

Kinikmi Sigum Qanuq Ilitaavut

Wales Inupiaq Sea Ice Dictionary



The village of Wales, Alaska, as seen from the land-fast ice, tuaq on February 9, 2007. Small pressure ridges, iunilaurat are built on the flat surface of the land-fast ice (tuagikuq) closer to the beach. Photo, Winton Weyapuk, Jr.

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Wales Inupiaq Sea Ice Dictionary

Winton Weyapuk, Jr. and Igor Krupnik, compilers

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and Matthew Druckenmiller



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Front cover: Ice-covered Bering Strait off the Village of Wales, Alaska., February 2007. Photo, Winton Weyapuk, Jr.

Back cover: Land-fast ice (tuaq) solidifies off the beaches of Wales on January 4, 2007. Photo, Winton Weyapuk, Jr.

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Inupiaq Summary

Una irruiqtuq amafhaatunig suaqtauqaatuq suli malguḡnik ugiunik piqunisuagaat. Kinikmi, atiqatualu Wales, Alaska-mik, tallimakiviat inuinaq qaanivlu taiyuutait aglagsimaaqtut sigumun aḡanunlu Kinikmiutun Inupiauraagnamik. Ugiut 2007–2008 suwaitut, taamna suwaalautauraq SIKU-mik atiqaatuaq (*SIKU* – Sea Ice Knowledge and Use). Nanigliḡaan nunamin ilisḡhaatuat suwaitkaat tallimanin nunaaqitnin aasi inuinaq qaanitlu inuit nunaaqitigiitnin Alaska-mi, Canada-mi, Greenland-mi, suli Chukotka-mi, Russia-mi. Una naituaq siufiq quliagaa qanuq Kinikmiut sigutkun taiyuutait pifiuqsimaqtuaq aasi qanuq atuḡnaatuq Kinikmiunun uvlumini.

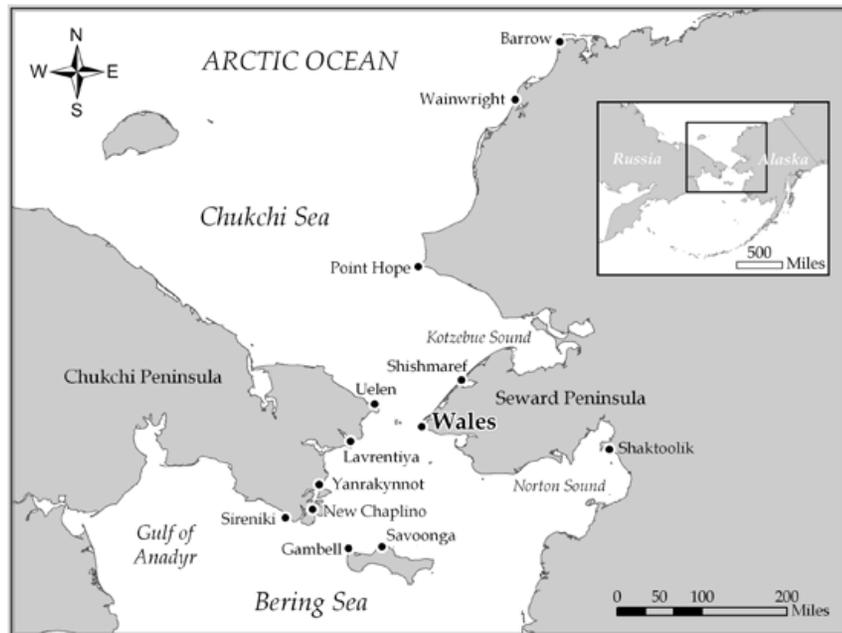
Isimautaa aglaguplui Kinikmiutat taiyuutait sigutmun maliguagaa suwaksraq Sivugaami, Alaska-mi. Ugiutni 2000–2002 Yupit aḡuni-aqtitlu, utuqanaatlu Siuḡaami (Gambell) aasi Sivunḡami (Savoonga) aglagukḡui ilisimaafhat sigumun aasi silamun atausigun ilipḡu qiniqtuamun Siugaamiutunlu Naluagḡmiutunlu. Igor Krupnik Smithsonian Institute-min siupmiutigaa sawaksraq Siugaami. Taimana ittuamik

sawaaksramik qaniqutigai Kinikmi taapkua IRA Council-lauruat. Utuktaaḡ/Winton Weyapuk, Kinikmiu umialiuruq suli qaniḡuuruq Kinikmiutun, siufiupkai katifhat Kinikmiutun taiyutait sigunmun, aglagai utuqanaat ilisimakaagit sigunmun, aasi suli tallimakiviat qaanivḡui agliusritaaqtuq Kinikmi asruani. Igor sawaitaliqtuq iluqnaita ilaurautlu aḡalatauruat aulaatiqtimatiḡ. Qatiqsruḡai iluqnaita ilita-agitlu, aglaksimaaqtuatlu suli agliusritat aasi naguatum ilipḡui tarrunḡa ‘taiyutait’-nun.

Aḡiyaḡaq/Herbert Anungazuk Kinikmi Kinikmiu, inuit inuufhat ilisauti National Park Service-mi Anchorage-mi una suwaaksramun igayutalliqtuq. Malḡuuk utuqanaat Kinikmi Suggina/Pete Sereadlooklu, suli Ikkana/Faye Ongtawasruk-lu ilausugait suwaituat. Hajo Eicken-lu, Matthew Druckenmiller-lu Geophysical Institute-mi University of Alaska Fairbanks-mi suwaitut nunaaqitigiitlu uurapḡui sigum siliktilaḡa aasi iglitifhaḡa. Taamna SIKU suwaksraq atausisrimaaqtuq ‘Shared Beringia Heritage’ suwaaksrami.

SIKU ataani nunaaqitni ‘taiyutait’ sigunmun aglaksimaakaniktut Qiqigtamilu (Shishmaref) suli Utqiaḡvinmilu (Barrow), Sirinikimi aasi Ualiḡmi (Uelen) Chukotkami, Igluulikmi, Cape Dorset-mi aasi Pangniqtuunḡmi (Pangnirtung) Canadami. Ukpiigugut magua Kinikmiutun taiyutait sigunmun, agliusritatlu sigut qanuqliḡaa ittuat, aasi suli Inupiaqtun quliaqtautit suli Naluagḡmiutun mumiksrait katitaavut uani irruiqtuani igayutauliqtuq nutaagatnun aḡuniḡuuruatnun, taima Kinikmiut ilisimagaagit aḡauiquqtuq aḡat inuuliuqtuat siupmi.

(Translated by Utuktaaḡ Winton Weyapuk, Jr.)



Map of the project activities in 2006–2009 in the Bering Strait region showing Wales and other local communities in Alaska and Siberia that participate in the sea ice observation and knowledge documentation efforts.

Contributors



Winton Utuktaaq Weyapuk, Jr. was born in Wales in 1950. He has been a subsistence hunter since he was a young boy and he is now a whaling captain and the Chair of the Wales Whaling Captains Association. He received a BA in Rural Development with an emphasis in Land Use Planning in 1986 and a BA in Inupiaq Eskimo language from the University of Alaska Fairbanks in 1987. He currently serves on the Wales Native Corporation, Board of Directors and on the Native Village of Wales, IRA Council.



Herbert Agiyagaq Anungazuk (1945-2010) was born in Wales in 1945. He left Wales to attend Mt. Edgecumbe High School and trade school at Haskell, Kansas, following a stint in the Army which included a year with the infantry in Vietnam. He lived in Wales as a subsistence hunter and boat captain until 1982. He was employed by the Department of the Interior, National Park Service, Alaskan Office, in Anchorage as a cultural anthropologist.



Pete Suggina Sereadlook was born in Wales in 1930. He has lived in Wales all his life. He is an accomplished ivory carver, subsistence hunter and fisher, a member of the Kingikmiut Dance Group, and also serves on the Wales IRA Council. He is one of the Wales Elders who is fluent in Inupiaq and who regularly carries on his conversations in Inupiaq with fellow elders.



Matthew Druckenmiller (born 1979) is working on his doctoral thesis on coastal sea ice at the University of Alaska Fairbanks. Originally from Pennsylvania, he moved to Alaska in 2004. Since that time, he has worked on the land-fast ice off Barrow, Wales, and other Alaskan communities.



Faye Ikkana Ongtowsruk was born in Wales in 1928. She and her family own and operate a reindeer herd, which they have managed for over 50 years. Faye has a lifetime's worth of experience of sewing clothing and boots for her family and processing and preparing harvested foods. She has taught Inupiaq language and Eskimo dancing at the local school and she serves on the Kawerak Elders Advisory Council and the Seward Peninsula Reindeer Herders Association.



Igor Krupnik (born 1951) is ethnology curator at the Arctic Studies Center of the National Museum of Natural History, Smithsonian Institution in Washington, DC. For over thirty years, he has studied cultural heritage, impacts of climate change, and ecological knowledge of the Arctic people. He served on the Joint Committee for International Polar Year 2007–2008 .



Hajo Eicken (born 1965) studies growth, evolution, and properties of sea ice at the Geophysical Institute, University of Alaska Fairbanks (UAF). Before joining UAF, he led the sea-ice and remote-sensing group at the Alfred Wegener Institute for Polar and Marine Research in Germany. At UAF, he is working to enhance exchange between scientists, Alaskan communities, and the public at large.



Lawrence Kaplan (born 1950) is Director of the Alaska Native Language Center at the University of Alaska Fairbanks and Professor of Linguistics. For the past thirty years he has studied the Alaskan Inupiaq language, working on dictionaries, oral history, place names, and vocabulary pertaining to traditional indigenous knowledge, particularly of the Bering Strait Inupiaq dialects.

Qanuq Iilitaavut: *How We Learned What We Know*

Winton (Utuktaaq) Weyapuk, Jr.



When I began hunting with my father, my uncles, brother-in-law, other adults, and Elders in my youth, our communication was totally in Inupiaq. More specifically it was in our Kinjikiut or Wales dialect of the Inupiaq language. Those words and sentences in Inupiaq concisely relayed information necessary to be successful as a hunter and just as importantly, to be safe in our endeavors. The behavior of the animals we hunted, their biology, and the environment they lived in could be quickly described and understood in our language. Understanding led to success and safety of individuals and hunting crews. I was eleven years old when I started going with my father's crew and because Inupiaq was our family's primary language, I was fluent and could fully understand the hunters' conversations and their instructions on the ice and in the boat. I was able to remember many of our Inupiaq sea ice terms simply by hearing them spoken around all the time and by using them myself.

Also, when I was growing up and in grade school, the use of the Inupiaq language was forbidden in the classroom. It was one of the misdirected educational policies of that time. I believe that the rationale was that by suppressing the use of Inupiaq, Native students, like myself, would more readily learn English. My reaction, as I grew into my teen years, was that I should learn even more of and use this "forbidden" language. Today, all that has changed; but also the language used for instructing young hunters has changed - from Inupiaq to English.

Within the past two generations there have been dramatic changes in the lives of the Kinjikiut, the people of Wales, Alaska. New homes were built to replace poorly insulated framed houses. An electrical power plant to light people's homes, the streets, power appliances, fax machines, and computers was installed. A new school for grades kindergarten through high school was built. A road to subsistence harvesting areas near the Lopp Lagoon was constructed, as was a new airport strip for passenger and cargo planes.

Along with the changes to the infrastructure there have been changes in the way the Kinjikiut live their lives. Snowmachines replaced dog teams, ATV's replaced walking to subsistence resource areas, aluminum skiffs replaced skin boats. VHF radios provide instant communication among crews and between hunters and their homes. Global Positioning System (GPS) units now supplement or replace compasses and other means of navigation.

All these changes brought with them new English words that describe the new objects and tools and their function. The changes also brought with them a shift in the use of language. The English language gradually encroached upon and began replacing Inupiaq as the Kinjikiut fundamental language. The words, the stories, the instruction, and the descriptions of our local environment in our Inupiaq dialect slowly began fading away. They are little used today or are already replaced by the new English words. Our school teaches students how to communicate verbally or in writing in English or mathematics, but not in our Native language.

A few generations ago the situation was reverse. Inupiaq was the main language while English was an interesting but rarely used

second language. Now, as far as language use goes, people have turned one hundred eighty degrees: English is now the primary language and Inupiaq has been relegated to an interesting but rarely used way of communicating. Inupiaq is not yet “dead” in our community as linguists may describe it. People often intersperse Inupiaq into their everyday conversations. Exclamations, endearments and teasing in Inupiaq can be heard among young adults. The few Elders still carry on their conversations totally in Inupiaq. The Inupiaq language in Wales has been severely impacted, but it survives. It persists in the knowledge that some older adults and our Elders retain. It remains firmly implanted in their thoughts, their stories, and the daily descriptions of what they have seen and done. Our Kijikmiu dialect is not yet extinct but it is endangered. It must be documented and preserved.

The people of Wales have continued to hunt and use other subsistence resources even as the changes described above have taken place. The animals, plants, invertebrates, and environmental conditions remain the same. Global warming may have changed the timing of *sigu*, or sea ice arrival, the formation, departure and the thickness of the ice, but basically the environmental conditions are unchanged.

Scientifically there are many words and phrases, in English, to describe sea ice conditions. There are just as many, perhaps more words in Inupiaq for *sigu*, the sea ice. On St. Lawrence Island, hunters use more than one hundred words in their Yupik language to describe various forms of sea ice in their area. In Wainwright, over eighty words have been documented. The number of Inupiaq words for sea ice in Wales is, perhaps, comparable to that in Wainwright.

Many of the Inupiaq and Yupik terms explain sea ice conditions

that may pose hazards or are extremely dangerous to hunters. Years ago, the commonality of Inupiaq usage meant that all hunters, young and old, knew of, or would readily learn about, these dangerous conditions. Young people listened as adults and Elders talked every day about hunting and the conditions they encountered. Thus, young hunters learned how to watch for those dangers. Today, because English is the prime language, it is more difficult for Elders and older hunters to pass on information. Indeed, some Elders say that when they speak in Inupiaq to young people they only receive blank, uncomprehending stares. Young people today use mainly English to tell about their hunt and what they have seen on their hunting trips. That, in its way, is a very different way of learning hunting safety and about our ice than in my early days.

It is our hope that our Inupiaq words for sea ice and the English translations we collected here can help young hunters supplement what they have learned in English about sea ice in our area. Using the English translations they may begin to understand the changing conditions as they are affected by winds and currents. It is also our hope that they can learn and begin to use some of the Inupiaq words as a way to teach those younger than themselves.

By no means is this Inupiaq sea ice “dictionary” an attempt to revive the Inupiaq language in Wales. Only constant usage by adults and youth can achieve that. Perhaps it can be achieved through other avenues. One can only hope.

Our use of subsistence resources continues as it has been through the ages. Our travels onto and through sea ice to obtain those resources also continues. Our language may be changing but the dangers inherent in hunting on ice remain the same. Hunting for whales, walrus, and seals in often changing and dangerous

conditions remains the same. Only the equipment has changed. Aluminum skiffs with outboard motors can go further and much faster than the old skin boats. Sometimes, because hunters are so far from home, it increases the risk and the danger for them.

Perhaps, this Kijikmi sea ice “dictionary” can be viewed as a link between the way our Elders communicated in the past and today’s way of communicating. It is hoped that it can be used as a learning tool. Enjoy this book for what it is. It is, in its way, a heartfelt tribute to our Elders who taught us so much. Without their dedication and instruction our life would be dramatically different today. They taught us how to hunt and where and how to do it safely. This book can also be seen as praise for our youth who continue our way of life and whom we love deeply. As they continue to hunt on the sea ice we hope that they do it safely. Language, any language, is beautiful in its own way. Inupiaq, because of its construction and its concise description of the natural environment, is no less beautiful. This dictionary may help preserve parts of it for generations to come.

Acknowledgments Quyaaniuqtaavut

Quyaana (“Thank you”) to the Kijikmiut of the old days. They created the knowledge about the ways people should watch the ice and know its many types, and how they could safely hunt and travel in the ever-changing Bering Strait. By carefully passing this knowledge among many generations of the Kifikmiut, they ensured that the community lived safely to these days.

Quyaana (“Thank you”) to the Elders of the Kijikmiut, who trained our team members in the traditions of the forefathers and who keep supporting today’s generation of the Kifikmiut hunters with wise stories, watchful observation, and good advice. By sharing your knowledge with us you made this book possible.

Quyaana (“Thank you”) to the Native Community of Wales and to the Wales Village IRA Council that supported our project and recognized its importance, so that the culture and traditions of the Kijikmiut could be preserved for future generations.

Many thanks to the Shared Beringian Heritage Program of the National Park Service, Alaska Office; to the Office of Polar Programs, National Science Foundation; and to the National Museum of Natural History, Smithsonian Institution that provided funds to cover this work and the production of the book. The Joint Committee for International Polar Year 2007–2008 endorsed the SIKU project (IPY #166); our work in Wales was a part of that effort.

At the Denver Museum of Nature and Science in Denver, CO, Liz Clancy, Rene Payne, and Lisa Crunk prepared copies of historical photographs from Wales that are reproduced in this book. Carol Zane Jolles at the University of Washington and Chris Petrich at the University of Alaska Fairbanks kindly offered their photographs as illustrations. Carol Jolles, as well as Mette Kaufman, Cara Seitchek, Lindsey Fell, and Allison Maslow assisted us in the preparation of this book. We thank you all.



“Natives hunting seals” at Wales, Alaska. Photograph by Alfred M. Bailey, May 1922. Denver Museum of Nature and Science, BA21-395D.

“Three Kinikmiut hunters are standing at the edge of the shore-fast ice (tuaq). To the left of the men is the edge of the shore-fast ice with a small area of water (imauraq). Behind them is the pack ice (sigu). All the men have ice testing poles (ayaupiaq). The man in the middle has snow shoes (taglut) for walking on new ice. The men are also wearing snow goggles (taġġaatautit), are packing sealskin hunting bags (aġinaq), and their rifles” (Winton Weyapuk, Jr., 2008).

How This Book Originated

Igor Krupnik

This book is a work of many partners that took almost three years to accomplish. In the community of Kinjigin, also known as Wales, Alaska, over 120 words have been documented for various types of sea ice (*sigu*) and associated phenomena in the local Kinjikiut dialect of the Inupiaq language. The work was conducted in 2007–2008, as a contribution to the International Polar Year 2007–2008, under a special project called *SIKU* ('Sea Ice Knowledge and Use'). This introduction tells how the Kinjikiut sea ice 'dictionary' was prepared and how it can be used by the Kinjikiut people of today.

The idea of recording the Kinjikiut words for sea ice followed in the footsteps of an earlier work on the nearby St. Lawrence Island, Alaska. In 2000–2002, we partnered with Yupik hunters and Elders from the communities of Gambell (*Sivuqaq*) and Savoonga (*Sivungaq*) to document their knowledge of sea ice and weather and put it together as an illustrated book (Oozeva et al. 2004). A bilingual Yupik-English sea ice 'dictionary' of 100 local terms for sea ice illustrated by pencil drawings was produced for that book. For the International Polar Year 2007–2008 we wanted to expand this collaboration to other communities in Alaska and across the Arctic. This is how our project *SIKU* ('Sea Ice Knowledge and Use') was born; it eventually became an international partnership among scientists from six nations and over 20 indigenous communities in Alaska, Canada, Greenland, and Chukotka, Russia (Krupnik et al. 2010). The collection of sea ice terms in local languages and dialects was put as one of the key tasks of the proposed *SIKU* project activities. In 2005, the project was endorsed as a part of the International Polar Year 2007–2008 science program (IPY #166).

