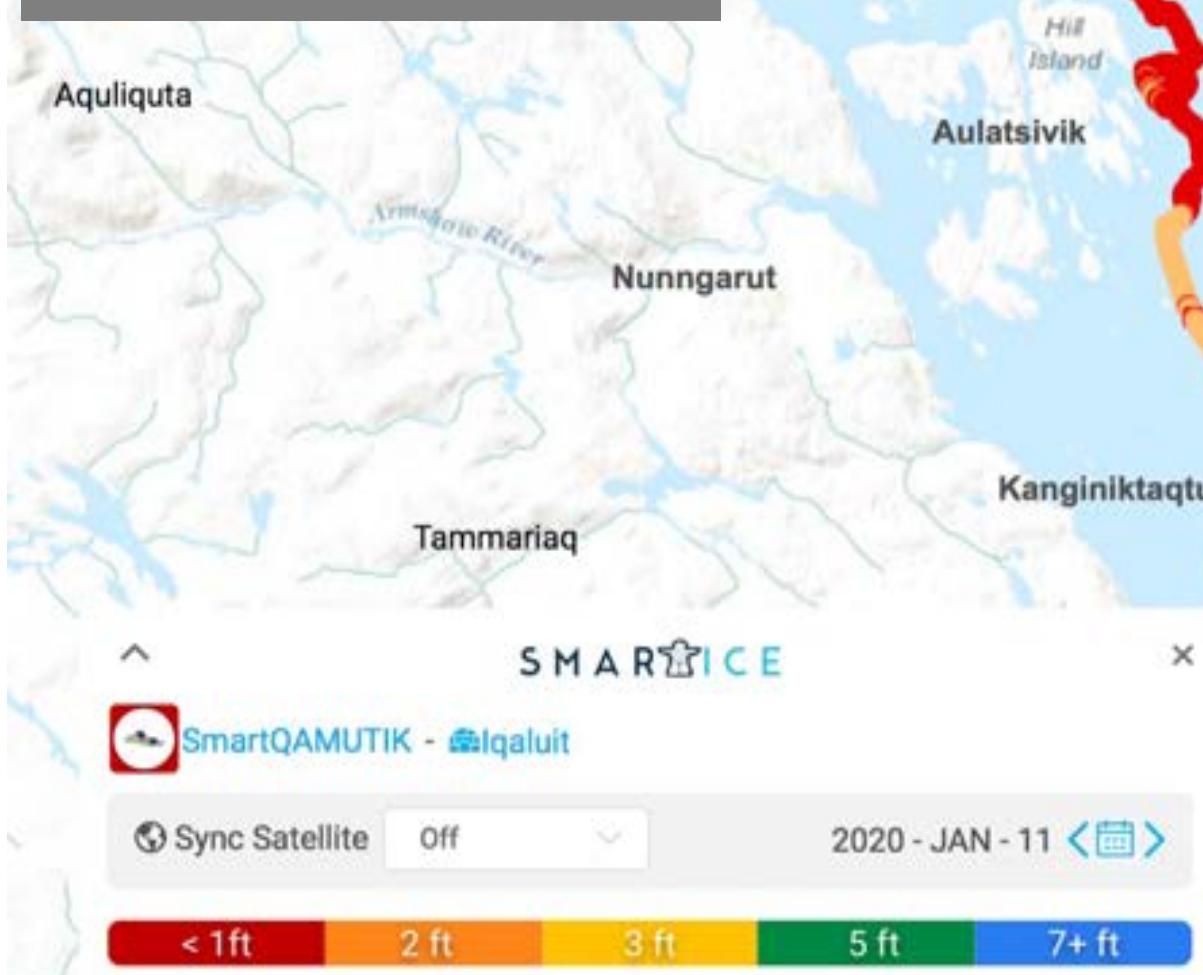




SmartQAMUTIK

Aggaut

Colour-coded track
of ice + snow
thickness where
operator travels

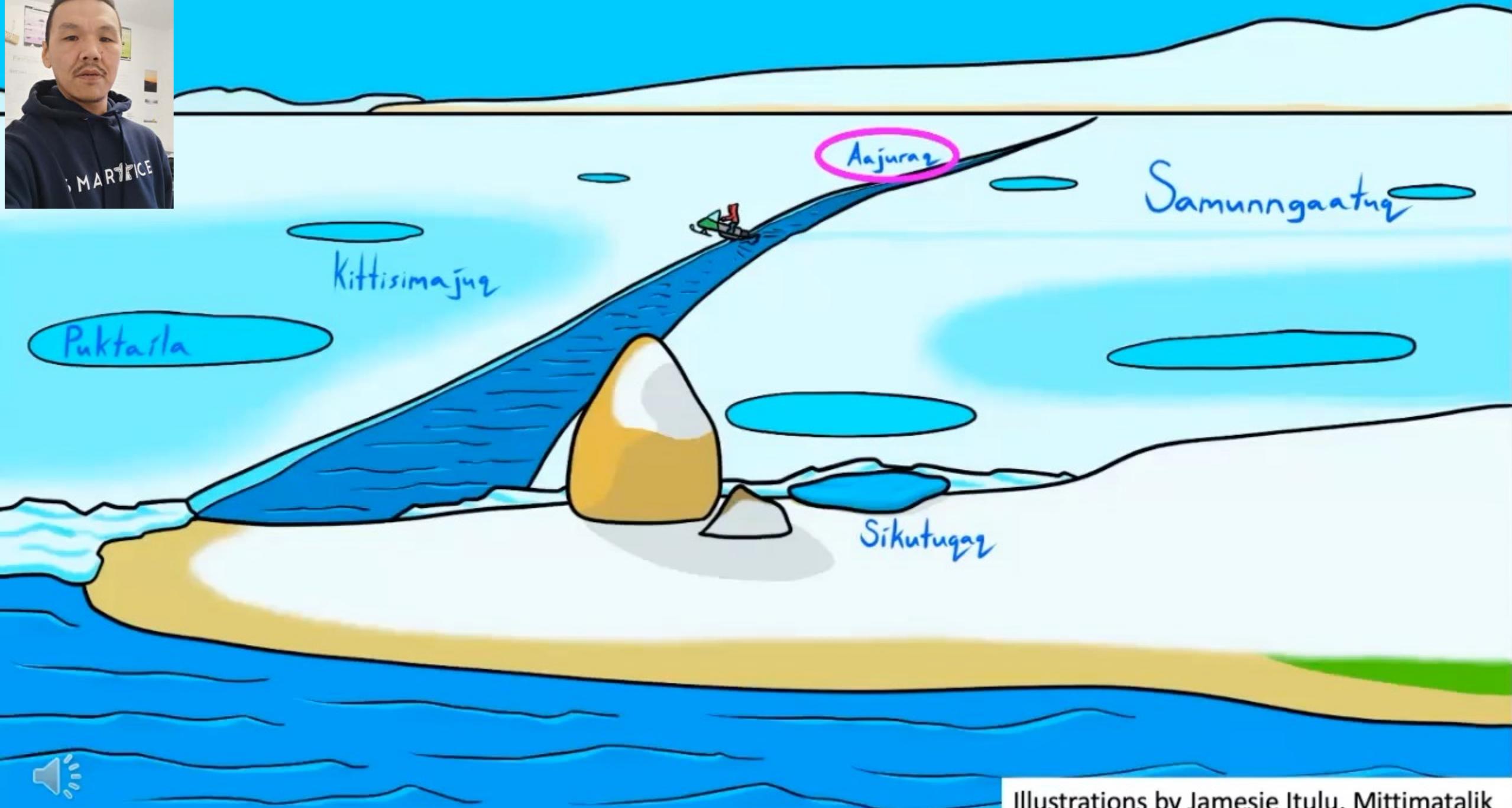
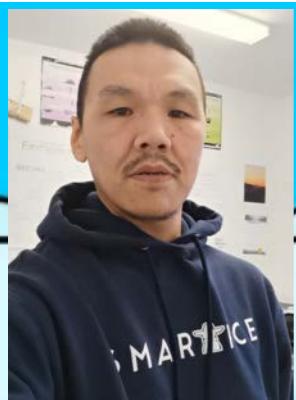