The work on collecting local sea ice terms in the Kinjikiut dialect spoken in the community of Wales (Kinjigin) began in spring 2007. By that time, Hajo Eicken and Matthew Druckenmiller from the Geophysical Institute at the University of Alaska Fairbanks were already working at Wales on another IPY project in observation and analysis of seasonal ice dynamics in the North Alaskan coastal zone (*SIZONeT*). Winton Weyapuk, Jr., of Wales was collaborating with Eicken and Druckenmiller as a local sea ice observer. An experienced hunter and whaling captain, Weyapuk is also a speaker of the local Kinjikiut dialect of the Inupiaq language. He agreed to lead the effort to collect the Kinjikiut sea ice terms and to document Elders' knowledge about ice in the Wales area. Herbert Anungazuk of Wales, now cultural anthropologist at the National Park Service, Alaska Office in Anchorage became our project advisor. Two Kinjikiut Elders, Pete Sereadlook and Faye Ongtawasruk, agreed to join the team. In spring 2007, the *SIKU* project was funded by the grant from the Shared Beringian Heritage program of the National Park Service, Alaska Office. This is how our work was started.

The first step was to compile the words in the Kinjikiut dialect that relate to sea ice and associated activities. In summer 2007, Weyapuk prepared the first alphabetical list, originally of some 60 Kinjikiut terms. That list was reviewed and expanded through consultations with Herbert Anungazuk, Faye Ongtawasruk, Pete and Lena Sereadlook, Raymond Seetook, Sr., and other Kinjikiut experts. With advisers' help, the list grew to more than 120 words. Weyapuk also wrote Inupiaq explanations for major terms, so that the Kinjikiut understanding of many types of ice in their area was recorded in their Native dialect.

A crucial task was to secure good illustrations, so that the Kinjikiut terms for ice can be visualized in a life context. For that, Weyapuk took some 150 color photographs during various seasons, starting from winter 2007 and into spring 2008. The pictures were taken from the beach and the mountain above the village, on the land-fast ice, and from the boat at sea, that is, in settings that are well familiar to the Kinjikiut. Over 80 photographs have been selected. On each of them, Weyapuk put the Inupiaq words for the ice forms that can be recognized by experienced viewers.

In spring 2007, another valuable resource was added to our project, namely, historical photos taken in Wales in spring 1922 by biologist Alfred M. Bailey. Bailey stayed in Wales for three months and he took over 100 photographs of local hunters on ice and in boats, of community activities, and of the nearby landscapes. Bailey's photographs from Alaska are now stored at the Denver Museum of Nature and Science in Denver, CO. The Museum kindly shared copies of those pictures for our study and for the production of the Kinjikiut sea ice dictionary. In May 2007, Weyapuk, Eicken, and Druckenmiller recorded stories related to Bailey's photographs from Elders in Wales; portions of these materials are used in the book.

Winton and I met in Wales in September 2007 to review and organize our records. During that work, we put together a draft illustrated 'dictionary' of the Kinjikiut sea ice terms. We then presented the project to the Wales Village IRA Council. The Council expressed its support of our work and, after reviewing the first draft, endorsed the 'Kinjikiut sea ice dictionary.' We met again with Winton and Elders in Wales in February 2008. As the temperature dropped to -30F and gusting winds blew over Wales, there was plenty of ice in the frozen Bering Strait to watch and talk about.

At least three more versions of the dictionary have been produced, and reviewed by Winton Weyapuk and other Kinjikiut experts after February 2008. Herbert Anungazuk, Hajo Eicken, Matthew Druckenmiller, and Lawrence Kaplan were trusted partners in the process until the 112-page bilingual book, with over 100 color and black-and-white illustrations, was finally completed.

The Kinjikiut Sigum Qanuq Iilitaavut (Wales Sea Ice Dictionary) is one of the contributions of the *SIKU* project to International Polar Year 2007-2008. We plan deliver copies of this book to every family in Wales and to the Wales High School for use in the school cultural and language curriculum. The popularity of the earlier St. Lawrence Island Yupik sea ice book, "*Watching Ice and Weather Our Way*" (Oozeva et al. 2004) indicates that the Kinjikiut Sea Ice Dictionary will also have many enthusiastic readers. Under the *SIKU* project, local lists of sea ice terms have been already collected in Shishmaref, Barrow, and Shaktolik in Alaska, in Sireniki and Uelen in Chukotka, in Igloodik, Cape Dorset, Pangnirtung, and other communities in Canada and Greenland. We believe that the Kinjikiut words for sea ice, illustrations of many local ice forms, and the Inupiaq explanations and English translations we collected in this book will be of special help to young hunters, so that the Kinjikiut knowledge is preserved for future generations.

Krupnik, Igor, Claudio Aporta, Shari Gearheard, Gita, J. Laidler, and Lene Kielsen Holm, editors. 2010. *SIKU: Knowing Our Ice. Documenting Inuit Sea Ice Knowledge and Use*. Dordrecht, etc.: Springer. xxxii+514 pp.



Small berms of frozen slush ice (qaimguq) are being built along the beach at Wales on November 27, 2007, behind the formed low pressure ridge (iuniq) made of broken drifted ice. Slush ice (qinu) can be seen on open water behind the pressure ridge.

1. Alphabetical List of Kingikmiut Sea Ice Terms

(Plural forms are given in parentheses; verb forms are followed by a hyphen)

Winton Weyapuk, Jr. (WW), Herbert Anungazuk (HA), Pete Sereadlook (PS), and Faye Ongtomasruk (FO)

Allu (allut):

Seal breathing hole in the shore ice

Alluaq (alluat):

Fishing hole chipped out on the shore fast ice or in cracks in new ice (siguliaq)

Analuaq (analuat):

Piece of floe ice that has walrus droppings on it

Anisaaq:

Visible breath of whales or walrus; the breath of a whale visible from a long ways away without the whale being visible; the sound of a whale breathing within pack ice

Attaaq:-

For a sea mammal, such as a bowhead whale or beluga whale, to swim underneath shore fast ice

Atiqtaq (atiqtat):

Person or persons who drift away on moving ice (HA)

Auksaanik (auksaanit):

Hole melted into or through shore-fast ice or floe ice

Aufhaaniq (aufhaanit):

Fresh melt water on top of sea ice

Aᅇuun:

Paddle or oar; can be used to listen for sea mammal vocalizations underwater

Auniq (aungit):

“Rotten” ice,” very unsafe, shore-fast ice or pack ice that is thin and has many melted holes in it

Ayaupiaq:

Slender pole with an ice testing tip on one end and a hook at the other end; it is dangerous to walk on questionable ice without an ayaupiaq.

Ayuugluk:

To listen for seal, walrus, and whale calls underwater using a paddle with one end placed against an ear and the other end underwater

Ikalitaaq (ikalitat):

Ice floe grounded in shallow water (usually refers to smaller floes)

Iluqnaaq (iluqnaut):

Large ice floe, up to one half square mile in size or larger

Iluqnaaqpak (iluqnaaqpait):

Very large ice floe, up to one mile long or more

Iluq:

Seal’s maternal den; a den near a pressure ridge where a new born seal resides until it is old enough to leave

Imaq:

Ice free ocean or sea

Imaḡruk:

Very large and wide lead; also uinivak; a large pond of open water within pack ice

Imauraq:

Small open pond of water within pack ice or a large ice floe

Inipkaq (inipkat):

Multi-year ice, or old ice (HA)

Inipkaq-:

For there to be a mirage; ice, land or water looming above the horizon; when pack ice appears as a white line along the horizon

lqḡak-, ikḡaktaaq-:

To catch a fish by jigging; to jig for fish through a fishing hole or crack in shore-fast ice

lziq:

“Smoke”; frost smoke over open water; usually, winter or early spring phenomenon (HA)

Issuaq-:

To look through a fishing hole made for spear fishing to the bottom of shallow water; to look underwater

Itiḡliq (itiḡlit):

Large opening in shore-fast ice, such as a bay or cove; also refers to the end of a lead with shore-fast ice on one side and pack ice on the other (literally “a place you can enter”)

luluk-:

The sound of ice piling up in ridges

luniq (iunḡit):

Pressure ridge formed on shore-fast ice

luniq (iunḡit):

Small pressure ridge formed within shore-fast ice

lunivak (iunivait):

Very large pressure ridge on shore-fast ice

Kaḡiaq-, kaḡiaqtuq:

To go spear fishing on shore-fast ice

Kaivraq, kaivsraaqtuaq:

Ice floe that is rotating in the current; a large ice floe that is rotating as one end nudges other ice floes or shore-fast ice (literally: to go round and round)

Kanjiḡḡuk:

Ice with overhanging shelf; dangerous spot to step on (HA)

Mapsa:

Overhanging snow cornice on the edge of shore-fast ice; very dangerous

Mauḡḡigutaaq-:

To cross open water by jumping from one ice floe to another (HA)

Mauqsruq-:

To watch for seals or other sea mammals from the edge of shore- fast ice or pack ice

Mauqsravik:

Place on shore-fast ice or pack ice from which to watch for seals or other sea mammals

Mitivik:

Ice crystals floating in the ocean or a fishing hole

Mitiñjun, mitiqmiutaq (mitiqmiutat):

Screened ice scoop for removing ice crystals from a fishing hole

Mituglak:

Surface of shore-fast ice or pack ice that has been changed by rain from a smooth surface to a rough surface with ice crystals

Nağituaq:

Low place on shore-fast ice or on an ice floe where a boat can be pulled out

Nakkaq-:

For a sea mammal to dive into water from shore-fast ice or pack ice; also applies to someone falling overboard from a boat (HA)

Nalunaitkutaq:

Marker on trail; marker at the boat launch site

Nannum ilua:

Polar bear maternal den on shore-fast ice

Nasrazvik, nazirvik:

Ice floe or floe berg with a pressure ridge that can be climbed to look around; a look-out place (also puktaaq)

Nutigaguugvik:

Very thick slush; pancake ice

Nunavak (nunavait):

Walrus on top of an ice floe; also nunavaat for many walrus herds on ice floes (HA)

Pituqi (pituqit):

Ramp cut into the edge of shore-fast ice for launching boats

Pituqiuğvik:

Boat launch site

Pituqiliuq-:

To make a ramp on the edge of shore-fast ice for launching a boat, usually in late March or April

Puikaaniq (puikaanit):

Piece of vertically lifted ice; standing chunk of ice

Puilauq (puilaut):

Piece of ice that has broken off underwater from an ice floe or shore-fast ice and surfaced, can be dangerous if it hits a boat or outboard motor

Puizri (puizrit):

Sea mammal, or seal, that surfaces in a lead or open water

Puiyaq-:

For a sea mammal or piece of ice to surface in a lead or open water

Puktaagruaq (puktaagruat):

Small ice floe, small floe berg

Puktaaq (puktaat):

Ice floe, floe berg

Puktaaqpak (puktaaqpait):

Very large ice floe, very large floe berg

Puktaaqpak ikalititaaga:

Iceberg that has become “stuck” by grounding in shallow water

Qagi-:

For a sea mammal to climb onto shore-fast ice or pack ice; qaksraq – any sea mammal on ice until positively identified (HA)

Qaimġuq:

Berm (a small ridge) along the shore formed when slush and brash ice and the water from waves freezes on the beach; snow drifts on the shore-fast ice and tundra, one to two feet high, that resemble waves (pl. qaimugut)

Qamiyanaqtuaq:

Pack ice that is packed tightly together

Qamaiyaq:

Pack ice that has been packed tightly together by a large eddy current; bow waves of a seal, walrus or whale swimming underwater visible on top of the water

Qamiyaq-:

To pull a boat over a section of pack ice to open water or to the shore-fast ice

Qanataruaq:

Ice floe floating free after high tide

Qaaptiniq:

Overflow on shore-fast ice or ice on a lagoon; water splashed on top of ice around a seal breathing hole

Qaupik:

Ice shove; pack ice or shore-fast ice that is pushed onto land by wind and current; cf. lvu - the term more common in the North Slope dialect, but also known to the Kinjikiut speakers (HA); can be very dangerous if it threatens people unaware it is happening

Qaksraq (qaksrat):

Seal sleeping on shore-fast ice or pack ice

Qauksraaġniq:

Reflection of pack ice on low clouds on the horizon

Qinu:

Slush, slush ice on open water; see also nutiġaġuugvik

Qinuliaq:

“Becoming slush”; light slush in ocean water just beginning to form

Qissuk:

“Water sky”; reflection of open water on low clouds or frost smoke

Quppaq (quppait):

Crack in the shore-fast ice or ice floe

Qupniq (qupnit):

Crack on shore-fast ice or ice floe that has re-frozen

Saalguraq, saaqġuuraq (HA):

Thin fresh water ice on still waters; also applies in spring conditions when melt water on sea ice freezes (HA)

Saġvaq:

Current; ocean current

Saŋaġak (saŋaġait):

“Dirt”, small broken pieces of brash ice; scatter consisting of slush and ice that is weakly connected to land-fast ice or large ice floes; a dangerous place (HA)

Sigimizimaaqtuaq:

Pack ice that has been ground into small pieces by moving against shore-fast ice

Sigu:

Ocean pack ice, also a generic term that refers to all sea ice, including shore-fast ice

Siguliaksraq:

“That which will become young ice”, grease ice

Siguliaq:

Young ice, gray or gray-white in color

Sigum izua: The end of a floating mass of pack ice, the open ocean edge of a floating strip of pack ice (HA)

Sigum kaŋiġaa (1); sigum kaŋia (2):

The extent of the pack ice: 1 – FO, PS and WW, 2 – HA

Sigu qayuaqaatuaq:

Ice that has sand on top

Sigu taatuaq:

Pack ice that is “coming in”, pack ice approaching land or shore-fast ice; also known as sigu agituaq

Sigu uituaq:

Pack ice that is moving out and forming a lead

Siguturuuaq:

Area that has a lot of pack ice

Sigutuvaktuaq:

Area that has a lot of heavy pack ice

Siguiq-:

To become free of sea ice

Siguitpaktuaq:

Area that has very little pack ice

Siuġaq:

Point along the edge of shore fast ice that sticks out from the rest of the ice

Taglu (tagluk):

Snowshoe made for walking on new ice (siguliaq)

Tamalaaniqtuaq:

Pack ice that is scattered enough to boat through

Tasraatuaq:

Pack ice that is moving tightly against the edge of shore-fast ice

Tuaġiktuq:

Smooth, flat section of shore-fast ice

Tuaq:

Shore-fast ice, land-fast ice

Tuwaiq-:

For shore-fast ice to break off and drift away from the shore, usually occurs during spring break-up (WW); may also occur in winter time under southeast storm conditions (HA)

Tuwaiyanti-:

For a person, animal, or thing to drift away on a broken piece of shore-fast ice; the term *atiqtaq* also applies (HA)

Tuwaigñiq (tuwaigñit):

Piece of shore-fast ice that has broken off from the shore and is floating free

Tunnuruaq:

Grounded pressure ridge or ice floe

Tutqiksriǵvik:

Place with a layer of snow on shore-fast ice, near an ice pressure ridge, where a boat and gear can be stored up side down, and the sides of the boat banked with snow to protect gear under the boat. The bow of the boat is anchored to a piece of ice.

Tuuq; tuuq-:

Long handled ice chipping tool; to chip an ice fishing hole on shore fast ice

Tumi:

Trail over shore-fast ice; cf. *tumisaaq* – a trail on land

Tuvli-:

To cut or make a trail (over shore-fast ice)

Uiniq:

Open lead that has formed between pack ice and the shore-fast ice

Uingum izua:

End of the open lead, the corner of the open lead with pack ice on one side and shore-fast ice on the other side; also known as *uingum kanigaa*

Uingum taggaa:

“The open lead’s shadow”, a dark reflection of open water in lead on low clouds above; see also *qissuk*

Uinivak:

Very large and wide lead; also *imaǵruk*

Uqqutaq:

Windbreak wall built around a fishing hole; a windbreak wall built on shore-fast ice or pack ice

Uqsruǵaq:

Oil slick in a lead or open water, often left by a wounded animal

Utuqaq:

Old winter ice or also known as multi-year ice which usually arrives in the Bering Strait in the last week of November; also spelled *utukaq* (HA)

Uuyuaq

Extension ice, literally ‘an extension of something’; ice and slush cemented onto land-fast ice, subject to removal by current or wind action; a very dangerous type of ice to walk on (HA)



Wales church (original caption by Alfred M. Bailey, July 1922). BA21-141

Residents of Wales in front of their new church building, most probably on the occasion of the 4th of July celebration. The photo features about 80 people, almost half of the village population, though probably twice more adult women than men. People are dressed in the mixture of summer and winter clothing. The schoolteacher in dark jacket is the last person to the right.



Winton Weyapuk, Jr. on the shore-fast ice a few miles north of Wales on May 7, 2008. He leads visiting UAF scientists Matthew Druckenmiller and Chris Petrich to the open lead edge (uinbum kafia) to perform ice thickness measurements. Photo, Chris Petrich

2. Explanations of Major Wales Inupiaq Sea Ice Terms

By Winton Weyapuk Jr.

Aukaaniq - Uvinnaqsrami tualu sigulu autaliqmata aukaaniqsuugaik. Aukaaniq nuyaanaguurut imaagusualuit inuit tupmimata aukaanim sagani.

In the spring on the land-fast ice and pack ice when they begin to thaw, *melt holes* form. The melt holes are *dangerous* as people may get wet when they step near the *melt holes*.

Ikalitaq - Puktaaq ikaliruaq immami isruvaunjituami.

A *grounded floe berg* that is in a shallow part of the ocean.

Iluqnauq - Sigu katitman aasi qigitman, iliqnauqmik pisuugaat.

When pack ice becomes concentrated together and freezes it is called *a very large floe*.

Itigliq - Ugiumi naaga uvinnaqsrami ilaatni tuam ilaa aktuuruuq piiyaaguuruq, sinaamun aguum. Tuayaaman taimana “itigliq” pisuugaat.

Sometimes in the winter or in the spring a large part of the land-fast ice breaks off and drifts away, even up to the shore. When a part of the land-fast ice breaks off and drifts away like that it is called “*a bay formed in the land-fast ice.*”

lungit - Sigu saġvam tunifikmaunġ tuamun iunit aglilainaguurut. Ilaait aglilaqpaguurut kinjipaklutin. Ilaaitni aglilainaguurut. Ilaait migisuurut

When the current shoves the pack ice against the land-fast ice, the *pressure ridges* gradually grow larger. Some become very large and are very high. Sometimes they grow very large quite quickly. Some are small.

Qanataruaq - Tuami naaga sigumi qaillu sagvamlu piiyaqtagaik attaakun. Qanataruat nuyaaġnaatut qanu’ataa uvsaaqtaatut tupmauqmait inuit.

On the land-fast or pack ice the waves and current undercut the ice creating a *shelf* hanging over the water. Shelves are *dangerous* because they break off and drop when people step on them.

Pituqi - Umiaqtuġaatuat pituqiliuġuurut ilaatni pinaqman.

When needed, boat crews cut a *ramp* on the shore-fast ice to launch their boats.

Puiyaagġniq - Tuam naaga sigum ataanin siguraq ilaatni piiqfuni puiyaaguuruq. Nuyaanġnaaguurut umiaq naaga anuutaa tuuqmait.

Small pieces of ice sometimes break off and surface from underneath the land-fast or pack ice. They are dangerous when they hit a boat or its motor.

Puktaaq - Sigu iuniġaqtuaq kiniktuamik puktaamik pilagaat. Aktuufuaqtut taapkua puktaat. Ilait puktaat nuyaaġnaġuurut attaataat imagmi aukman aasi mumikmata. Pack ice that has a pressure ridge that is high is called a *floe berg*. These *floe bergs* are fairly large. Some *floe bergs* are dangerous when the ice on the bottom under water melts and they turn over.

Qamiyanaqtuaq - Sigu katisavakman qamiyanaqnaasipuu qamiyanaqtuamik pilagaat. Nayaanġaġuuruq qanu'ataa umiaq kaliviguminaqtuq tarani.

Tightly packed ice giving its term “pack ice that requires pulling a boat over it.” It is *dangerous* because a boat can get stuck there.

Qaufuk - Ilaatni sigu naaga tuaq sinaa qaagunun tunikġuugaa saġvam, qaufuktiluu. Nuyaaġnaġuuruq qaufukvakman.

Sometimes pack ice or land-fast ice is pushed on top of the shore by the current, creating the condition of an *ice shove*. It is *dangerous* when the ice shove is severe and goes far on shore.

Qinu - Ugiaqsrami qanikpakman taamna aniu katisuuruq imami, qinutitiluu.

In the fall when it snows, the snow becomes concentrated in the sea, forming *slush*.

Quppaq - Ilaatni tuaq naaga sigu quvilaatuq ulitimaunġ naaga iunit nautmata. Ilaatni tuami quvitman tuayaguugaa ilaa naaga sigu quvitman aviguugaa taamna sigu. Ilait quvat silikpaguurut, ilait siliitpaguurut.

Sometimes the land-fast ice or pack ice forms a crack when the tide rises or pressure ridges grow. Sometimes when a crack forms on the land-fast ice that section of cracked ice drifts away or the pack ice is split in two pieces. Some cracks are wide, some are narrow.

Siguliaq - Ugiaksrami imaq qigitaliqman siguliaġuugaa. Taamna siguliaq. Silikpanġilaq.

In the fall when the sea begins to freeze, the new ice forms. The *new ice* is thin.

Sigu - Ugiaksrami isrraliqmaunġ sigutaliġuugaa. Ugiami imaq qigitman siguguugaa.

In the fall when it gets cold the pack ice begins to form. In the winter when the sea freezes there is pack ice.

Tamalaaniqtuaq - Sigu katisimaanġaiqtuaq umiaqtuġuminaasilfuu iluani. Tamalaaniqtuami qaunagiinaatuq qanu'ataa utigmun sigu katisuminaqtuq. Scattered pack ice making it possible to boat within. You must *be careful* inside the scattered pack ice because it can become tightly packed again.

Tuaq - Ugiumi imaq qigitman tuaġuugaa. Ugiami isrraliqtalainaman tuaq siliktilainaġuugaa.

In the winter when the sea freezes the land-fast ice begins to form. In the winter when it becomes colder the *land-fast ice* becomes thicker.

Tuwaigniq - Uvinġaqsrami tuayaamaunġ taapkua sigut tuamin piiqtuat “tuaġnimik” pisuugait.

In the spring when the land-fast ice breaks away those pieces of sea ice are called “pieces of ice that broke off from land-fast ice and are drifting.”

Tuayaq - Uvinᅇaqsrami tuaq augataqmauᅇ aasi suli quviqmauᅇ tuayaᅇuugaa. Nuyaᅇᅇnaatuq tuayaamauᅇ tuayautisinaalivluu.

In the spring when the land-fast ice begins to melt and it also forms cracks, *the land-fast ice breaks off and drifts away*. It is *dangerous* when the land fast ice breaks away with the possibility of becoming *stranded on drifting ice*.

Uiniq - Anuᅇim sigu tinjitmauᅇ naaga saᅇvam sigu aᅇmaatititmauᅇ, uinitisuugaa. Ilait uinit siliitpaktut. Ilait silikpaguurut anuqtisiluakun naaga saᅇvaqtisuakun. Ilaatni uinitisuugaa anugaitᅇaan saᅇvaqman.

When the wind blows the pack ice or the current causes the pack ice to open up, a *lead* forms. Some leads are very narrow. Some leads are very wide depending on the strength of the wind or the current. Sometimes a *lead* forms even though there is no wind and there is current.

Uingum kaᅇja - Uinimauᅇ ilaatni kaᅇkaᅇaqtuq, sigugaaluni iluani aasi tuaqaaluni iluani.

Sometimes when leads form there is a corner of the lead, with pack ice on one side and the land-fast ice on the other side.

Uingum taᅇᅇaa - Uinimauᅇ suli qilakᅇugaqman uiniq qiniqnaᅇaqtuq qilakᅇuit ataani.

When a lead forms and there are clouds the water sky (the “lead’s shadow”) is visible under the clouds.

Uuyuaq - Ugiumi tuami ilaatni uuyuaᅇuugaa. Uuyuaᅇuugaa ilaatni sigu tuamun taatman, qiᅇitiluu aasi tuamun. Ilaatni siguliaq tuamun qiᅇisuugaa uuyaqtiluu.

In the winter, sometimes a shelf extension forms on the land-fast ice. Sometimes that *shelf extension* forms when pack ice moves in to the edge of the land-fast ice, and freezes in place, forming this shelf extension. Sometimes the *shelf extension* forms when new ice freezes along the edge of the land-fast ice.



Wales hunters hauling killed white whale ashore. May 17, 1922 – Photo by Alfred M. Bailey (Denver Museum of Nature and Science, IV. BA21-986)

“For mid-May it’s a lot different than nowadays. We usually see belugas (white whales) here in April through early May. This past winter we have seen them in February. Usually they show up here when the leads start opening up. But of course nowadays we have leads here all winter. We don’t have the pack ice keeping everything closed like it used to be. A lot more open water all winter long. Maybe that’s why we are starting to see belugas in mid-winter. Belugas follow the bowheads, and bowheads follow belugas. Mid-April, early May was probably the best time to hunt them these days” (Winton Weyapuk, Jr., May 23, 2007)

3. Kinjikmi sigum taiyutait *Wales Sea Ice Terms by Major Groups*

By Winton Weyapuk, Jr., and Igor Krupnik

Ugiaksrami qigitman, Siguliaq

Fall freeze-up, young ice

Nutigaguugvik:

Very thick slush; pancake ice

Qaimguq:

A berm (small ridge) along the shore formed when slush and brash ice and the water from waves freeze on the beach; snow drifts on the shore-fast ice and tundra one to two feet high that resemble waves (pl. qaimgut)

Qinu:

Slush, slush ice on open water; see also nutigaguugvik. It forms when drifting snow enters open water as in weather or wind activity (natiqviq), which describes snow drifting at floor or knee level, thus the term, also means ‘ground blizzard.’ Snow will continue to melt but melt ratio is so low in late fall, or in early winter that snow congregates into collective pools freezing in place or moving at mercy of wind generated by waves or ocean current (HA).

Qinuliaq:

“Becoming slush”; light slush in ocean water just beginning to form

Siguliaksraq:

“That which will become young ice”, also referred to as “grease ice”, very thin young ice (WW).

Siguliaq:

Solidified young ice, grey or grey-white, usually a few inches thick (WW); black unsafe young ice that is formed overnight (HA)

Siqpaaniq:

Ice frozen on rocks from ocean water or slush splashing on them

Qalligiit:

New ice, or young ice that rafted on top of each other to double or triple the thickness (literally: things on top of one another)

Shore-fast ice

Tuaq:

Shore-fast ice, land-fast ice

Siugaq:

Point along the edge of shore-fast ice that sticks out from the rest of the ice, also nuvuk (HA, Barrow term)

Tuagiktuq:

Smooth, flat section of shore-fast ice

Tuwaiq:

To breakup, for shore-fast ice to break off and drift away from the shore

Tuwaǵniq (tuwaǵnit):

Piece of shore-fast ice that has broken off from the shore and is floating free

Tuwaiyanti-

For a person, animal, or thing to drift away on a broken piece of shore-fast ice.

*Pack Ice***Sigu:**

Ocean pack ice, also a generic term that refers to all sea ice, including shore-fast ice

Qamiyanaqtuaq:

Pack ice that is packed tightly together

Qamaiyaq:

Pack ice that has been packed tightly together by a large eddy or current; bow waves of a seal, walrus or whale swimming underwater visible on top the water

Qamiyaq-

To pull a boat over a section of pack ice to open water or shore-fast ice

Qauksraǵniq:

Peflection of pack ice on low clouds on the horizon;

Sigimizimaaqtuaq:

Pack ice that has been ground into small pieces by moving against shore-fast ice

Sigu qayuaqaatuaq:

Ice that has sand on top

Sigu taatuaq:

Pack ice that is “coming in”, pack ice approaching land or shore- fast ice

Sigu uituaq:

Pack ice that is moving out and forming a lead

Siguturuq:

Area that has a lot of pack ice

Sigutuvaktuaq:

Area that has a lot of heavy pack ice

Siguiq-

To become free of sea ice

Siguitpaktuaq:

Area that has very little pack ice

Sigum izua:

End of a floating mass of pack ice, the open ocean edge of a floating strip of pack ice (HA); also known as sigum kaŋja - the extent of the floating mass of pack ice (FO, PS and WW)

Tamalaaniaqtuaq:

Pack ice that is scattered enough to boat through
Tasrraatuaq: pack ice that is moving tightly against the edge of shore-fast ice

*Multi-year ice***Inipkaaŋ** (inipkaat):

Multi-year ice, or old ice (HA)

Utuqaq:

Old winter ice or also known as multi-year ice which in the old days usually arrived in the last week of November. This ice is moving in the north-to-south direction (uᅇavriq) and carries sea mammals as walrus, polar bear, etc. South-to-north movement of the current is kuᅇiq (HA)

Pressure ridges, rafted, rough/smooth ice

luniq (iunᅇit):

Pressure ridge formed on shore-fast ice

lunilauraq (iunilaurat):

Small pressure ridge formed within shore-fast ice

lunavak (iunavait):

Very large pressure ridge on shore-fast ice

Mituglak:

Surface of shore-fast ice or pack ice that has been changed by rain from a smooth surface to a rough surface with ice crystals

Puikaaniq (puikaanit):

Piece of vertically lifted ice; standing chunk of ice

Tunᅇuruaq:

Grounded pressure ridge or ice floe

Uiniᅇuk:

Sound of ice piling up in ridges

Cracks, leads, polynyas

Imaᅇruk:

Very large and wide lead; also uinivak; a large pond of open water within pack ice

Imauraq:

Small open pond of water within pack ice or a large ice floe

Itiᅇliq (itiᅇlit):

Large opening in shore-fast ice, such as a bay or cove; also refers to the end of a lead with shore-fast ice on one side and pack ice on the other (literally “a place you can enter”)

Mauᅇᅇigutaaq:

Crossing open water by jumping from one ice floe to another

Mizakturuaq:

New ice that is wet on its surface; water that has seeped up from cracks around an iceberg

Quppaq (quppait):

Crack in the shore-fast ice or ice floe

Qupniq (qupnit):

Crack on shore-fast ice or ice floe that has re-frozen

Uiniq:

Open lead that has formed between pack ice and the shore-fast ice. The lead will widen as force of the wind increases, or close as decreasing winds force the current to close the ice upon land-fast ice. This phenomenon is essential in building pressure ridges that will anchor the shore ice to the ocean bottom (HA).

Uingum izua:

End of the open lead, the corner of the open lead with pack ice on one side and shore-fast ice on the other side; also known as uingum kanᅇᅇaa

Uingum taggaa:

“The open lead’s shadow”, a dark reflection of open water in lead on low clouds above; see also qissuk

Uinavak:

Very large and wide lead; also imagruk

Ulisimaaq-:

For there to be water seepage between the land-fast ice, tuaq and beach from wind-driven tide cracks

Imaq:

Ice-free ocean or sea

*Ice floes***Ikalitiq (ikalitit):**

Ice floe grounded in shallow water (usually refers to smaller floes)

Iluqnauq (iluqnaut):

Large ice floe, up to one half square mile in size or larger

Iluqnauqpak (iluqnauqpait):

Very large ice floe, up to one mile long or more

Kaluaqtuaq:

One ice floe that is “towing” another; an iceberg following closely behind another

Magaqliq (magaqlit):

Piece of floe ice that has mud or sand on it.

Nazirvik:

Ice floe or floe berg with a pressure ridge that can be

climbed to look around; also puktaa

Puktaaġruaq (puktaaġruat):

Small ice floe, small floe berg

Puktaa (puktaat):

Ice floe, floe berg

Puktaaqpak (puktaaqpak):

Very large ice floe, very large floe berg

Puktaaqpak ikalititaaga:

Iceberg that has become “stuck” by grounding in shallow water

Puiyaġniq:

Piece of ice that has broken off underwater from an iceberg or shore-fast ice and surfaced

Qaġataruaq:

Ice floe floating free after high tide

Sanġait:

“Dirt”, small broken pieces of brash ice

Taagluk:

Dark piece of ice that lay low on (under?) the water and is hard to see, usually Puiyaġniq; they are smooth and wet and usually the same color as the water

Nuyaġnaatu

Dangerous spots

Ataġluk:

Ice shelf under water; can be dangerous if it breaks, lifts and surfaces, or an outboard motor hits it and damages the propeller

Mapsa, mapsaq:

Overhanging snow cornice on the edge of shore-fast ice; very dangerous

Mizagluk:

Water on the ice, often covered by snow. A dangerous spot to step on.

Puilauq (puilaut):

Piece of ice that has broken off underwater from an ice floe or shore-fast ice and surfaced, can be dangerous if it hits a boat or outboard motor

Qanataruaq:

Shelf of ice on shore-fast ice or an ice floe hanging over the water, caused by erosion of the ice

Qanjuk:

Ice with overhanging shelf, dangerous to step on (HA)

Qaaptiniq:

Overflow on shore-fast ice or ice on a lagoon; water splashed on top of ice around a seal breathing hole

Qaupik:

Ice shove; pack ice or shore-fast ice that is pushed onto land by wind and current; cf. lvu - the term used in the North Slope dialect; can be very dangerous if it threatens people who are unaware it is happening

Sanantlaq:

Scatter consisting of slush and ice that is weakly connected to land-fast ice or large ice floes; a very dangerous place to be (HA)

Uuyuaq:

Young ice or pack ice that has frozen to the edge of the shore-fast ice and has extended it further out (WW). Scattered ice and slush newly frozen and cemented onto land-fast ice; subject to removal by current or wind action. A very dangerous type of ice to walk on (HA).

Uvingaksrami auktaaqman

Spring Break-Up, Melting Ice

Auksaanik (auksaanit):

Hole melted into or through shore-fast ice or floe ice

Aufhaanik (aufhaanit):

Fresh melt water on top of sea ice

Aunig (aungit):

“Rotten” ice, very unsafe, shore-fast ice or pack ice that is thin and has many melted holes in it

Saalguraq:

Thin fresh water ice on still waters. Also applies in spring conditions when melt water on sea ice freezes; the water is the finest that can be drunk by the hunter, and relieves the hunters of having to melt water (HA).

Other Terms

Ice-related phenomena

Inipkaq:

Mirage; ice, land or water loom above the horizon; pack ice appears as a white line along the horizon

Iziq:

“Smoke”; frost smoke over open water

Mitivik:

Ice crystals floating in the ocean or a fishing hole

Qissuk:

“Water sky”; reflection of open water on low clouds or frost smoke

Saġvaq:

Current; ocean current

Uqsruġaq:

Ice slick in an open lead or open water

*Animals and Ice***Allu (allut):**

Seal breathing hole in the shore ice

Analuaq (analuat):

Piece of floe ice that has walrus droppings on it

Anisaaq-:

Visible breath of whales or walrus; the breath of a whale visible from a long way away without the whale being visible; the sound of a whale breathing within pack ice

Attaaq-:

For a sea mammal, such as a bowhead whale or beluga whale, to swim underneath shore fast ice

lluqaq:

Seal’s maternal den; a den near a pressure ridge where a newborn seal resides until it is old enough to leave

Nakkaq-:

For a sea mammal to dive into water from shore-fast ice or pack ice

Nannum ilua:

Polar bear maternal den on shore-fast ice

Nunavait:

Herd of walrus hauled out on top of an ice floe

Puizri (puizrit):

Sea mammal, or seal, that surfaces in a lead or open water

Puiyaq-:

For a sea mammal or piece of ice to surface in a lead or open water

Qagi-:

For a sea mammal to climb onto shore-fast ice or pack ice

Qaksraq (qaksrat):

Seal sleeping on shore-fast ice or pack ice

*Moving and hunting on ice***Alluaq (alluat):**

Fishing hole chipped out on the shore fast ice or in cracks in new ice (siguliaq)

Atiqtaq (atiqtat):

Person or persons who drift away on the moving ice. In the Shishmaref dialect such person is called ayaktaq, or ayaktat (pl), two different terms with similar identifying meanings (HA).

Anjuun:

Paddle; can be used to listen for sea mammal vocalizations underwater

Ayaupiaq:

Slender pole with an ice testing tip on one end and a hook at the other end; it is dangerous to walk on questionable ice without an ayaupiaq.

Ayuugluk-:

To listen for seal, walrus, and whale calls underwater using a paddle with one end placed against an ear and the other end underwater.

Iqfaktuq: to jig for fish through a fishing hole or crack on shore-fast ice

Issuaq-: to look through a fishing hole made for spear fishing to the bottom of shallow water; to look underwater

Kagiaqtuq-: to go spear fishing on shore-fast ice

Mauqsruq-: to watch for seals or other sea mammals from the edge of shore- fast ice or pack ice

Mauqsruǵvik: place on shore-fast ice or pack ice from which to watch for seals or other sea mammals

Mitiñjun, mitiqmiun: screened ice scoop for removing ice crystals from a fishing hole

Naǵituaq: low place on shore-fast ice or an ice floe where a boat can be pulled up

Nalunaitkutaq: marker on trail; marker at the boat launch site on the shore-fast ice; also applies to trail markers on land (HA)

Pituqi (pituqit): ramp cut into the edge of shore-fast ice for launching boats

Pituqiugvik: boat launch site

Pituqiliuq-: to make a boat ramp on the edge of shore-fast ice

Tagluk (taglut): snowshoes made for walking on new ice (siguliaq)

Tutqiksri vik: place with a layer of snow on shore-fast ice, near a pressure ridge, where a boat and gear can be stored up side down, and the sides of the boat banked with snow to protect gear under the boat. The bow of the boat is anchored to a piece of ice.

Tuuq: long-handled ice chipping tool; to chip an ice fishing hole on shore-fast ice

Tumi (tumit): trail over shore-fast ice; cf. tumisaaq – a trail on land

Tuvli-: to cut or make a trail over shore-fast ice

Uqqutaq: windbreak wall built around a fishing hole; a windbreak wall built on shore-fast ice or pack ice



“Wales Village. The School house is the large building to the right; only the frame buildings show in the photograph, for the majority of the igloos [sod houses] were still buried in snow on June 1, [1922]” – Alfred Bailey’s caption (Bailey 1943, p.34). Original negative and photo BA21-132.

Illustrated List of Kinikmiut Sea Ice terms

Ugiaksrami qig'itman



Semi-frozen slush berm (qaimguq) is built along the shore of Wales on November 25, 2007, with light slush (qinuliaq) in the water. Towards the right are pieces of pancake ice (nutigaguugvik) that have been covered with slush.

Fall freeze-up



A slush berm (**qaimguq**) is forming along the shore on November 9, 2007, with slush ice (**qinu**) and small pieces of pancake ice (**nutigaguugvik**) moving with the current just off the slush berm.

Siguliaq



Raymond Seetook Sr.'s whaling crew off Wales, Alaska on April 25, 2007. Pack ice (**sigu**) seen on the horizon surrounded by the belt of young ice (**siguliaq**) that became thicker over night. The boat is moving through the newly formed ice (**siguliaksraq**) that was formed over night. In the boat, left to right: William Crisci, Abel Apatiki, Joseph Seetok (behind Abel), Raymond Seetook, Sr., Raymond Seetook, Jr., Andrew Seetook.