SmartQAMUTIK supporting SAR response



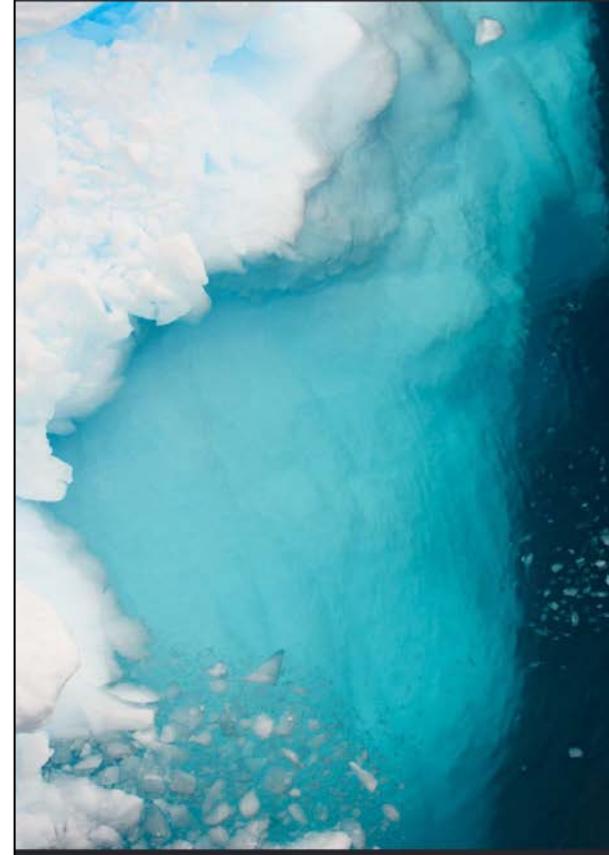
A photograph showing three men seated around a light-colored wooden table. The man on the left wears a blue and white striped baseball cap and a blue and white striped shirt. The man in the center wears glasses and a tan button-down shirt. The man on the right wears glasses and a dark red t-shirt under a black jacket. They are looking down at the table, which has several white index cards with handwritten text and symbols. In the background, there is a large painting of a polar bear on ice. A red mug is on the table to the left.

It begins with language and ice terminology



Illustrations by Jamesie Itulu, Mittimatalik

Illustrated Ice Terminology Books



‘᭕᭟᭟ ላ᭕᭟ ላ᭕᭟ ላ᭕᭟ ላ᭕᭟ ላ᭕᭟’
‘᭕᭟᭟ ላ᭕᭟ ላ᭕᭟ ላ᭕᭟ ላ᭕᭟’

**Qikiqtaqmiut tariurmik
taiguusit Uqsuqtuuq,
Nunavut**

**The Qikiqtaqmiut sea ice
terminology for Uqsuqtuuq
(Gjoa Haven), Nunavut**

Ice Travel Safety Posters

Qaujimajatuqangit...Sikumiut Uqartut...Sikumiut Says...

Are you prepared to travel on the sea ice?

Aullalaunginninni silanniarutimi qaujigiaqaqpaluti
Ammalu apirilut angunusutkimik qanuuliungmangat siku ammalu Inuit Qaujimajatuqangit.

Piturnirtillugu
Ujjuarsarluq beqqut qanuilingalimnanganik; ajurutituiunniqaravvik uallarsimajarmut ikpikauttituunniqaravmat. Taqqi inuitutillugu imar anginirsuaqgattarmat, kuuqtulu kulumisauallutik ingiraniq sanguinsaqluruni. Maniitut siku maniinnisauallutik, nuttait aajurangurlutik ammalu imauningit angilgiarlutik.

Lunar Tides
Be aware of the moon phases: they could make or break your trip. The full moon creates a lot of water everywhere, more flow from rivers and lakes and stronger ocean currents. Rough ice may get rougher, small cracks may get wider and open water areas may get larger.

Check the Weather Forecast Before you Leave
And ask experienced hunters about recent conditions and their Inuit Qaujimajatuqangit.

Inuutuluti Aullaqattangillutit
Maruuk piunirsauvuk isumagutik atausimlit.

Never Travel Alone
Two heads are better than one.

Piruluknartut Qangatuumnaq
Matusisanik inuulisaatinliku naksaqattarlutit, utiraasalinilaralaruvilluunniit.

Accidents Happen
Always take a first-aid kit, even if you're only planning to go for a few hours.

Stay warm
Pack a lamp, stove, fuel, candles, matches, lighter, and sleeping bag to keep warm.

Protection
Carry a rifle and bear spray to protect yourself. You don't want to face down a bear with nothing but your bare hands.

Nakakkannirlutit Nauttiuumartaartuk
Nakakkannirlutit namsuk. Negavanierttu, imiq, ammalu ursurianartamik. Namsukqannguunngut qaujimaluq, annurasiutut qaujimaluq, annurasiutut langnug paganniarjamullu.

Know Where You Are
Bring a GPS or map to help you navigate and share your travel routes with family and friends.

Urkkua
Sila asillirgattarmat, ingirajunnailinarpak&unilu. Nakakkannirlutit tumpik uquarjunnartamik. Qaujimajatuqangit.

Shelter
The weather can change, travel delays happen. Carry a tent for protection from the outside elements. Check the Sikumiut maps and add the coordinates of known shelter areas before you go.

Igaak
Sicqiniittillugu atuqtatarrutit igaak sikumiillut illulijianginnavit.

Shades
On a sunny day always wear sunglasses out on the ice so you don't become snow blind.

Extra Clothing
Always take a second or third pair of clothes with you. What are you going to wear if you accidentally get wet?

Annuraaggikanirpagluti
Nakakkannirlutit manuuknik pingasankuunniit annuraniq. Kisumik atigajarpit masakkuvit.

Extra Supplies
Pack more food, water and fuel than you expect to use. And always clean up after yourself; don't leave garbage lying around.

Naksakkannirlutit Nauttiuumartaartuk
Niqjikkannirlutit, imiq, ammalu ursurianartamik. Salumarsaqtarlutit, sanimik qimiaqtangillutit.

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www.SMARICE.org
[Facebook.com/Smarice.Arctic](https://www.facebook.com/Smarice.Arctic)

Qaujigiaqaqpaluti
Aullalaunginninni silanniarutimi qaujigiaqaqpaluti
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Saputisimajunnarlutit
Qikiutlikim naksaqattarlutit amma tingmikattitqutitumit nanuruk saputisinasugunnarlutit ililik. Nanursiaruvit qikiutiqiangikuvit aginnarnuurasikkajariavik.

Protection

Carry a rifle and bear spray to protect yourself. You don't want to facedown a bear with nothing but your bare hands.

Naksakkannirlutit Nauttiuumartaartuk
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Lunar Tides

Be aware of the moon phases: they could make or break your trip. The full moon creates a lot of water everywhere, more flow from rivers and lakes and stronger ocean currents. Rough ice may get rougher, small cracks may get wider and open water areas may get larger.

Tusaumajutiqarpaklitit
Tusaumajutiqainnataqtarrut sikumiillut. Uqaalutnik, ugallutnik ammalu naqittauallitilkik uvaniippunguarutik.

Keep in Touch
Always have a way to communicate when out on the ice. Bring a radio, satellite phone, and SPOT device.

Uquunasugunnarlutit
Nakksuluq suupijjuq, sirartuq, patijjaq, ikumat, kasuk, ammalu qipik ukkuujitajunnartut.

Stay warm
Pack a lamp, stove, fuel, candles, matches, lighter, and sleeping bag to keep warm.

Qaujimalutit Namiiimmangaarpit
Tammariikkutimik naksaqattarlutit nunangauqmiilunit namungauvallianuit qaujimalug, ammalu ugasisingattarfugu namungaunarlutit ilangnut piqanniarjamullu.

Know Where You Are
Bring a GPS or map to help you navigate and share your travel routes with family and friends.

Urkkua
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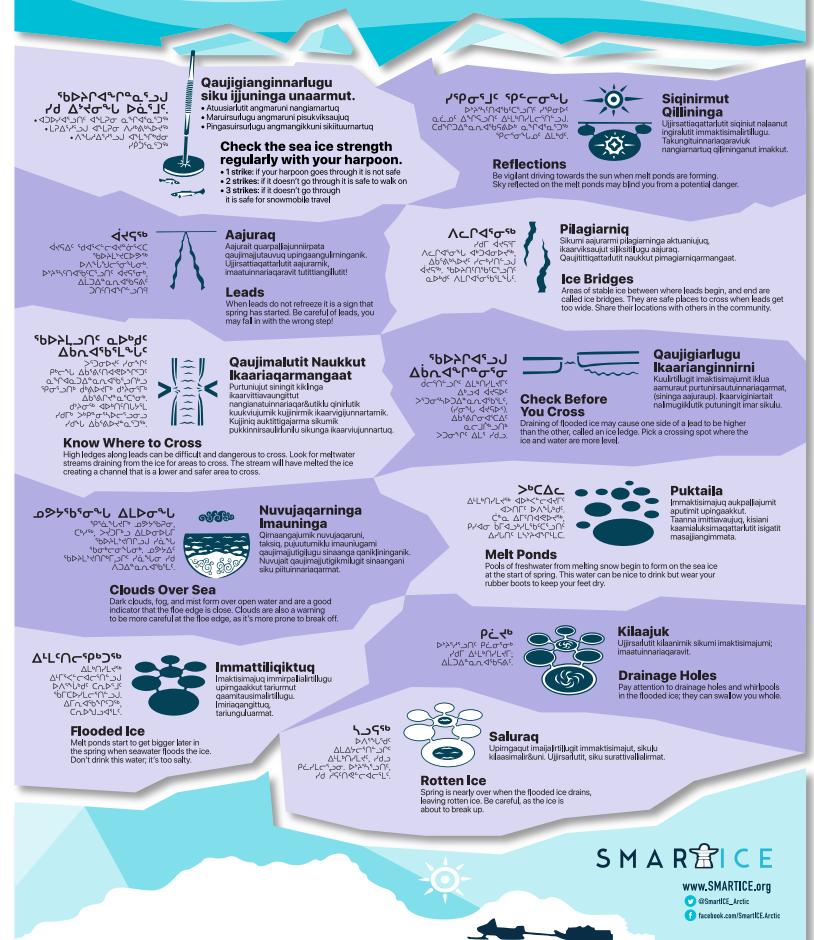
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Annuraaggikanirpagluti
Nakakkannirlutit maruuknik pingasankuunniit annuraniq. Kisumik atigajarpit masakkuvit.

Ice Travel Safety Posters

“...Sikumiut Uqartut...Sikumiut Says...

“...Qaujimajariaqartut aularniaruvit sikukkuurniaruvit?
What to know as you travel on the sea ice?



Inuit Qaujimajariutangit from the Sikumiut advisory group for SmartICE in Mittimatalik | Illustrations by Jamesie Iltu, Mittimatalik.

“...Qaujigianginnarlugu siku ijjuninga unaarmut.

- Atusiarlirut angmaruni nangiarnartuq
- Maruirslurluq angmaruni pisukviksaujuq
- Pingasiuslurluq angmangikkuni sikiituumartuq



Check the sea ice strength regularly with your harpoon.

- 1 strike: if your harpoon goes through it is not safe
- 2 strikes: if it doesn't go through it is safe to walk on
- 3 strikes: if it doesn't go through it is safe for snowmobile travel

“...Aajuraq

Aajuraq quarpalliajunnipata qaujimajariatuuvuq upingaaqngilirninganik. Ujirsattiaqattarlutit aajurarnik, imatuunmariaravat tuttiqiangillutit!

Leads

When leads do not refreeze it is a sign that spring has started. Be careful of leads, you may fall in with the wrong step!

“...Ice Bridges

Purtutut sinrigit kiklinga ikaavittiaqangittut nangiarnatunniaraqarutik qinirlutik kuujivikum kujinirmik ikaavijunnartarnik. Kujiniq auktitigajarma sikumi pukkiniarsaulinluluq sikunga ikaavijunnartuq.

Know Where to Cross

High ledges along leads can be difficult and dangerous to cross. Look for meltwater streams draining from the ice for areas to cross. The stream will have melted the ice creating a channel that is a lower and safer area to cross.

“...Clouds Over Sea

Nuvujaqarninga Imauninga Qirnaajajumnuvujaqaruni, taksiq, pujutumilluq imauningami qaujimajutigilugu sinaanga qaniklinninganik. Nuvujait qaujimajutigilmilugit sinaangani siku piitungnariqarmat.

“...Flooded Ice

Immatiliqituk Imaktisimajauq immirpialliariluq upirngaaqkut tarumut qaamitsimiliriluq. Imriqangittuaq, tarunguluarat.

Flooded Ice

Melt ponds start to get bigger later in the spring when seawater floods the ice. Don't drink this water; it's too salty.