Young ice



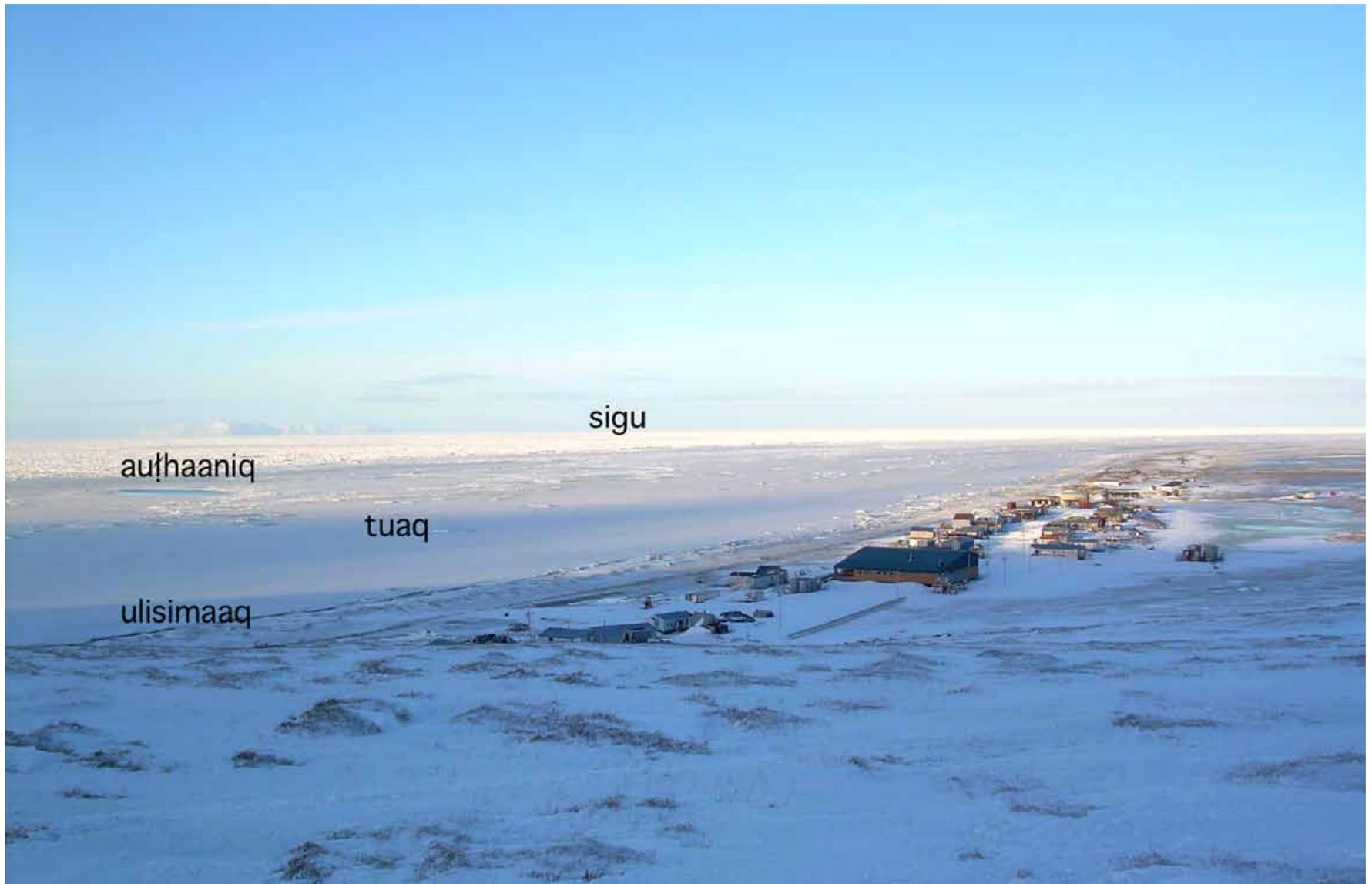
Snow covered beach in Wales on November 10, 2007. A small slush berm (**qaimġuq**) is being formed along the shore, with light slush ice (**qinuliaq**) seen in the water.

Tuaq



Frozen Bering Strait off Wales, Alaska on February 5, 2007. Land-fast ice, **tuaq**, with small pressure ridges, **iunilaurat**, and vast stretches of flat smooth ice, **tuaġikuq**. Snow-covered Little and Big Diomedede Island and East Cape, Chukotka, Russia (from left to right) are seen on the horizon.

Shore-fast ice



Land-fast ice, **tuuq**, has solidified off Wales, Alaska (February 4, 2007). **Ulisimaaq** – water seepage can be seen between land-fast ice and the beach through wind-driven tide cracks. The surface of the shore-fast ice is covered with wind-blown snow and small pressure ridges (**iunilaurat**), with patches of **auḷhaaniq** – fresh melt water on top of the ice. Consolidated pack ice, **sigu**, is now very close to the shore. Little Diomed Island is seen to the left.

Tuaq



The town of Wales, Alaska, in early April 2007. An open lead, **uiniq**, separates land-fast ice, **tuaq**, and a wide strip of floating pack ice, **sigu**, on the horizon. The lead is covered with patches of newly formed ice, **siguliaq**.

Shore-fast ice



The town of Wales, Alaska, in early April 2007. An open lead, **uiniq**, separates land-fast ice, **tuaq**, and a wide strip of floating pack ice, **sigu**, on the horizon. The lead is covered with patches of newly formed ice, **siguliaq**.

lungit



Pressure ridges (*lungit*) built on top of a large floe (*iluqnaupak*), with small ponds of melted water (*imaurat*) in between the ridges. April 2007.

Pressure ridges



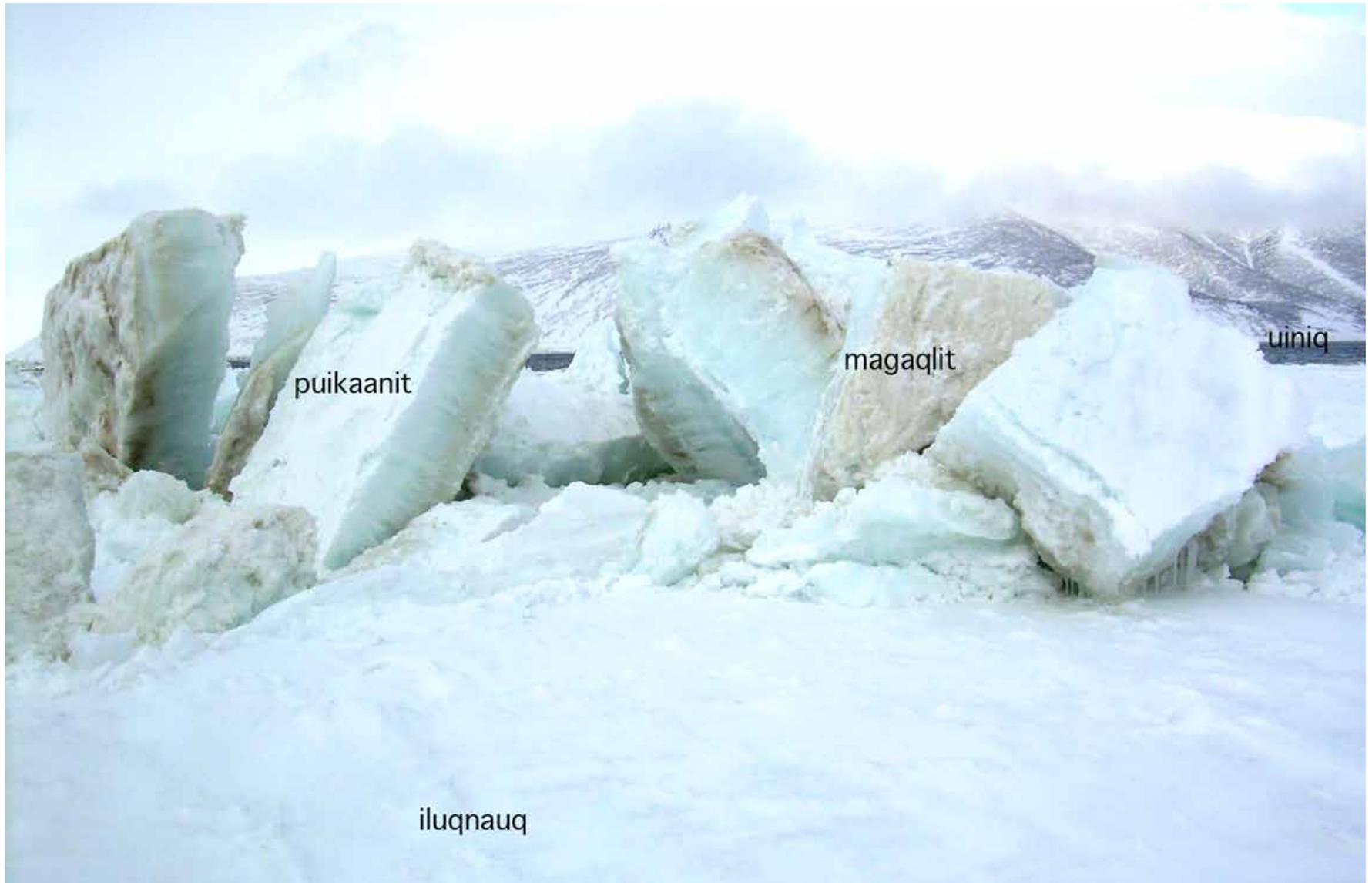
Winton Weyapuk, Jr., standing on top of a small pressure ridge (*iunilauaraq*) on the land-fast ice (*tuaq*), February 1, 2007. Dark strip in the sky (*uigum taggaa*) indicates presence of an open lead (*uiniq*) or young forming ice (*siguliaq*). Photo, Matt Druckenmiller.

lungit



Ice pressure ridges (*iungit*) formed on top of a very large ice floe (*iluqnaupak*), about two miles long and almost a mile wide. The ridges are built of blocks of rafted ice (*puikaanit*) with pieces of *magaqlit*, dirty ice covered with sand. April 14, 2007.

Pressure ridges



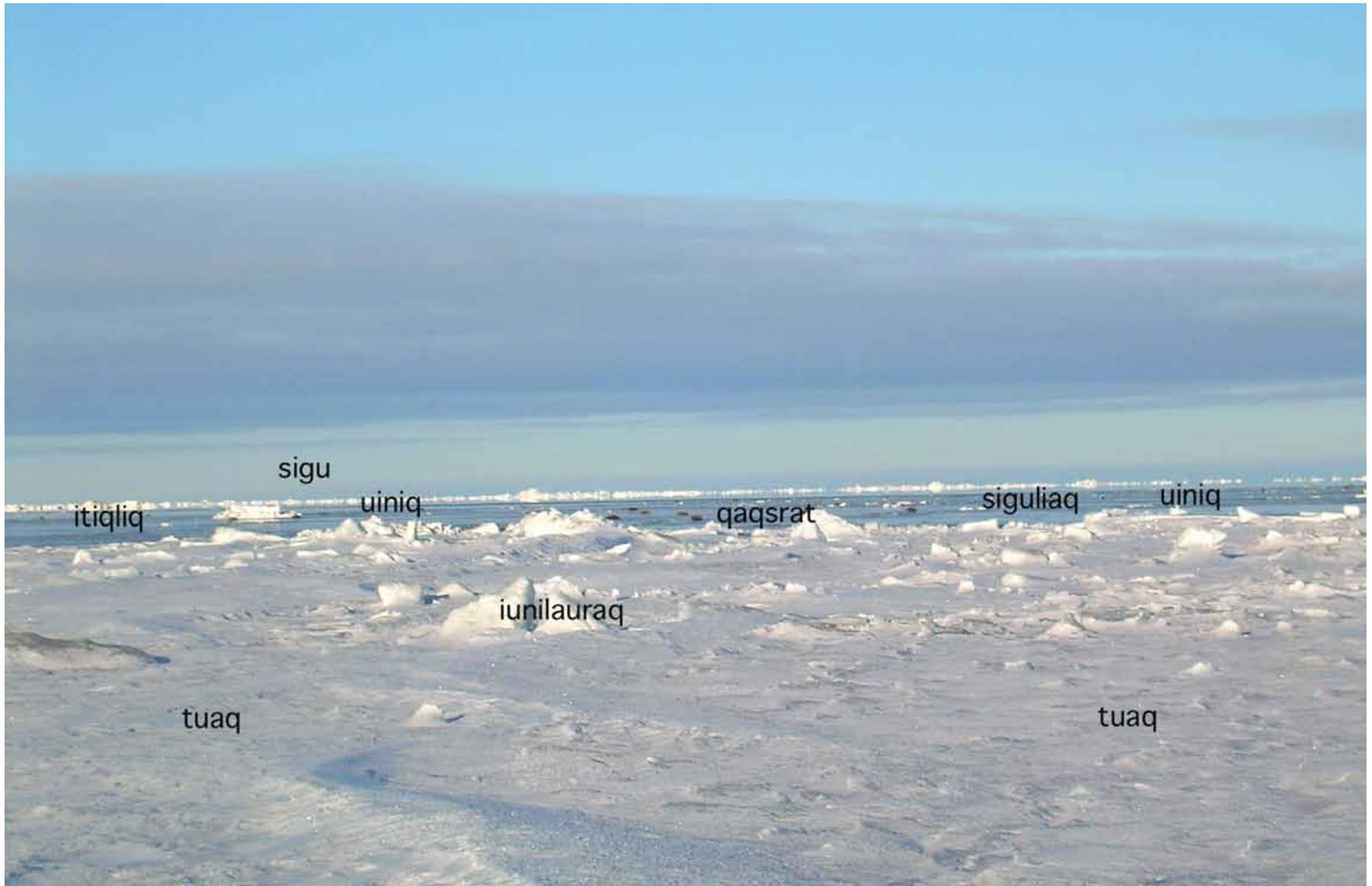
Pressure ridge (**iuniq**) on top of a large ice floe (**iluqnauq**), built of blocks of vertically rafted ice (**puikaanit**), some covered with sand (**magaqlit**, 'dirty ice'). The floe is separated from the shore-fast ice (**tuaq**) by a wide open lead, **uiniq**. April 2007.

Uingit



Large open lead (**uiniq**) between the land-fast ice (**tuaq**) and a large ice floe, **iluqnauqpak**, with cracks (**quppait**) and small pressure ridges (**iunig**). Luther Komonaseak, Archie Olanna, and Davis Ongtowsruk are standing next to Luther Komonaseak's whaling skiff, which is pulled onto the ice floe. The lead is covered with the patches of **siguliaq**, newly formed ice and small pieces of **sanafait**, floating 'dirty' ice. April 2007.

Open leads



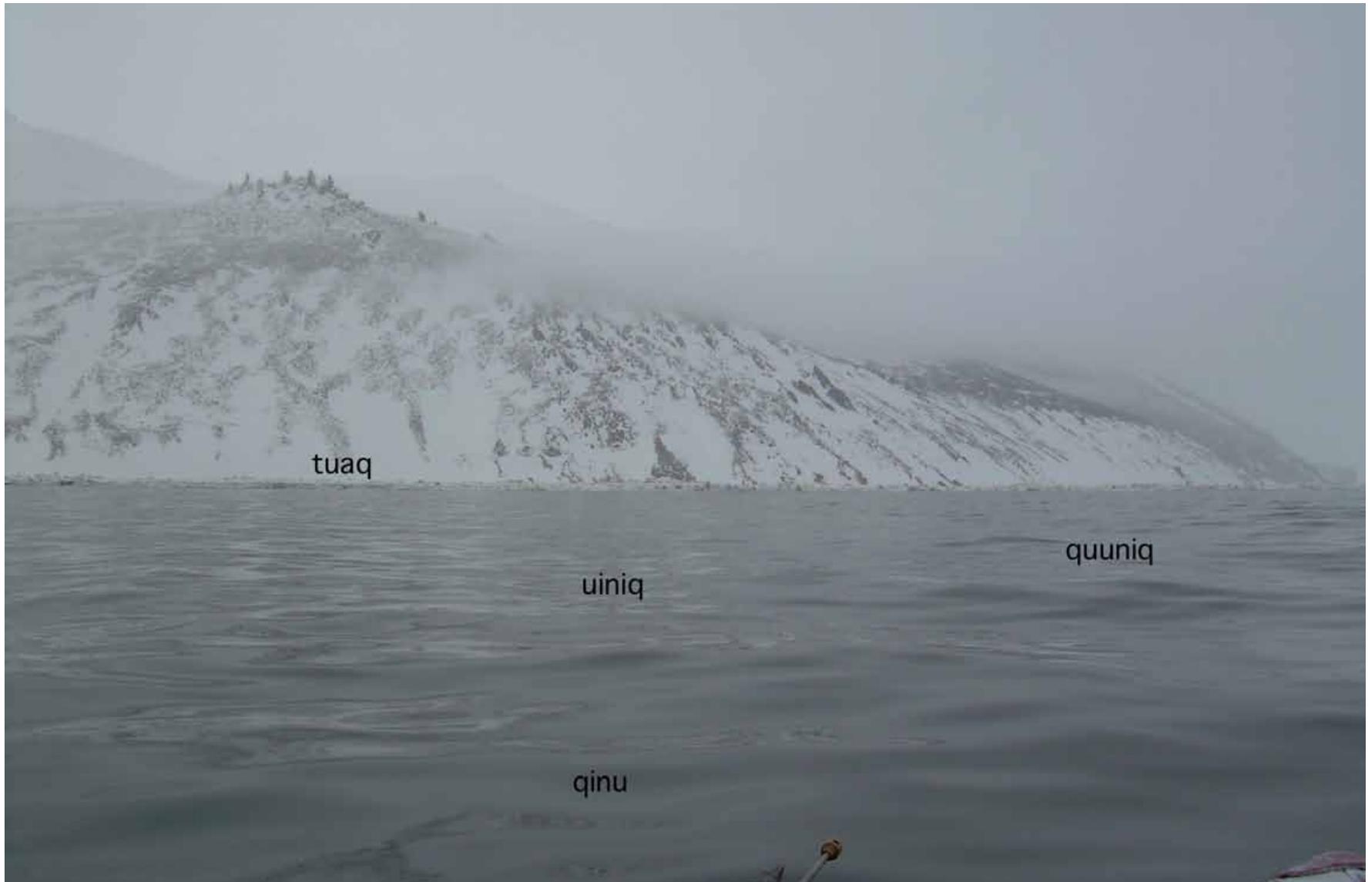
Open lead (**uiniq**) is formed between the land-fast ice (**tuaq**) and the pack ice (**sigu**) 8 miles north off Wales, Alaska, on February 9, 2007. The lead is covered with patches of **siguliaq**, newly formed ice. Dark spots seen on the newly formed ice (**siguliaq**) and along the edge of pack ice (**sigu**) are **niqsat**, ringed seals and **ugrut**, bearded seals; they are commonly called **qaksrat**, 'seals resting on land-fast or pack ice.' The surface of **tuaq** is covered with **iunilaurat**, very small pressure ridges and stretches of packed 'wavery' snow. A small bay, **itiqliq** in the body of the land-fast ice can be seen at the left edge of the picture; it is formed when a section of **tuaq** breaks off and is drifted away by the current. In the middle of the winter such small ice 'bays' are quickly covered with **siguliaq**, the newly formed ice.

Uingit



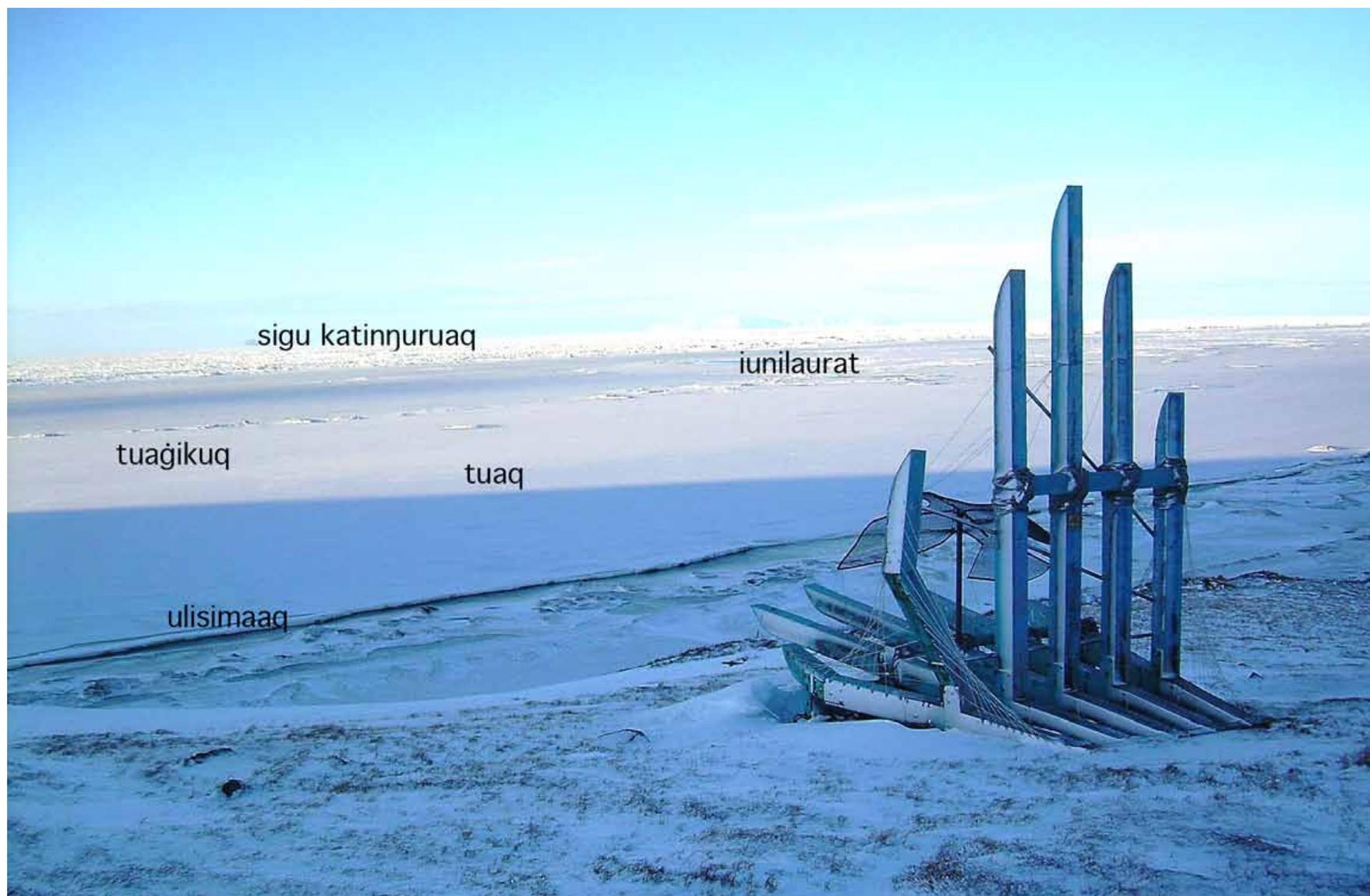
Wales, Alaska and Cape Mountain (April 14, 2007). Uiniq (open lead) and iluqnaupak (very large ice floe). Raymond Seetook Sr.'s whaling crew visible at the edge of the shore-fast ice facing the lead.

Open leads



Large open lead (**uiniq**) is formed off the shore of Wales on April 28, 2007. Calm flat water (**quunig**) is covered with patches of slush ice (**qinu**) formed from the snowfall. A narrow strip of land-fast ice (**tuaq**) can be seen along the shore.

Sigu



Tightly packed winter pack ice (**sigu katinjuruaq**) is pushed by the north wind toward the land-fast ice (**tuaq**) on February 4, 2007. The land-fast ice (**tuaq**) is smooth and flat (**tuaqikuq**), except for a few small pressure ridges (**iunilaurat**). Water seepage (**ulisimaaq**) between land-fast ice and beach from wind-driven tides can be seen as a dark line along the shore.

Pack ice



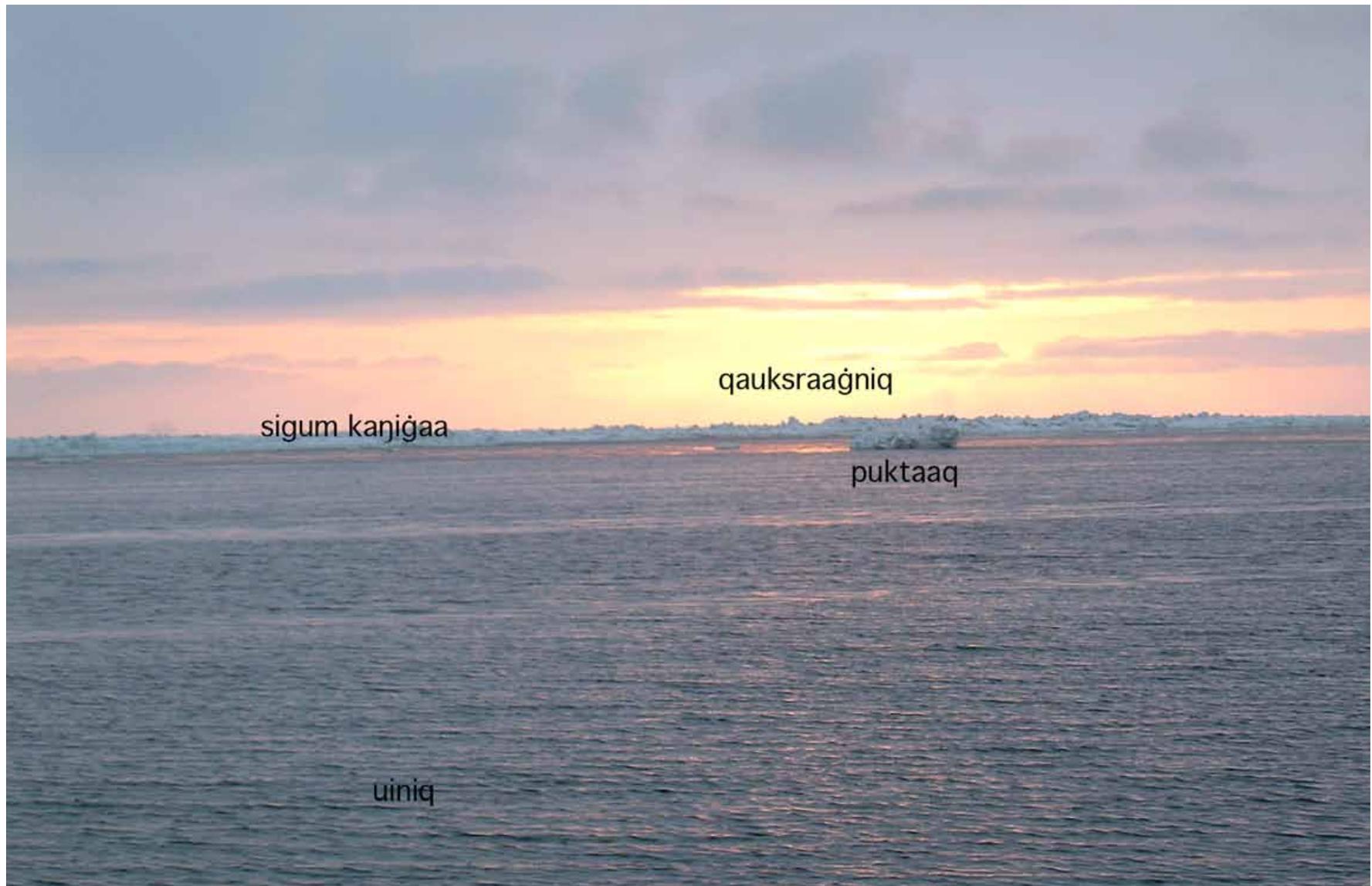
The edge of a floating strip of pack ice (**sigum kanigaa**) seen from across a wide open lead (**uiniq**) off Wales on April 14, 2007. The lead is covered with small pieces of floating ice (**puktaagruat**) and patches of newly formed ice, **siguliaq**, that can be dangerous, until it thickens.

Sigu



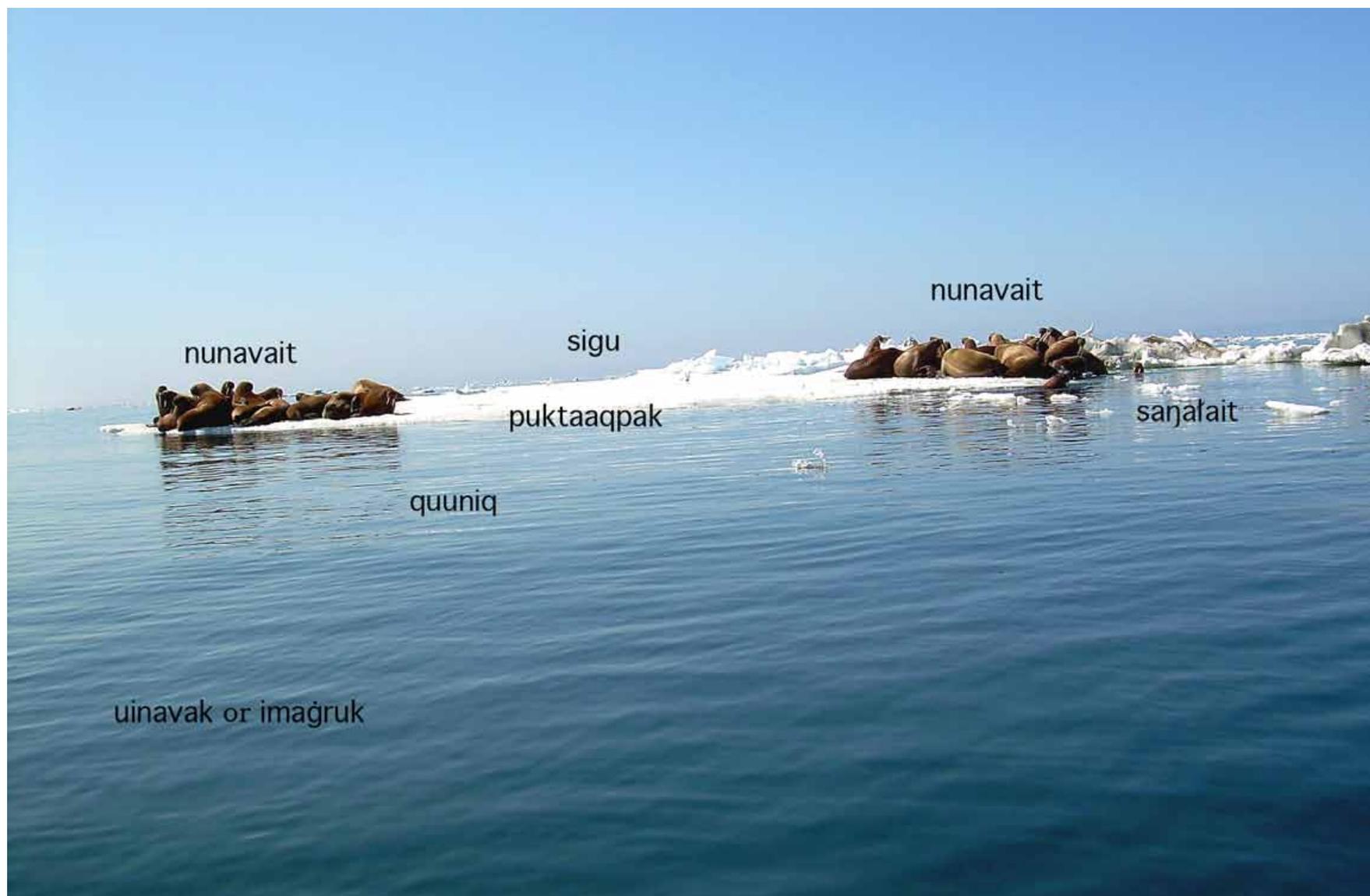
Female walrus and a calf (**isavgalik**) are resting on the ice (**nunavait**) in the midst of scattered pack ice, **tamalaaniqtuaq**, interspersed with patches of calm flat water (**quunig**). The mass of floating pack ice, **sigu**, consists of various types of ice, such as **puktaaq** – large floes, **puikaanit** – vertical blocks of ice, **quaniflaq** – ice floes with overhanging shelves, **taaglut** – large pieces of darker ice, and **sanafait** – small floating pieces of dirt ice. May 21, 2007.

Pack ice



The edge of the floating pack ice, **sigum kanigaa**, is seen on the horizon across a wide lead of open water, **uiniq**, with smaller chunks of floating ice, **puktaaq**. The white reflection on the clouds above the pack ice, **qauksraagniq**, is an indicator of a huge body of solid pack ice.

Puktaat



Groups of walrus (**nunavait**) are resting on a large floating ice floe (**puktaaqpak**) that makes a part of scattered pack ice (**sigu**) off Wales on May 22, 2007. The pack ice is separated from the shore by a large and wide open lead (**uinavak** or **imaḡruk**). Small pieces of “dirt” floating ice (**sanafait**) can be seen on calm water surface (**quuniq**)

Ice floes, floating ice



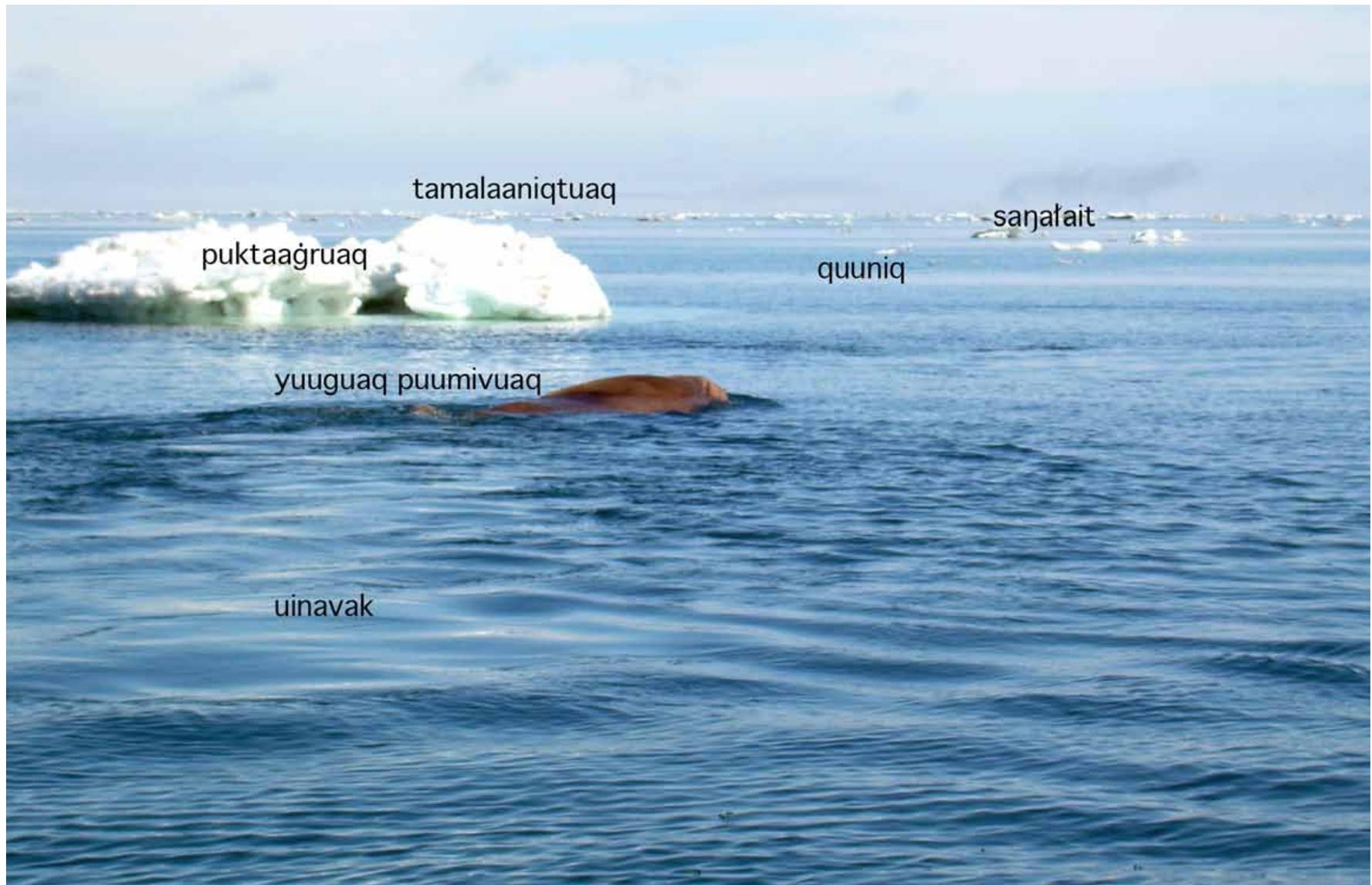
Large flat ice floe (iluqnaupak) off Wales on April 14, 2007. The floe is separated from the edge of pack ice (sigu) by a wide open lead (uiniq) covered with patches of slush ice (qinu) and young newly formed ice (siguliaq). Small pressure ridges (iungit) mark the edges of the ice floe, while its flat surface (tuaġikuq) is covered with snow and is crossed by numerous cracks (quppait).

Ilugnauqpat



Very large ice floe (*iluqnaupak*) off Wales on April 14, 2007. Pieces of flat surface (*tuwaignit*) are crossed by numerous cracks (*quppait*) and intermixed with sections of rough ice, pressure ridges (*iunġit*), and vertically lifted blocks of ice (*puikaanit*).

Ice floes



Small ice floe (*puktaagruaq*) in the middle of a large open lead (*uinavak*) off Wales on May 22, 2007. Scattered pack ice (*tamalaaniqtuaq*) and small pieces of “dirt” floating ice (*sanafait*) are seen on the horizon. Walrus is swimming (*yuuguaq puumivuaq*) in calm flat water (*quunig*) of the open lead.