“...Rotten Ice

Saluraq Upingaqut imajalitigilugu immaktisimajut, sikulu kilaasimalir&uni. Ujirsarlutit, siku surattivallialrmat.

Rotten Ice

Spring is nearly over when the flooded ice drains, leaving rotten ice. Be careful, as the ice is about to break up.

“...Siginirmut Qillininga

Ujirsattiaqattarlutit siginuit nalaanut ingralutit immaktisimiliriluq. Takungituiunniaraqaravik nangiarnartuq qillininganut imakkut.



Reflections

Be vigilant driving towards the sun when melt ponds are forming. Sky reflected on the melt ponds may blind you from a potential danger.

“...Pilagiarniq

Sikumi aajurarni pilagiarninga aktuanujuq, ikaaviksaujut silksitillugu aajurraq. Qaujitiqattarlutit naukkut pimagiarniqarmagaat.

Ice Bridges

Areas of stable ice between where leads begin, and end are called ice bridges. They are safe places to cross when leads get too wide. Share their locations with others in the community.

“...Qaujigiarlugu Ikaarianginnirni

Kuulillutit imaktisimajumit ikluu aamuraut purtunisutuinniaraqarmat, (sininga aajuraup). Ikaaviginiraita nalimugiklikut putunigut imar sikuli.

Check Before You Cross

DRAINING OF FLOODED ICE
Draining of flooded ice may cause one side of a lead to be higher than the other, called an ice ledge. Pick a crossing spot where the ice and water are more level.

Puktaila

IMAKTISIMAJUQ AUKPALLIAJUMIT APUTNIT UPINGAAKKUT.
TAANNA IMITTAVAVUJUQ, KISIANI KAAMIALUKSIMAQATTARFUTIT ISIGATIT MASAJIHINGIMMATA.

Melt Ponds

POOLS OF MELTING SNOW
Pools of freshwater from melting snow begin to form on the sea ice at the start of spring. This water can be nice to drink but wear your rubber boots to keep your feet dry.

Kilaajuk

Ujirsarlutit kilaanirkik sikumi imaktisimajumit; imatuunmariaravat.

Drainage Holes

POOLS OF FRESHWATER
Pay attention to drainage holes and whirlpools in the flooded ice; they can swallow you whole.

Mapping Inuit Ice Travel (geospatial) Knowledge

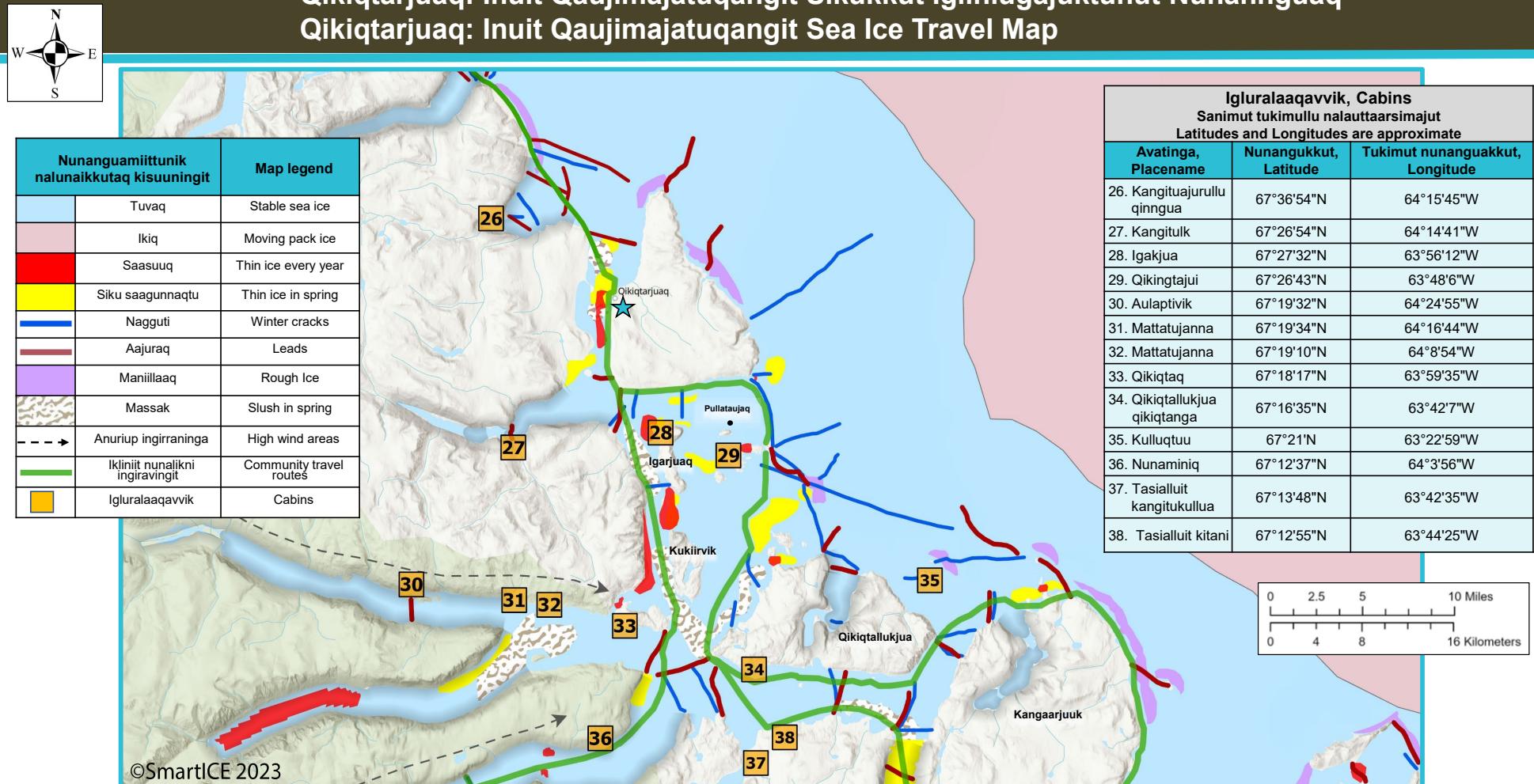


Seasonal IQ Maps

Jaannuari - Juuni, January - June

S M A R T I C E

Qikiqtarjuaq: Inuit Qaujimajatuqangit Sikukkut Igliniugajuktunut Nunannguaq Qikiqtarjuaq: Inuit Qaujimajatuqangit Sea Ice Travel Map



Qujagijaujut: Ikirmut uquajjigiaqtut katimajingit sikulirinimut Qikiqtarjuaq saqittilaurtut nunangumiit ilulinginnik 2019 - 2022. Unurtuungalitaujariaqangittuq angirtausimangilluni sanajuviniirnit. Sanajuq: Jotanie Keyootak, Shawna Dicker, ammalu Katherine Wilson

Acknowledgements: The Ikirmut Management Committee for SmartICE in Qikiqtarjuaq produced the map content in 2019-2021. It is not to be reproduced without their written permission. Cartographers: Jotanie Keyootak, Shawna Dicker, and Katherine Wilson