Nuyagnaatuat



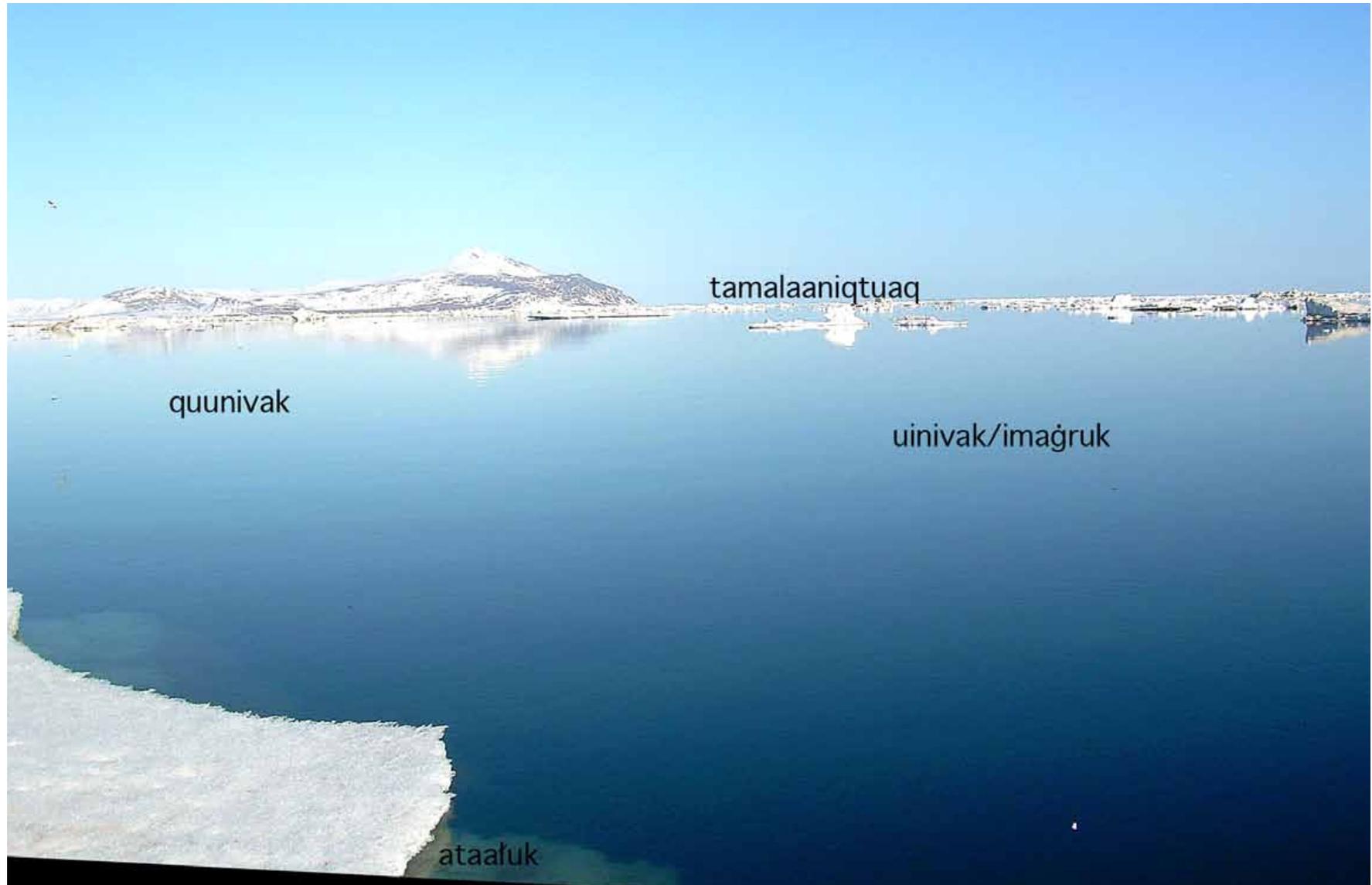
Thick slush ice (**nutigaaguugvik**) along the shore is moving southeast by wind driven current. Thick slush ice can be dangerous for hunters in a boat because it can impede or stop their progress when it becomes too thick.

Dangerous spots



Very large flat ice floe (*iluqnauqpak*) off Wales on April 14, 2007. The floe is separated from other drifting floes and the shore-fast ice by a series of open leads (*uiniq*), with patches of newly formed ice (*siguliaq*). The surface of the floe is crossed with numerous cracks (*quppaq*), through which the water is seeping from below (*mizakturuq*). Some of those wet places (*mizaglut*) are covered by snow, creating dangerous spots for the hunters.

Nuyagnaatuat



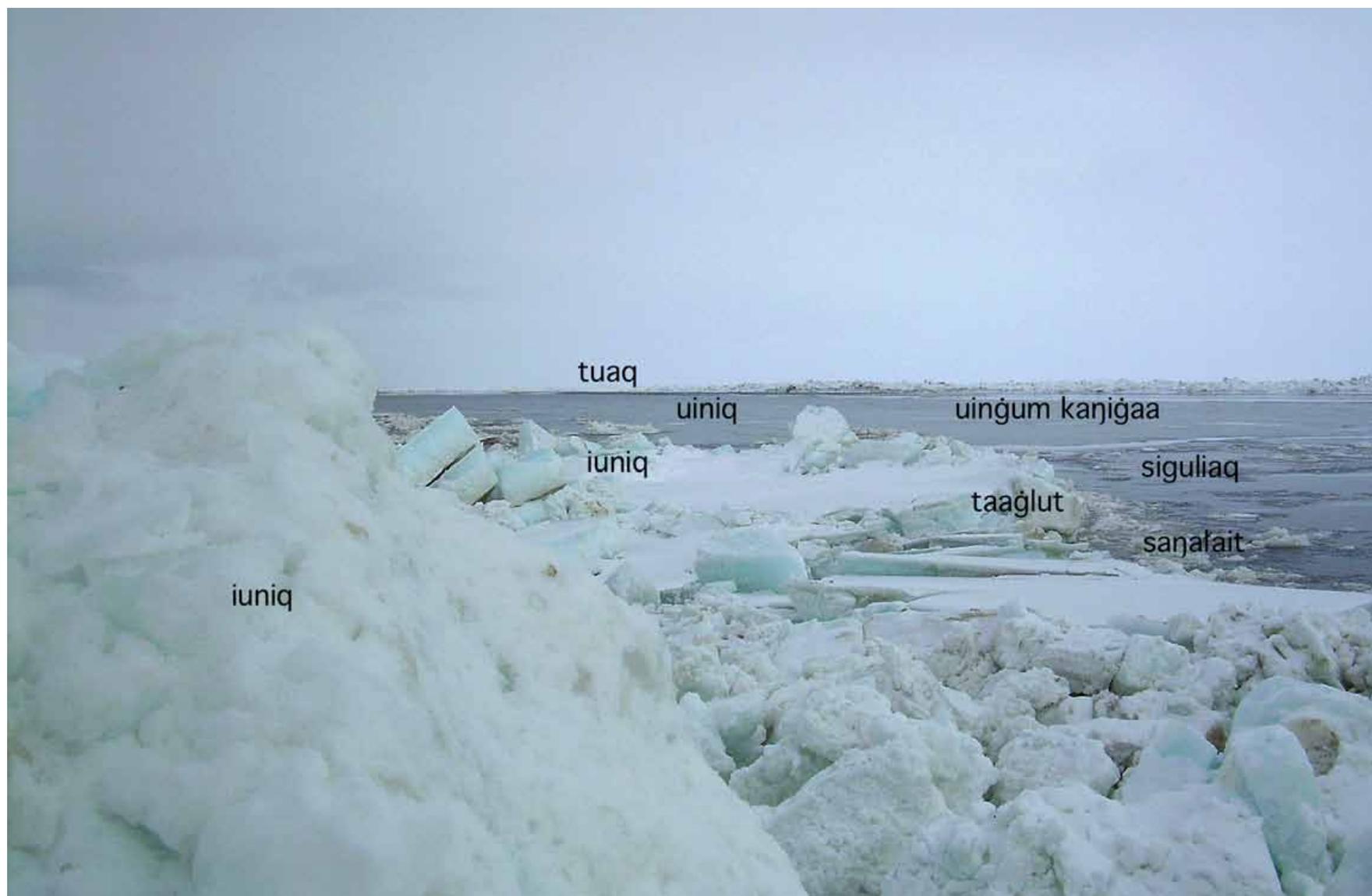
Ataaluk – ice shelf under water. It can be dangerous if it breaks, lifts, and surfaces or if an outboard motor hits it and damages the propeller. Such ice shelves are usually formed when the upper body of an ice floe above the water is eroded by melting and waves. Very large open lead, **uinavak** or **imaḡruk** with very calm, flat water surface, **quunivak**, separates the ice floe from the main body of scattered pack ice, **tamalaaniqtuag**.

Dangerous spots



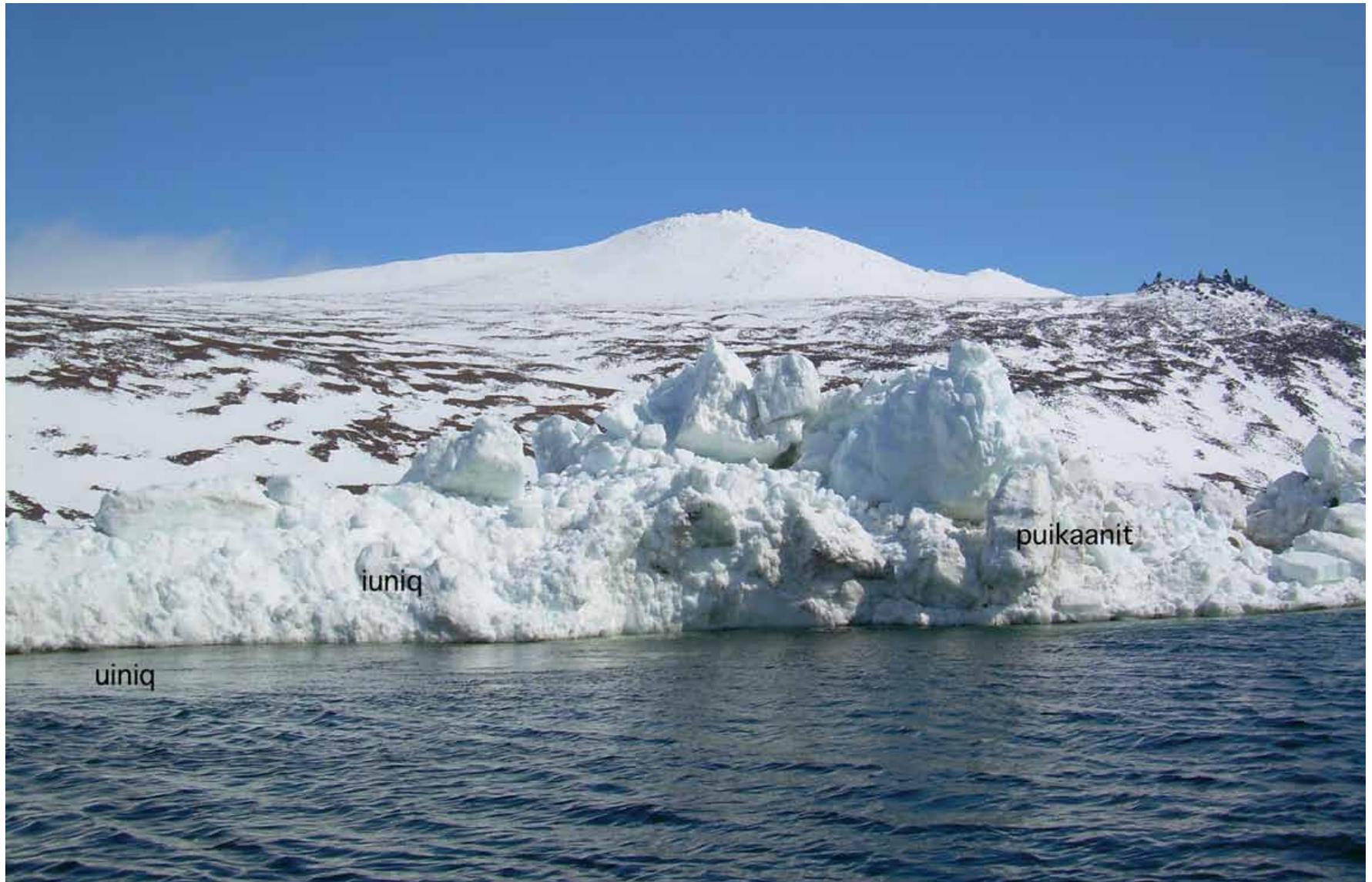
The edge of the land-fast ice, **tuam kanġaa**, facing an open lead, **uiniq**, on April 12, 2007. The edge is built of rafted ice ridges, **iunġit**, with the overhanging snow drift (**mapsaq**) on the edge. This overhanging snow drift may be dangerous for the hunters to step on, particularly later in the spring. Some of the ridges are of a very prominent size (**iunivak**). Chunks of **sanġait**, small pieces of 'dirt' ice, are floating in the lead among the patches of **qinu**, slush ice.

Uvingaksrami auktaaqman



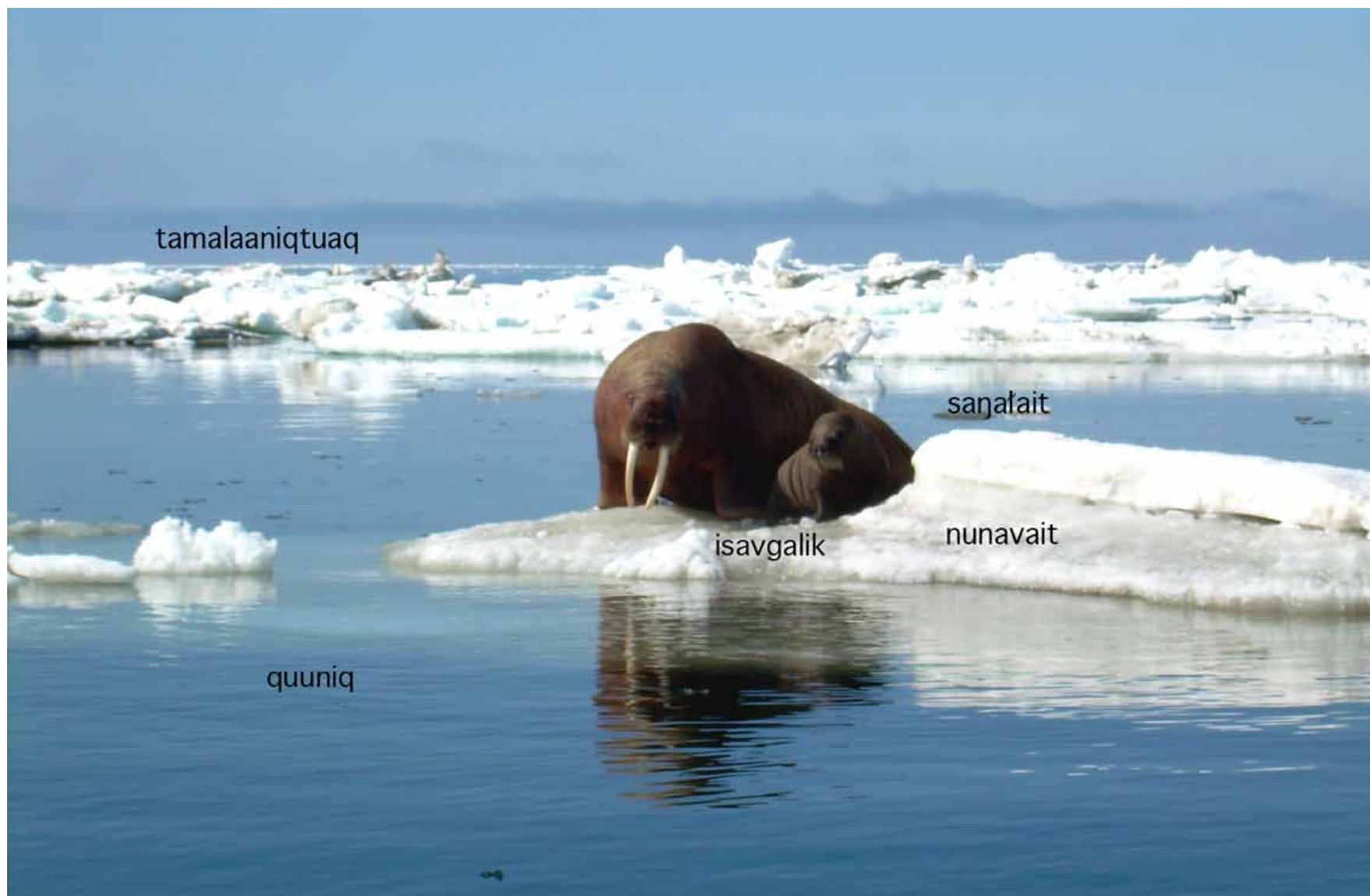
The edge of the shore-fast ice (**uingum kanigaa**) facing large open lead (**uiniq**) on April 14, 2007. Shore pressure ridge (**iuniq**) is made of vertical ice blocks and broken pieces of **taaglut**, dirty or dark-colored ice. The lead is covered with patches of the newly formed ice (**siguliaq**) and chunks of floating “dirt” ice (**sanafait**). The left and center portions of the distant edge of the lead are made of pack ice (**sigu**), whereas land-fast ice (**tuaq**) is to the right.

Spring break-up



Large open lead (uiniq) off Wales on May 9, 2007. Large pressure ridge (iuniq) remains along the edge of the land-fast ice built of large vertical pieces of ice blocks (puikaanit).

Uvingaksrami auktaaqman



Scattered spring floating ice, **tamalaaniqtuaq**, at midnight, May 22, 2007, off Wales, Alaska. A female walrus with a calf (**isavgalik**) rest on small ice floe (**nunavait**) surrounded by calm flat water (**quuniq**). This condition is typical during quiet warmer days of spring walrus hunting.

Spring break-up



Groups of walrus (**nunavait**) rest on pack floe ice (**puktaaq**) in a large wide open lead (**uinavaq** or **imaḡruk**) off Wales on May 22, 2007. The main front of drifting pack ice (**sigu**) is seen on the horizon. Some walrus are also swimming in the water (**pimiruat**). Note red blood spots on the central ice floe from the placenta of a female walrus that just gave birth to a calf.

Uvingaksrami auktaaqman



Gradual break-up of shore-fast ice (**tuaq**) in spring time. Pressure ridges (**iungit**) have melted and broken apart. Pieces of shore-fast ice have broken off (**tuwaḡnit**) and are moving north with the current in the open lead (**uiniq**) between the land-fast ice and drifting pack ice (**sigu**) that is seen on the horizon. Photo, Hajo Eicken, May 24, 2007.

Spring break-up



Shore-fast ice (**tuaq**) disintegrates, with the remaining broken pieces (**tuwaignit**) drifting away. Scattered pack ice (**tamalaaniqtuaq**) has been driven back close to the shore by northern wind on June 7, 2007, with some floes grounded in shallow water (**ikilituat**). The pack ice that has drifted north and then drifted back south by wind-driven current is called **atitiqtuaq**.

Sigu auktuaq



Final stage of spring break-up in Wales, May 30, 2007. A narrow section of land-fast ice (**tuaguruaq**) remains along the shore, with some pressure ridges (**iungit**) and large grounded pieces of ice (**kisannuruaq**) seen on the left. Most of the shore ice has been already broken off (**tuwaignit**) and drifted away and is separated by a stretch of calm flat water (**quunig**).

Melting ice



Last rotting ice of the year, June 8, 2007: Pieces of broken shore-fast ice (**tuwaiḡnit**) are being drifted away with the chunks of dirty or dark-colored pack ice with sand (**magaqlit**). A line of pack ice (**sigu**) can be seen on the horizon across a large stretch of open sea (**imaq**).

Other terms



Allut - seal breathing holes

Allu – seal breathing hole on the land-fast ice (**tuaq**) off Wales on February 8, 2007. The hole is surrounded by **siqpaaniq**, patches of frozen water that is splashed on top of the ice, when the seal surfaces to breath or to rest on the ice. **Tuaġiktuq** – smooth flat surface of the shore-fast ice is covered with small ridges of compacted snow eroded by wind that creates a bumpy ground. A small section of **ivu** - ice shove (ice pushed on shore over the rock) is seen in the upper right corner, where **tuaq** connects to the shore. Wales residents enjoy fishing for blue cod through the seal breathing holes on a quiet February day. The standing figure to the left is probably Lucy M. Kitchen.

Other terms

Alluat - ice-fishing holes



Reuben Ozenna and Lucy M. Kitchen fishing for blue cod (**kaluwaq**) on 18-inch thick land-fast ice (**tuaq**) off Wales, Alaska on February 8, 2007. The fishing holes (**alluat**) are chipped through the cracks (**quppait**) in the land-fast ice that are covered with **siguliaq**, newly formed ice, about 4" thick. The smooth dark surface of new ice is very different from the main body of **tuaq**, with its bumpy surface created by small ridges of densely packed snow.



“Natives dragging bearded seals” (Wales hunters dragging a bearded seal killed among drifting ice floes, May 1922). BA21-395G.

“It looks very typical for those past years, even this year. Although, right now [late May] the ice is starting to rot and it melted a little bit. This year not much, but the pack ice we’ve been seeing going by, it’s quite a bit of melting and rotting. In this picture there is a lot of frozen, still really white snow, that hasn’t started melting. It looks pretty solid like, maybe, winter shore ice here. It’s hard to say when or where the hunters are. This could be a part of the shore ice here, the edge of the shore ice. It’s pretty low with no ridges on it. There are some really low spots now. The edges have started coming off. [...] Some of the hunters do have the waterproof mukluks, these black ones. The way they prepare the skins is, I forget how they do it, but they turn out looking black, and they’re one of the waterproof type.” (Winton Weyapuk, Jr., May 2007)

Alfred Bailey in Wales, Spring 1922

Igor Krupnik

On April 6, 1922, a young biologist from the Colorado Museum of Natural History in Denver, Colorado, named Alfred Marshall Bailey arrived in Wales. At that time, people came to Wales either by boat in summer or by dogsled in winter. Bailey (1894–1978), who was then 28 years old, and his Inupiat companions reached Wales at the end of an 800-mile dogsled journey from Wainwright in Northwestern Alaska to Bering Strait. The route took them all the way through Cape Lisburne, Point Hope, Kotzebue, Cape Espenberg, and Shishmaref. Bailey was to stay in Wales for the next four months; that visit produced a legacy that extended far beyond Bailey's professional interests as an arctic biologist and is surprisingly relevant to today's study of Arctic climate change.

Wales was the last stop on Bailey's three-year fieldwork in Alaska that brought him first to southeastern Alaska in 1919–1920 and, later, in 1921–1922 to Bering Strait, Siberia, Barrow, Wainwright, and, finally, to Wales (Bailey 1933, 1943, 1971). Bailey was then curator of birds and mammals at the Colorado Museum; his second Alaskan mission of 1921–1922 was aimed at securing Arctic bird and mammal specimens for museum collections and exhibits. The most ambitious target of Bailey's second Alaskan voyage was to bring skins and skulls of the largest Alaskan mammals—walruses, polar bears, caribou, and seals—to Denver, so that they could be transformed into stuffed animals for future life-groups or 'diora-

mas,' displays of stuffed animals in their recreated 'live' setting, to be built at the museum.

For that task, Bailey and his companion, Russell W. Hendee, picked two North Alaskan communities, Wainwright and Wales, as their prime 'base' sites. In summer 1921, Bailey and Hendee traveled on the U.S. Coast Guard Cutter *Bear* from Nome to Provideniya Bay, Siberia and then all the way to Barrow. On that route, they collected birds and mammals, surveyed the coast, took numerous photographs, built connections in local communities, and stocked their supplies in Wainwright and Wales. They wintered together in Wainwright and in early March, as the days grew longer, Bailey made the last 800-mile leg of his Alaskan journey by dogsled to Wales. There, he joined Wales boat crews during the spring hunting season in his pursuit for walrus, seal, and bird specimens for his growing museum collections.

For the next two months, from early May till late June 1922, Bailey went out hunting with the Wales crews, until the season was over. At the end, Wales hunters were successful in catching enough walruses and seals to support their families for the year and Bailey secured the specimens he needed for the animal life-groups (dioramas) to build in his museum. During these days, Bailey kept a detailed diary. In addition, he took almost 120 black-and-white photographs of Wales hunters on ice and in boats, of people in the village, and of birds and the scenery around Wales.

Upon his return from Alaska, Bailey enjoyed a long and distinguished career as a curator and museum biologist. He eventually served for 33 years as Director of the Denver Museum of Natural History from 1936–1969. Bailey’s Alaskan diaries and photographs are now kept at the museum in Denver (today named ‘The Denver Museum of Nature and Science’) in what is officially called the ‘Bailey Library and Archive.’ Most of Bailey’s Alaskan photographs have been digitized and some 370 images can be accessed online on the Museum’s public website at <http://www.bcr.org/cdp/search.html>, including over 100 pictures from Wales, about 160 from Wainwright, 34 from Siberia, 26 from Barrow, 17 from St. Lawrence Island, and about 60 from other places in the region (Nome, King Island, Point Hope, Icy Cape, etc.). Over the years, Bailey used his Alaskan photographs as illustrations to his many publications, including his book, “The Birds of Cape of Prince of Wales, Alaska” (1943) that features about 30 photos from 1922. Some of Bailey’s pictures were published in other Arctic collections and catalogs; nonetheless, they remained mostly unknown and unavailable to the people of Wales.

In summer 2005, I visited the Denver Museum of Nature and Science and surveyed Bailey’s photographs and diaries in the museum archives. The dioramas with stuffed walruses, birds, and seals that Bailey once brought from Alaska were still on display. Following an agreement with the then-photo archivist Elizabeth (Liz) Clancy, curator of the Bailey photo collection, the museum kindly agreed to share copies of Bailey’s photographs from 1922 with the community of Wales for heritage research and education. Prints of some 30 of Bailey’s photographs from Wales and a few spare copies of “The Birds of Cape Prince of Wales” (1943) were sent to the community. Herbert Anungazuk and Winton Weyapuk,

Jr. kindly agreed to work with Bailey’s photographs and to show them to Wales Elders for their insight and personal stories. Matt Druckenmiller and Hajo Eicken continued that work on their visit to Wales in May 2007. Altogether, six experts from Wales—Herbert Anungazuk, Winton Weyapuk, Jr., Pete and Lena Sereadlook, Raymond Seetook Sr., and Faye Ongtawasruk—contributed their remarks about Bailey’s photographs. That helped expand Bailey’s original short captions and contributed a valuable new knowledge. We hope that these new narratives will soon become available to the people of Wales, with the full set of the old black-and-white photographs from 1922.

For this book we have selected 11 photographs that feature sea ice conditions and subsistence hunting activities in Wales in spring 1922. All of the photographs we selected were dated, either by the specific dates or at least by month. Many of Bailey’s dates on the photographs came as a surprise to today’s experts, as subsistence activities featured by Bailey often take place a few weeks, if not a full month later than in recent years. To illustrate the scope of change—environmental and cultural alike—we placed Bailey’s photos of 1922 next to today’s pictures of the more or less similar settings. All of the modern pictures were taken by Winton Weyapuk, Jr., in spring 2007; he also wrote short captions to both Bailey’s and his own photographs. Some pictures illustrate dramatic shifts in ice and weather conditions from Bailey’s time to our days. An image of the village of Wales taken on June 1, 1922, shows all of the houses covered in deep snow, with an unbroken expanse of shore-fast ice and no open water on the horizon (“The Birds of Cape Prince of Wales,” p.34). Winton’s response to another of Bailey’s photo featuring Wales hunters butchering walrus on the floating ice (see p. 98) was quite illuminating: “This is late June?! Wow!

That is pretty late still to have pack ice compared to now. By late June in recent years there's been no ice at all to speak of."

Bailey's photographs, books, and diaries offer other invaluable information to document the scope of today's climate change. A trained naturalist, Bailey duly recorded the timing of the spring arrival of Arctic birds and mammals, as well as the dates of nesting for many bird species. His dates of 1922 can be compared with the present-day timing of similar events. Though Bailey did not record air temperature, he made numerous references to the wind direction, status of sea ice, ocean currents, and overall weather conditions on his numerous hunting trips. Again, these records can often be supported and interpreted using his photographs taken on the very same day. Thanks to this combination of various sources, Bailey's records from Wales offer a rare chance to document the scope of change or, at least, to follow the seasonal transition from winter to spring to summer in the Bering Strait some 85 years ago.

In many aspects, Bailey was a true pioneer. He was the first scientist to hunt with the Alaskan subsistence hunters in their skin boats (though some whalers and local traders did it before him). He carefully documented his hunting trips and he took numerous photographs of hunters on sea ice and in skin boats, something that earlier visitors never did before. His diary from Wales is the first source of information on village activities during the spring season on a day-to-day basis. Lastly, Wales hunters were obviously amused by Bailey's plan to get stuffed walrus for the museum display, but they welcomed him into their boat crews as a trusted member, good rifle shooter, and a nice companion. In his Wales diary, Bailey recorded a list of the crew members he hunted with (p.105): Paul Kaingnisina, Arthur Nagozaruk (Naguzruk), Mazon-

na, Charlie Kayoumew (Charles Kiomea Oxereok), Carl Keemeook (Carl Kemasuk Oxereok), Oksooyak (John Oxereok), Peter Ibayana (Ibionna), Johnnie Omaleena (Omedelina), Dwight Tavok (Tevuk), and Winton Weyabook (Winton Weyapuk, Sr.). Many of today's descendants will be pleased to see the names of their fathers and grandfathers recorded by the visiting biologist.

Working with Bailey's photographs and listening to today's experts was a rewarding experience. We are grateful to all people who participated in this work; to Liz Clancy, René Payne (who is today's curator of the Bailey collection), and to the Denver Museum of Nature and Science for allowing us to use Bailey's pictures in the *SIKU* project. We believe that today's Kinikmiut in Wales and their families elsewhere in Alaska will be pleased to see the images of their home community of some 85 years ago. Bailey's photographs show the ways people hunted in those days, how they were dressed, the type of boats and equipment they used, and the animals they killed at a particular time of the year. These old pictures, together with today's images and Elders' stories, may now become new community heritage resource. They are also a part of the legacy of International Polar Year 2007–2008 and of our joint effort to document Arctic climate change.



“Wales hunters with killed ringed and bearded seals and their skin-boat hauled on the land-fast ice, May 23, 1922.” BA-21-021

There are at least twelve crew men here shown with their boat. They have killed four bearded seals and a few ringed seals, not a small catch. They apparently have landed their boat on the ice, close to a launching ramp (pituqi), off to the left, very much like we do it today. The pressure ridges (iunġit) near the edge of the shore-fast ice are in the background. The “water sky” (qissuk) of the lead they hunted in can be seen in the low overcast; evidently, there is wide open water beyond the ice edge. Temperatures are cold on that day in late May as the men are warmly dressed and the ice is solid. They have a large skin boat (umiaq) which can accommodate a big crew of ten or even twelve” (Winton Weyapuk, Jr., May 2007).



Luther Komonaseak's (Wales, Alaska) whaling crew getting ready to hunt with its today's equipment (April 2007). The boat has been pulled by snowmobiles onto the shore-fast ice (tuaq) covered with drifted snow (piqtuq) over small pressure ridges (iungit). Cape Mountain is seen in the background. Left to right: Davis Ongtowasruk, Anson Roy Komonaseak, Sean Komonaseak, Archie Olanna, Sr.



Wales hunters on snow-shoes hunt for ringed seals along the edge of the shore ice in the early spring (May 1922). BA-21-772.

“It says ‘Early May’ – must have been cold at that time. They’re dressed pretty warm. The snow on these blocks of ice hasn’t even started melting. There is an Inupiaq term associated with those types of blocks of ice, but I can’t remember it. The elders used to say there are different terms for multi-year ice, thick ice, or thin ice, first year ice. I do remember they used to talk about that.

The hunters used to go on snowshoes in those days, especially when there was new ice or young ice thick enough to walk on. That’s why they have the ice picks, because they are traveling on thin ice. They usually have a narrow pointed tip that can poke a hole through young ice, so that they can gauge how thick it is. By pushing on it you can tell whether it can support your weight. They used to have an ivory tip a long time ago, but they started putting metal tips when they got metal. Some people used to say that the ivory tips were better because you get a better feel, somehow it makes you feel it through to your hand. With the metal point, maybe because it’s too solid, it doesn’t have that feeling...but somehow they say that with the ivory tip it transmits that to your hand” (Winton Weyapuk, Jr., May 2007)



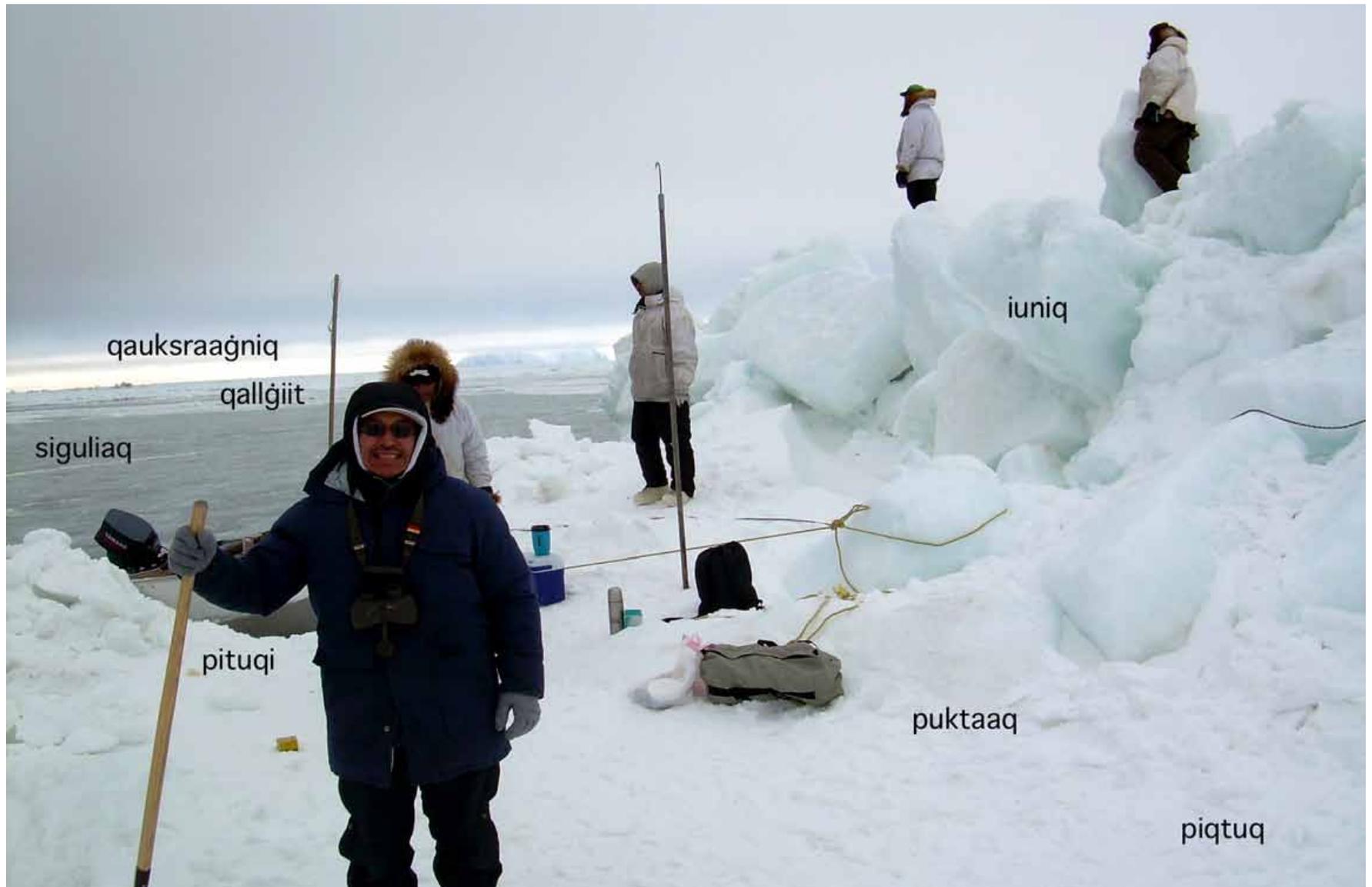
On April 14, 2007, Wales hunters are watching for bowhead whale from a top of ice pressure ridge (iuniq) located on a very large ice floe (iluqnaupaq). The ridge is built of rafted pieces of qagituk (layered ice) and puikaanit (vertical blocks of ice). Left to right: Archie Olanna, Sr., Luther C. Komonaseak, Sean C. Komonaseak, and Davis Ongtowsruk.



“The flaw and hunters” (Wales hunters and visiting families camp at the edge of shore-fast ice. Spring 1922). BA-21-449A

“This is what it looks like in April these days. Still pretty frozen solid ice edge there. The edge is all frozen. These extensions don’t form unless the temperature is below freezing. It’s called uuyuaq – ‘extension’; another term is ‘uniq,’ pressure ridge. That’s about it.

These guys on ice are probably doing a little bit of everything. They had equipment for hunting bowheads and shot whatever they saw, like bearded seals or seals. I thought maybe in the past they were more opportunistic, they would get whatever was available. Nowadays, we’re a little more selective. They also have something like a really small tent. People don’t do that anymore – camping out on the shore ice. Last time was maybe in the early 1980’s. One of the whaling crews was camping out there for a couple nights” (Winton Weyapuk, Jr., May 2007)



In a similar way 85 years later, Luther Komonaseak's whaling crew watches for bowhead whales from a large ice floe (puktaaq) with ice pressure ridges (iunig) on April 25, 2007. Two Diomed Islands can be seen on the horizon, across the body of open water, with the newly formed ice (siguliaq) and floating double and triple-layered young ice (qallgiit). To the left, a white reflection over water (qauksraagniq) indicates the presence of pack ice. Next to the boat is a ramp (pituqi) cut in the body of the ice floe to pull up the boat. Left to right: Terry Komonaseak, Luther Komonaseak, Anson Roy Komonaseak, Archie Olanna, Sr., and Davis Ongtawasruk.



“Natives hunting eiders. May 5, 1922” (IV BA 21-360A)

“This photo is reversed. I mean the image is reversed. It should be pointing that way. May 5th is pretty close for hunting eiders to what we have these days. Nowadays we start, maybe, on the last week of April. We hunt them through May too. But most of them migrate past in April, the last two weeks in April. They used to use a boat to hunt birds, just moving the boat back and forth whenever we see a big flock of eiders coming. We just point the boat toward them and shoot when they fly over. The kayaks were used mainly for hunting seals. But they stopped using them long ago. The last one here was maybe in the mid 1960’s, mid-to-late 1960’s” (Winton Weyapuk, Jr., May 2007).