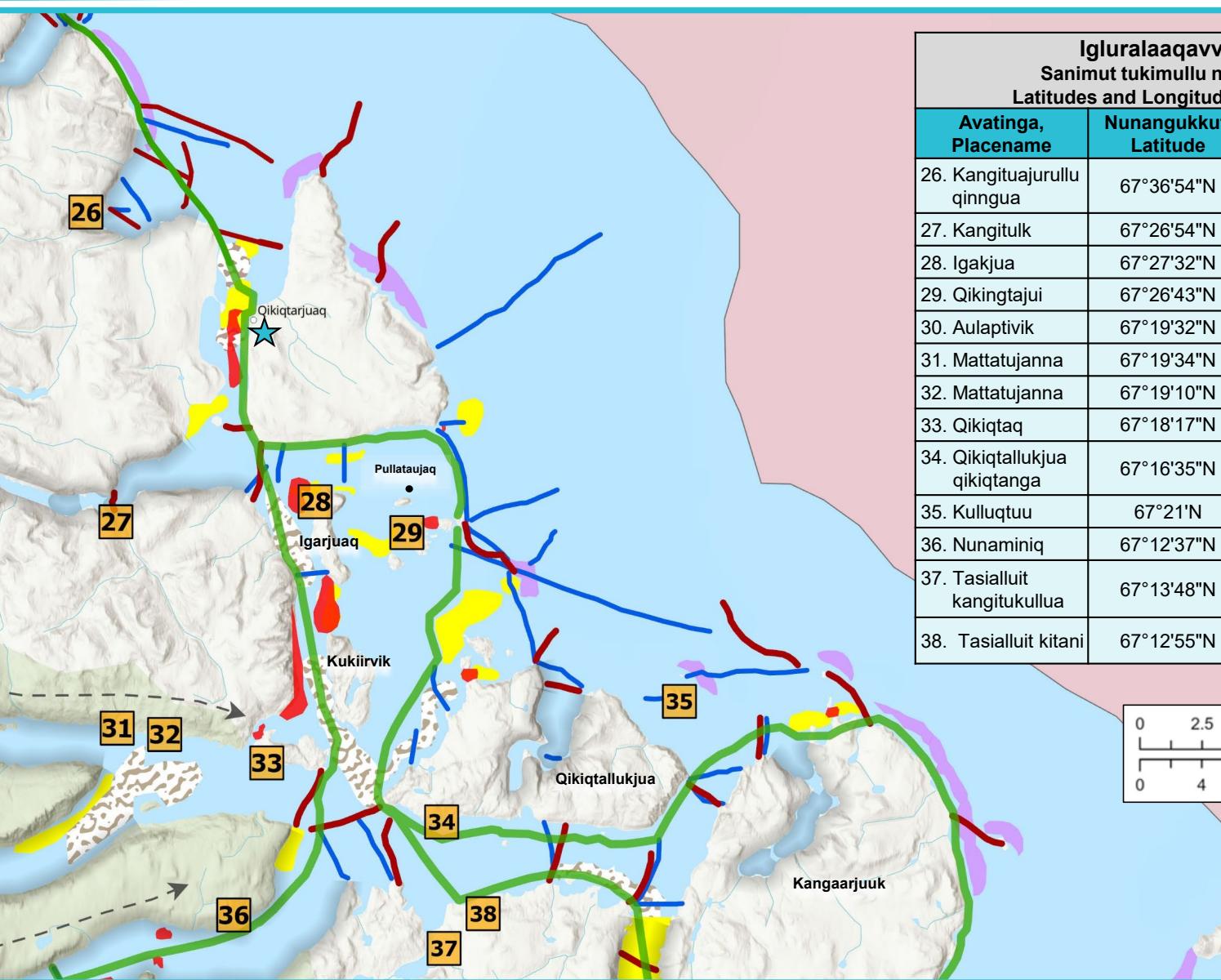
Qaujigiarvigitut
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www.smartice.org



Qikiqtarjuaq: Inuit Qaujimajatuqangit Sikukkut Igliniugajuktunut Nunannguad

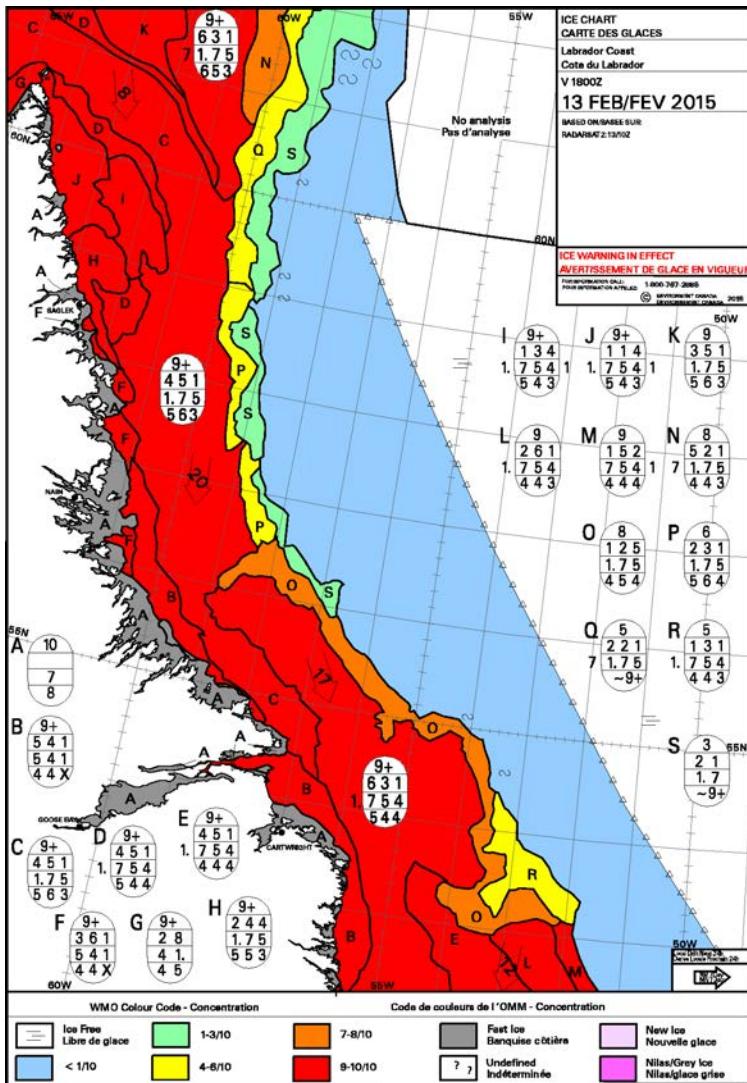
Qikiqtarjuaq: Inuit Qaujimajatuqangit Sea Ice Travel Map

Nunanguamiittunik nalunaikkutaq kisuuningit	Map legend
Tuvaq	Stable sea ice
Ikiq	Moving pack ice
Saasuuq	Thin ice every year
Siku saagunnaqtu	Thin ice in spring
Nagguti	Winter cracks
Aajuraq	Leads
Maniillaaq	Rough Ice
Massak	Slush in spring
Anuriup ingirraninga	High wind areas
Ikliniit nunalikni ingiravingit	Community travel routes
Igluralaaqavvik	Cabins

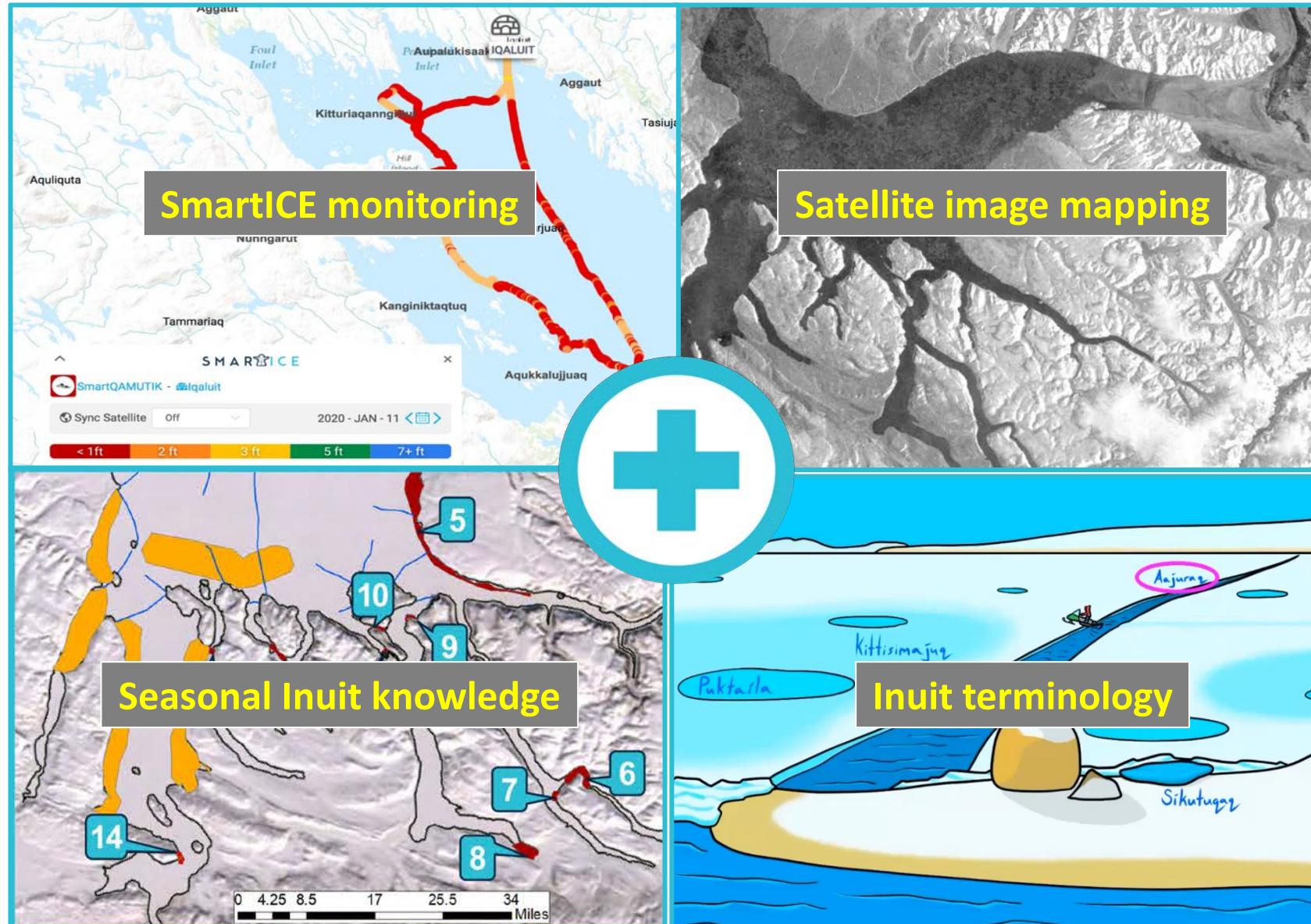


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Operational ice travel safety maps



Operational ice travel safety maps





This map indicates sea ice conditions around Nain on April 21, 2022. Ratholes, shown in red, are increasing in size in

Spring. The orange line was the extent of the

observable outer limit of

the sea ice. This is more

to be a guide and not a

safety map. Please

exercise care when

travelling on the sea ice.

If unsure of ice thickness,

check manually with your

harpisten, always carry an

emergency communication device. Be aware of the ice

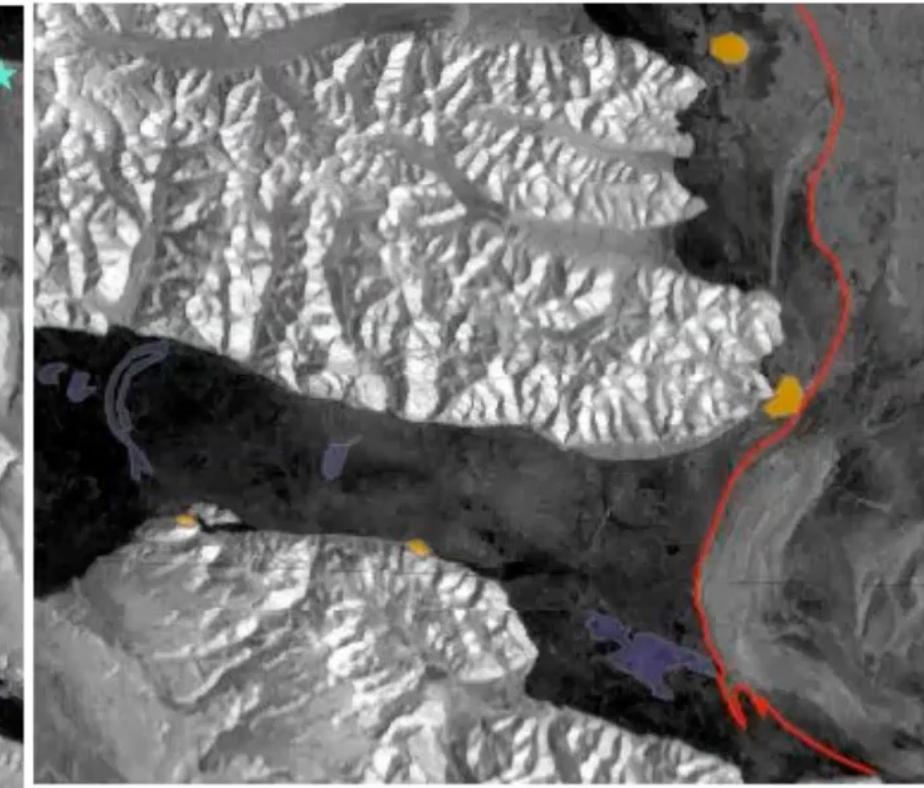
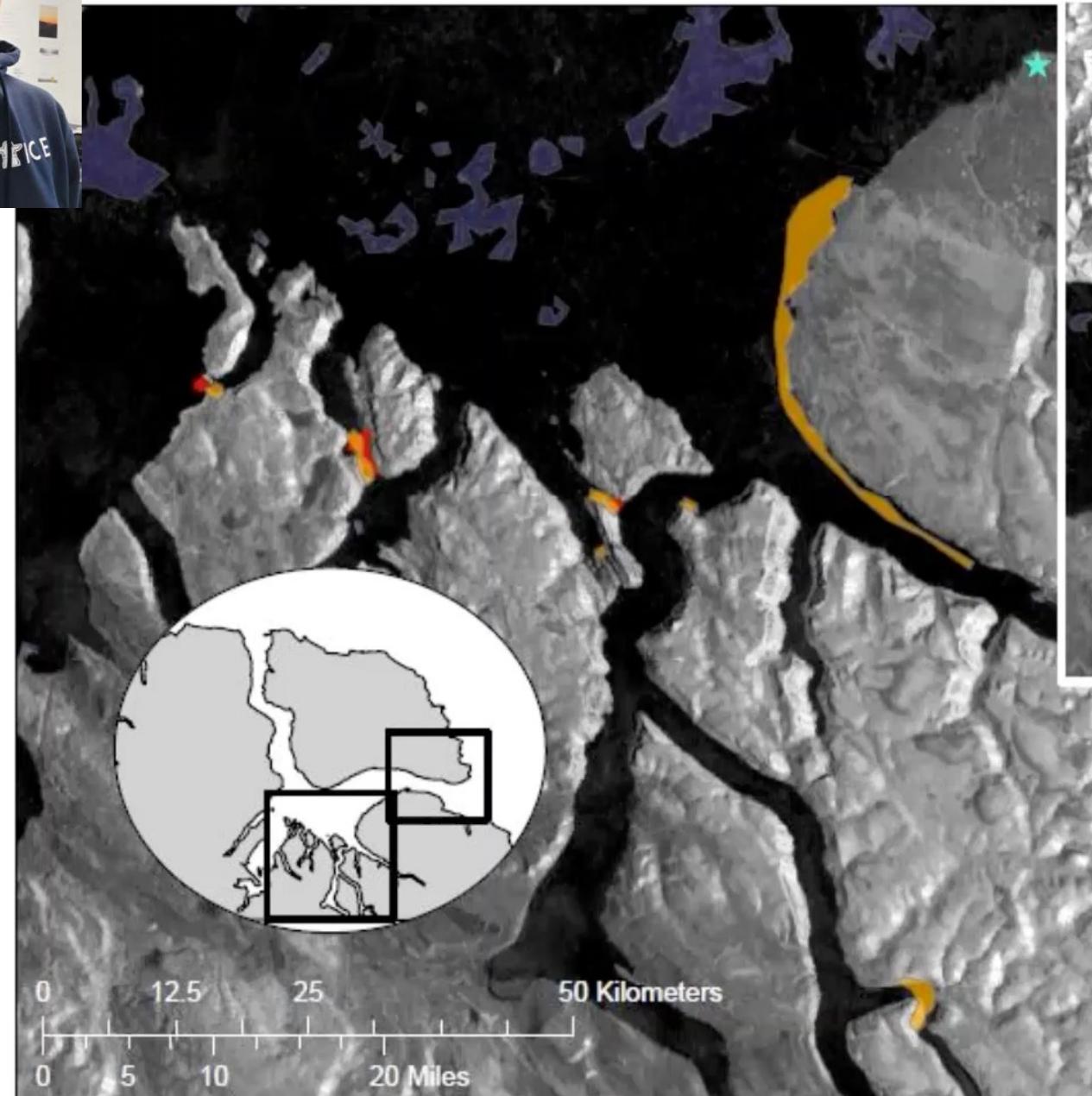
conditions when travelling

and don't travel alone.

Cartographer: Shelly Dickens



MARICE Sea Ice Safety Map of Mittimatalik Area March 2, 2022



★ Mittimatalik

— Sinaa - FloeEdge

■ Manila - Rough Ice

■ Attannaujannaqtuq - Dangerous

■ Aukkanniq - Polynia

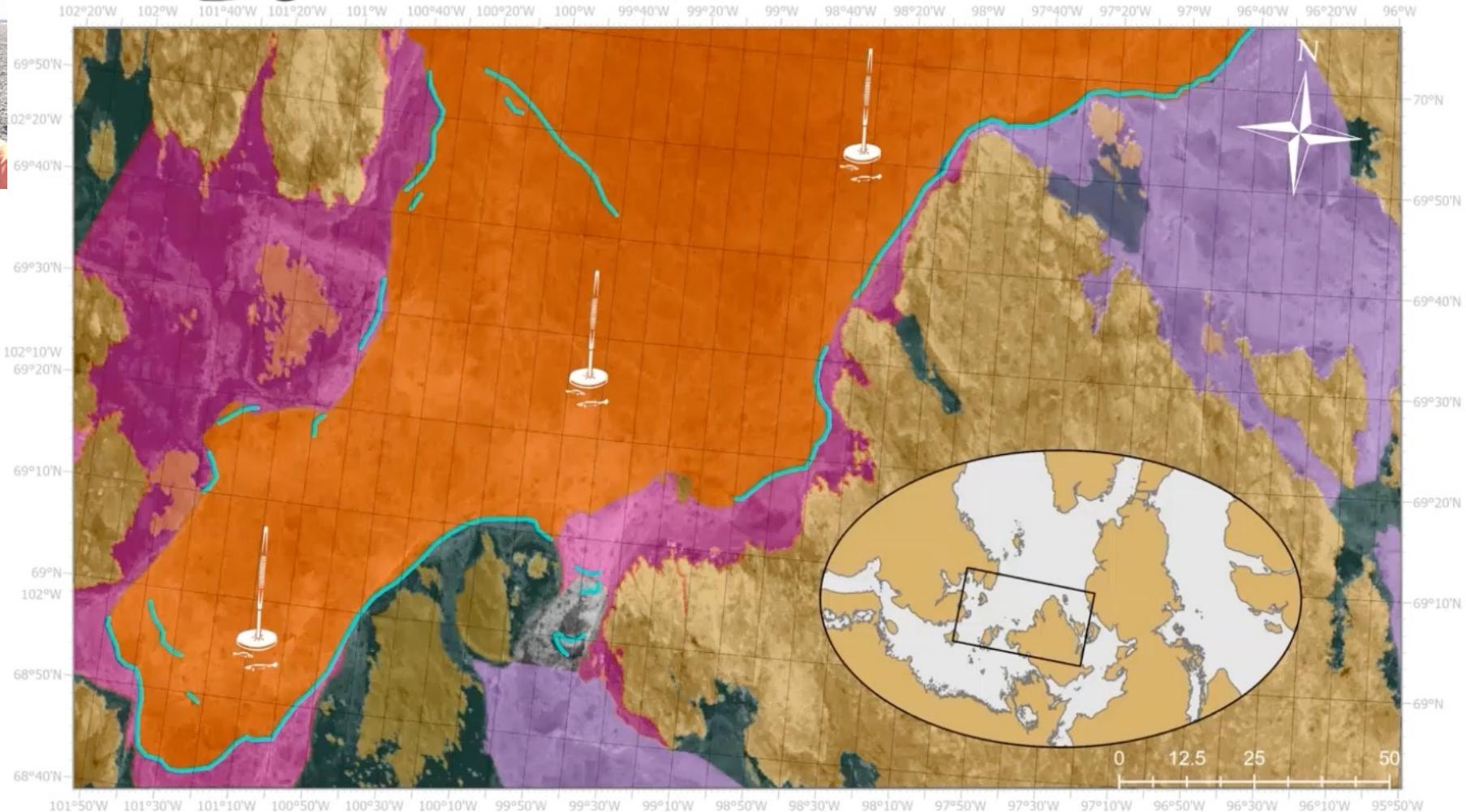




Sikumik Qaujimajjuti

Ice Safety Map Gjoa Haven February 8 2022

SMARTICE



- Cracks
- Moving Ice
- Caution
- Rougher Ice
- Safe Smoother Ice
- Land

This is a map indicating ice conditions for areas West of Gjoa Haven on February 8 2022. Take extreme caution if traveling in these areas. Area filled with cracks, open water and moving ice. Please be aware of surroundings. Use a Harpoon to check the ice conditions in these areas.

This map is generated as part of the Sikumik Qaujimajjuti project to provide additional sea ice information to communities. Ice conditions are mapped through interpretation of radar satellite imagery with ground observations and sea ice IQ, but please use careful judgement when travelling on the ice. This is the tenth map for Gjoa Haven following freeze up. Cartographer; Leanne Beaulieu



Impacts of SmartICE data on safe ice travel in Mittimatalik
according to the SmartICE Community Management Committee



Governor General's
Innovation Awards



MOMENTUM
FOR CHANGE



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SMARTICE™



A photograph of four men standing on a snowy, mountainous landscape. They are all wearing heavy winter clothing, including parkas with fur-trimmed hoods and snow boots. The man on the far left is wearing an orange safety vest over his jacket and has his right arm raised in a fist. In the foreground, there is a small white cylindrical weather station mounted on a stand, with several orange flags attached to its poles. The background consists of snow-covered mountains under a clear blue sky.

SmartBUOY sensor ideas to support safe travel

Visibility sensor
SOS button
Current meter
Others????

A black and white photograph showing a wooden sled being pulled by a black snowmobile across a vast, snow-covered landscape. The sled is heavily laden with equipment, including a blue and white cooler, a red container, and several small boxes. The sled's wooden frame is partially buried in the snow. In the background, there are snow-covered hills under a clear sky.

New sensors for ice
travel hazard mapping

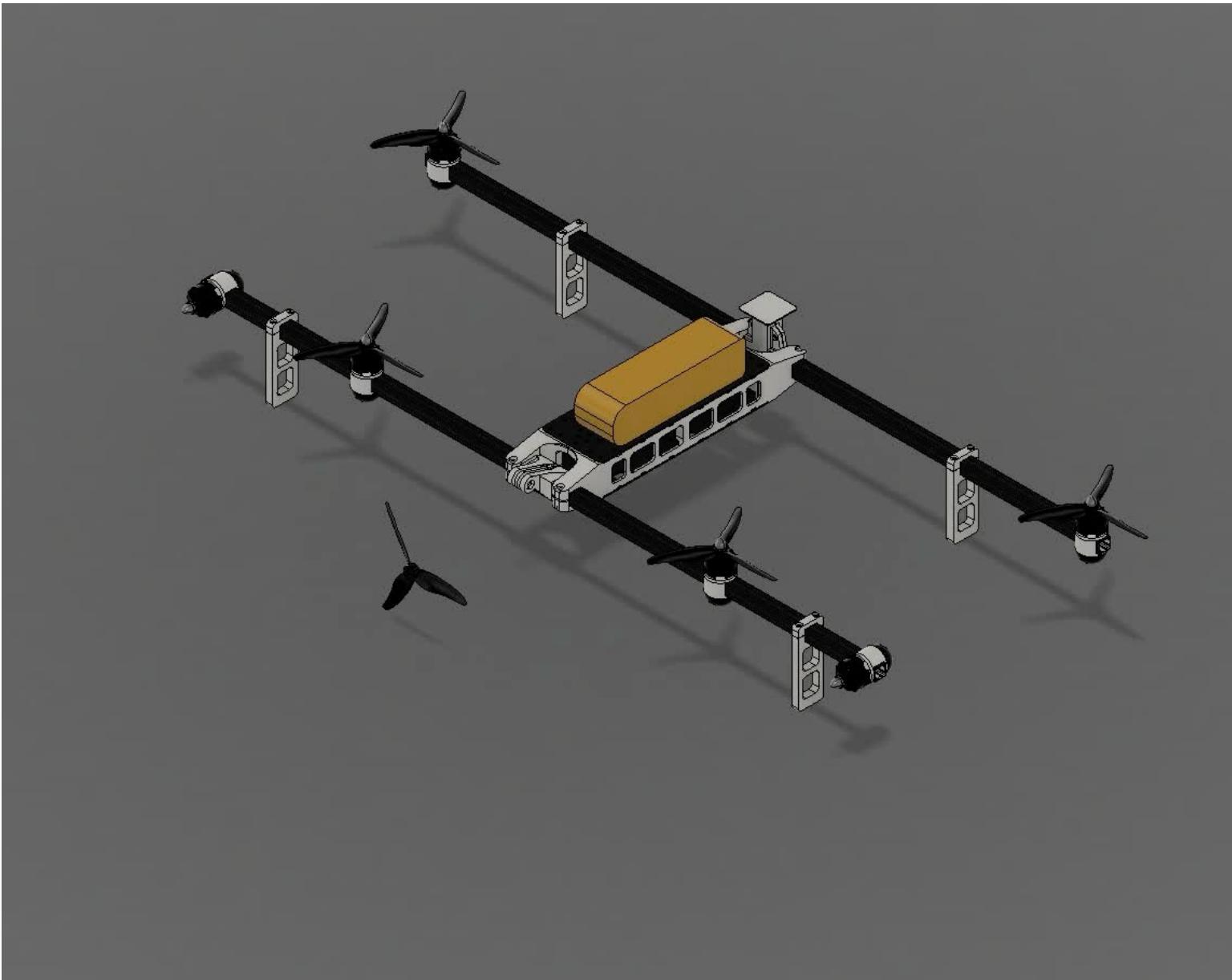
In spring, unexpected pockets of **slush** can stall snowmobiles, potentially leaving ice users wet, cold and stranded many hours from safety



Travel over **rough ice** is damaging to snowmobiles, costly in time and fuel, and more dangerous than smooth ice



Drone Development and Pilot Training





Governor General's
Innovation Awards



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