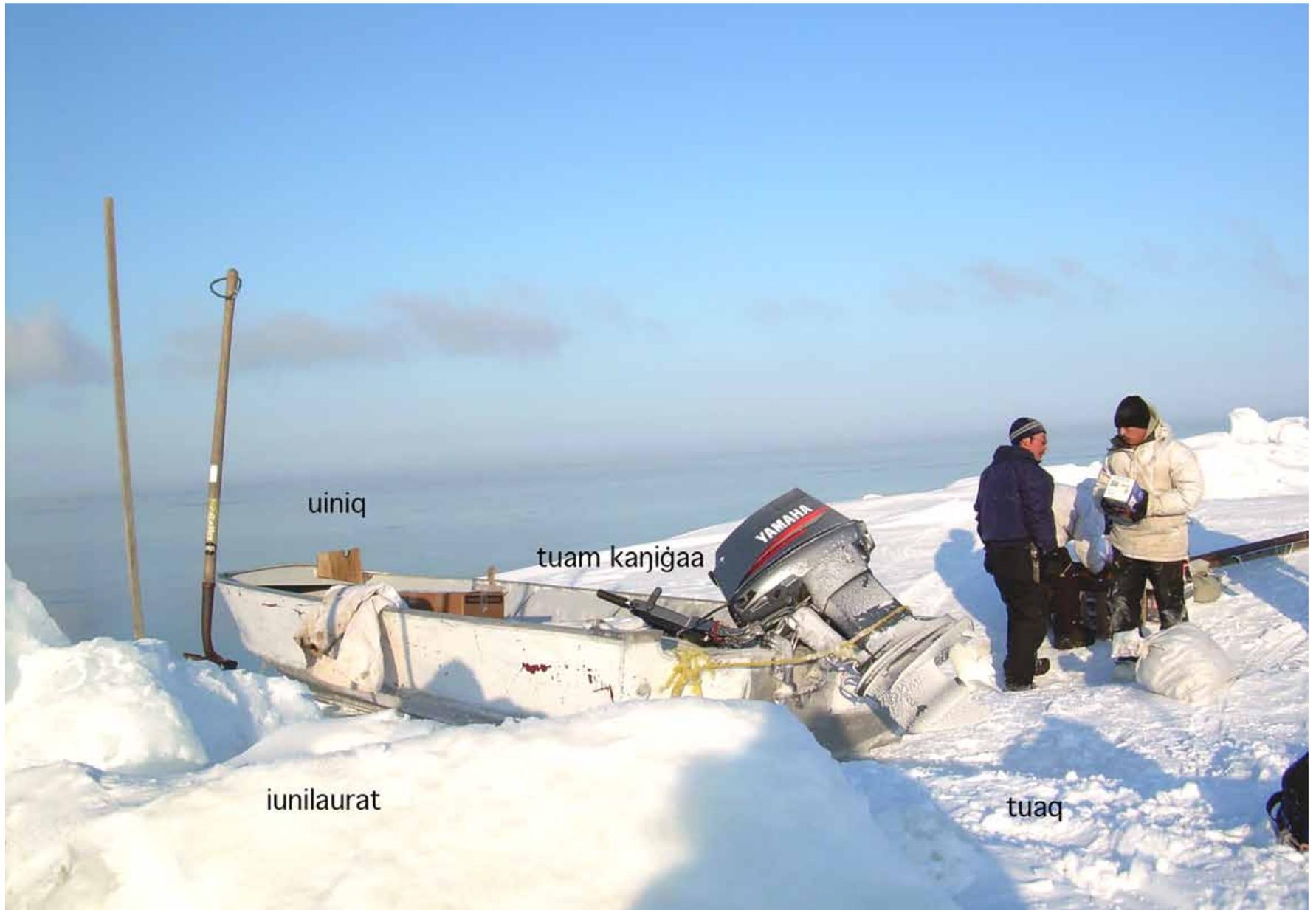


This is how our hunting mostly looks these days in the months of April and May, with a lot of open water and wide leads. Here, Luther Komonaseak whaling crew has pulled its boat up on an extension of the shore-fast ice (uuyuaq) eight miles north of Wales on April 12, 2007. Left to right: Anson Roy Komonaseak, Archie Olanna, Sr., Sean C. Komonaseak, and Luther C. Komonaseak.



“Group of men standing by umiak” - BA 21-750

This picture doesn't have a date; it's probably April or early May. And it looks like a really big ridge, ice pressure ridge. That's a person standing [in the far right] – you can see the size of the ice blocks there, really thick solid chunks of ice. We don't see too much of that solid ice anymore, real thick, three, four feet, even five feet thick. It used to get pretty thick, like in February. We'd be cutting holes through the ice for flounder fishing. We'd have to cut through four feet of ice, sometimes, maybe, even a little thicker. In recent years, below two feet is the thickest” (Winton Weyapuk, Jr., May 2007).



On April 12, 2007, Wales hunters Sean Komonaseak and Roy Komonaseak prepare their boat for bowhead whale hunting from the edge of the shore-fast ice (tuam kanigaa). The tuaq is covered with small pressure ridges (iunilaurat). The open lead (uiniq) between land-fast ice (tuaq) and pack ice (sigu) is covered with water that is quuniq (very calm and flat).



Wales hunting crew with its large whaling skin-boat (umiaq) at the edge of the shore-fast ice on June 16, 1922. BA-21-327

“June 16th – that’s a lot of ice for these days. Also little bit of brash ice in the lead. I wonder if that lead got temporarily closed? They have a big skin boat here. Some of the other crew members must’ve went somewhere else. ...Three, four, five, six, seven, eight. Eight men would probably be too few, almost too few to handle this big skin boat here. It almost looks unusually large. I wonder if that’s my uncle’s skin boat. I had an uncle named Archie Nagozruk. He was a schoolteacher here in Wales and he had a really big skin boat too. Almost thirty-six feet long. A real big one! He had a big crew too. For average big skins boats, the average size was probably thirty feet, a little over” (Winton Weyapuk, Jr., May 2007).



Wales hunters Sean Komonaseak and Davis Ongtawasruk, beside Luther Komonaseak's whaling skiff, now ready for hunting from the edge of the land-fast ice (tuam kanigaa) on April 12, 2007. The boat can be quickly launched into the open lead, when other crew members spot a whale from the top of the nearby pressure ridges (iungjit)



“Umiak, men and oogrook on a floe, June 1922” (Wales hunters butchering two killed bearded seals on a drifting floe) - BA 21-597.

“Compared to now, that looks like about a month late in conditions and activities. These guys have water-proof covers on, probably to protect from sea spray. The ice surface still looks like it’s covered in snow. I’m trying to see whether they have a darting gun in the boat or...just looks like a regular seal harpoon. The darting guns would only be used for whale hunting; so, perhaps these guys were also prepared to hunt whales” (Winton Weyapuk, Jr., May 2007).



Luther Komonaseak's crew resting on a very large ice floe (iluqnauqpak), off Wales, April 14, 2007. Thin layer of slush ice (qinu) is seen on the surface of open lead (uiniq) between the pack ice floe and pack ice (sigu) on the horizon. The edge of the ice floe (iluqnauqpak) is surrounded by the newly formed ice (siguliaq); it usually provides solid but unsafe footing at the edge of floating or land-fast ice.



“Walrus hunting off the Diomedes. The native has a harpoon attached to the walrus low in the water. Winter conditions still prevailed on June 3, 1922” (BA 21-451)

“It’s pretty flat ice, I mean, low ice. No ridges. It must have been really started warming up. All the ice gets undercut. They are hunting on this side of Little Diomedede. There’s that valley over there, huh? They must have been three, two or three miles from Diomedede on [our] side. You can see this valley right through this window. Last week Ray Seetook and his crew were quite a way past Diomedede to the North.

My Dad used to tell me stories of them going to the Siberian side to hunt walrus before the Cold War really started. When there was nothing here, there was always something over on the other side. They used to travel far. Current doesn’t really matter as long as the wind isn’t too strong and the waves are not very big. Probably, winds of fifteen knots or less. When we got a bearded seal or walrus, Elders used to tell us to cut it up quickly and load the boat and be ready to move, head home, because if you take your time trying to butcher a walrus the current will carry you four or five miles in the water in an hour” (Winton Weyapuk, Jr., May 2007).



Eighty-five years later, Pete Sereadlook's hunting crew chases walrus on open water (imaḡruk) in a large open lead off Wales on May 22, 2007. The water is mostly free of ice, except for a few small chunks of floating pack ice (siguuraq).



“Wales hunters asleep on the umiak on drifting ice” (June 1922). BA21-051

“This skin boat (umiak) has become trapped within the tightly packed multi-year ice (qamaiyaq) “Heavy” or multi-year ice is fairly uncommon in recent years. We mostly see first-year ice or new ice these days. On this picture, layered multi-year ice (inipkaq) can be seen to the left of the ice-testing shaft or seal hook (ayaupiaq) that is stuck in the ice between the two seals” (Winton Weyapuk, Jr., May 2007).



These days hunters hardly encounter any dense pack ice during spring hunt past late May. Luther C. Komonaseak's hunting crew approaches a bearded seal (*ugruk*) resting on a small ice floe (*qaksraq*) within scattered pack ice (*tamalaaniqtuaq*) on May 22, 2007. More tight pack ice (*qamiyanaqtuaq*) can be seen past the floe with bearded. In the boat, Kenneth Anungazuk is on the left and Sean C. Komonaseak is on the right.



“Skinning walrus on ice. Late June 1922” (IV BA 21-591)

“This is late June?! Wow! That is pretty late still to have pack ice compared to now. By late June in recent years there’s been no ice at all to speak of. That looks like the way it was yesterday and the day before [May 20, 2007]. Flat, calm, plenty of ice around. We call it signu – ice, pack ice. But this ice looks pretty low. No high, no big bergs. Low ice.

These guys are butchering walrus on floating ice. Looks like they must have got two or three. We mostly try to kill them while they’re on the ice. It’s no problem if you have a big crew, like eight or nine, ten people. But with four or five people these days it’s pretty hard to pull them up. Maybe, nowadays we see a lot more walrus swimming rather than resting on ice. Yesterday we were watching walrus give birth. Yeah, we watched one female walrus gave birth. And then there was another female that had just given birth to a calf. The young can go into the water within several minutes, maybe” (Winton Weyapuk, Jr., May 2007).

Ice Seasons at Wales, 2006–2007

Hajo Eicken, Igor Krupnik, Winton Weyapuk, Jr., and Matthew Druckenmiller

The story of the sea ice in the Arctic in summer 2007 has drawn attention by media and the general public because of a record reduction in ice extent to almost 25–35% below the previous levels, reported since the start of systematic satellite monitoring in 1979. Both in 2007 and in the later minimum record years, some of the largest reductions in sea-ice extent occurred in the Alaskan sector, that is, in the Chukchi and Beaufort Seas. What did hunters and ice experts in coastal Alaska villages, like Wales, observe during the ice year of 2006–2007? Here, we present a glimpse of what results from our collaborative work are telling us.

Observations by Winton Weyapuk, Jr. and satellite data for 2006–2007, along with information from Alfred Bailey's photographs taken at Wales in April–June 1922, are summarized in Figure A. According to the weather station at Tin City located less than 7 miles or 10 km from Wales, on the other side of Cape Mountain, the first day with freezing temperatures in fall 2006 was on October 6. Temperatures fell solidly below freezing from November 4 onwards. Between November 10 and 15, the first occurrence of an ice slush berm (*qaimġuq* – see photos on pp. 37–39) accumulating through wave action and wind driving slush ice (*qinuliaq*, photo on p. 38) ashore was noted in Winton Weyapuk's daily logs. This first ice can be very important for coastal communities as it usually calms ocean waves. In places like Wales and Shishmaref, 75 miles (120 km) from Wales along the coast, early formation of such a slush berm offers protection from the eroding action of

violent fall storms, which have caused significant damage to the community in prior years.

Light slush ice on the water is very difficult to detect in the low-resolution satellite images. Thus, it was not until November 25, 2006, that the satellite registered the first formation of ice alongshore, with the start of offshore freeze-up reported for December 11, only. So, one lesson to learn from local observation is that people on the ground detect and monitor the beginning of the freezing period earlier and in more detail than the satellites do it from space.

Local experts in Wales indicate that compared to past decades, fall freeze-up has been delayed in recent years by up to several weeks. Instrumental observations and satellite images over the past several years also confirm a much later onset of ice formation across the Bering Strait area and North Alaska. Of great importance for a community such as Wales is the formation of shore-fast ice (*tuaq*), attached to land and stabilized by the foothold of grounded pressure ridges (*iunġit*) forming as a result of offshore pack ice moving in and piling ice into larger heaps. In late 2006, it took several weeks from the first appearance of a shore-fast ice cover, which subsequently broke off several times, before the shore-fast ice solidly remained in place on December 22. While the ice was thick enough to walk on by December 26, it was not until almost a month later, on January 22, 2007 that ice experts in Wales considered the shore-fast ice safe as a result of repeated pressure

ridge building. These pressure ridges (iungit) that stabilized the shore-fast ice also cannot be seen in satellite data. Even so, lack of massive ridging, possibly a consequence of the lack in recent years of thick, old ice (utuqaq) making its way into Bering Strait, allowed the ice sheet to ride a few feet onshore (qaupik) creating a small berm on February 2. On February 4, the shore-fast ice broke out all the way back to the beach along several miles north of town.

A warming episode with rain a few days earlier also resulted in ponds forming on the ice surface. While not unheard of in the past, such mid-winter warming events appear to be more frequent in recent years, occasionally accompanied by rain. Episodes of wet surface snow and ice (misaklut) can pose danger to hunters and may harm the survival of ringed seal pups in their dens. In contrast with the spring melt, which is typically detected well by satellite, such winter warming events may be difficult to detect other than through local, ground-based observations.

In late March 2007, further ridging along the shore-fast ice edge helped stabilize the ice, coinciding with the early stages of establishing trails for hauling boats and

gear out to a prospective launching site (pituqi). Hunting with boats launched off the shore-fast ice depends on ice conditions, allowing safe launching, passage and access to marine mammals, and the weather. For approximately one month between mid-April and mid-May 2007 conditions were quite favorable for hunters in Wales. After that date, a combination of adverse weather, offshore ice conditions and shore-fast ice decay (which broke out on May 30,

see photo on p. 69) made hunting difficult. More importantly, after the removal of the shore-fast ice, the presence of drifting ice within the hunting grounds around the village was limited to a mere nine days, with the last floating ice seen on June 8, 2007 (see photo on p. 71). This extremely short transitional period between spring ice conditions and complete removal of sea ice was unusual. It is a big disadvantage to subsistence hunters, since it limits access to ice-associated marine mammals and eliminates a solid platform on which killed animals can be butchered (see photo on p.96).

The satellite data for 2007 show that the ice edge started to pull away towards the north of Bering Strait around May 21. The last time the ice was seen off Wales on the

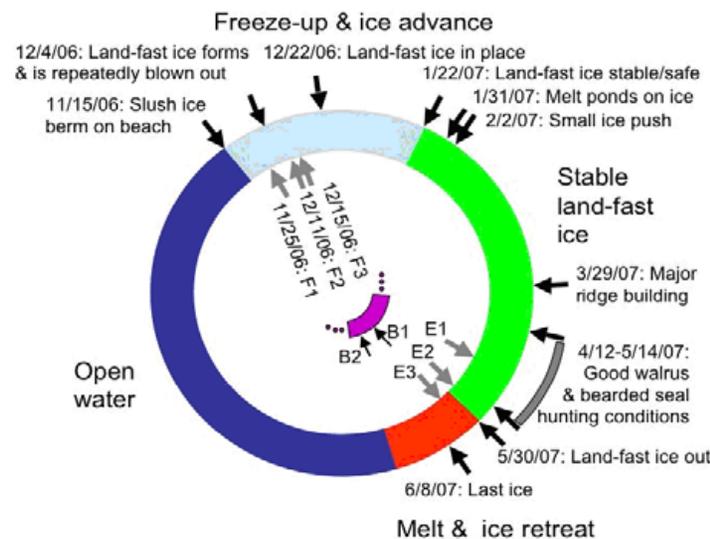


Figure 1: Seasonal ice cycle at Wales in 2006/07, based on observations by Winton Weyapuk Jr. (outermost set of black arrows), satellite remote sensing data (inner set of gray arrows), and Alfred Bailey's observations in 1922 (innermost purple circle, thin black arrows correspond to specific observations/photos).

Abbreviations: F1 - First ice growing out from shore, F2 - Start of freeze-up offshore, F3 - Ice edge south of Bering Strait; E1 - Ice edge reaches Bering Strait during ice retreat on 5/7/2007, E2 - Ice edge pulls away from Bering Strait to North on 5/21/2007, E3 - Last ice off Wales (6/8/2007); B1 - "Winter conditions still prevailed on June 3, 1922" (Alfred Bailey, photograph BA-21-451, p. 94), B2 - Land-fast ice still in place June 16, 1922 (Bailey photograph BA-21-327, p. 90).

satellite images was on June 2, almost a week earlier than observed on the ground. The weather station at Tin City puts the start of the melt season on May 20, 2007. Observations of sea ice during the melt season by satellite are difficult because of the presence of water at the surface, masking the signature of ice floes in remote-sensing data. Moreover, even the best modern satellites have difficulty distinguishing between the different types of ice that are of importance for coastal communities and are identified in hunters' vocabulary. Hence, there is potentially great value in more detailed analysis that combines both satellite data and ground observations by local observers, discriminating between different types of ice.

A further insight gained from the combination of satellite data and local observers' reports is the rapidity with which the ice edge moved north in spring 2007. Satellite data indicate that until the beginning of May, the southern extent of sea ice in the Bering Sea was normal or even slightly above normal. In late May and early June, ice retreated northward at well-above normal rates and by June 10, it was gone completely. This extremely rapid retreat continued into the summer, resulting in the record low Arctic ice extent of September 2007. In the case of Wales and other Alaskan communities, the lack of ice lingering near town over a longer stretch in late spring and early summer greatly impacts subsistence activities that depend on the presence of ice for successful hunting for marine animals, such as bearded seal and walrus.

Alfred Bailey's photographs from spring 1922 limit our 'window' into the past ice conditions in Wales for just three months of a single ice season. However, even as a momentary glimpse of what the ice was like in that particular year, they indicate significant differences between spring 1922 and 2007. In spring 2007 shore-fast ice (tuaq) had already been completely removed two weeks

prior to when Bailey's photo on page 88 was taken, it shows a solid shore-fast platform likely to persist for several more weeks. Bailey refers to the ice being in a solid "winter" state on June 3, many weeks later than in 2007. In 1922 hunting in the ice pack was possible until late June, again, almost a month later in the season compared to 2007, and possibly much longer.

While spring 1922 may seem today as being anomalously cold, other records from the same era indicate that this used to be a rather 'normal' condition early in the past century. A year prior, Bailey paid a brief visit to Wales on the U.S.C.G.C. *Bear* and he reported heavy drifting ice south of King Island on June 27, 1921 (Bailey 1931; 1971). A few days later, on June 30, 1921, the *Bear* steered from St. Lawrence Island to Siberia through dense ice floes, so that at times her engines had to be stopped to avoid particularly heavy ice and full power was thrown on with the result that the ice moved out of her way (Burnham 1929: 53). At Cape Dezhnev, right across from Wales on the Russian side of Bering Strait, the ice cleared up on June 24, 1921.

Some years around Bailey's visit in 1921–1922 were even colder. According to the old Russian data, in spring 1918, the floating ice was cleared off the area around Cape Dezhnev by July 9, only; and in 1926, the shore-fast ice was not broken until July 23, so that the last drifting ice floes disappeared on August 6, 1926. In the past decade not a single year would have had pack ice in Bering Strait in late June. Without today's ground observations at Wales, we would have no chance to check those early ice records against modern satellite images and other instrumental data.



The village of Wales, as seen from the land-fast ice (**tuag**) on windy day of January 4, 2008.

Ilisimaksravut: *What We Must Know*

Herbert O. Anungazuk †

All sea- or ice-borne people have an intimate knowledge of sea and ice which surround their total being. The lore of those who live by the Ocean contains numerous stories of the land and the sea that tie the people directly into their origins. The cold ice-bound sea, in particular, is critical in the lifeline of survival, despite its malevolent nature in the eyes of outsiders. Land is also crucial as an element of people's life; as such, it has become sectioned and co-memorized through the countless place names and stories that are woven into the hearts and minds of those who know them. The windborne sea; the ice with its special relationship to the animals and the people thus became ingrained into the language, so that the definitions become self-descriptive to communication among hunters and among many generations of speakers.

Among thousands of words in conversational Inupiaq the term *sigu* (*siku*), our most common word for sea ice, is possibly the most often used. It is a term of great importance and it projects into the lives of the hunters, into daily worries of their families, and into the stories of the elders that are being told during the course of the wintertime. The term *siku* is almost self-descriptive and as a complete word it defines the authority in its use which sets the line of the meaning for a whole family of related words that describe dozens of phenomena related to water in its three states. Sea ice has even been devised to assist the hunter in his harvest. Blocks of ice were carved to form hunting implements, like a bell to lure seals to seal nets under the ice, as was revealed to me in 2007 by

Wales elder, Teddy Kowealuk, who now lives in Anchorage. The carved implement, tied onto the anchor of the net and moved by the actions of the wind sends chimes of sounds under the ice luring the seals into the awaiting net. Seal netting is an activity that takes place on the land-fast ice, *tuaq*, and is most successful during dark moonless nights. Ice blocks are also often used to make blinds and wind walls that hide the hunters from the prying eyes of sea mammals and flying birds.

I am certain that many prospective hunters felt very immature when they had their first opportunity to accompany the hunters in the spring. Many may recall how cold it was and how tired you can become while you were first out in the boat or on ice. It is fortunate that hunter's training begins at a very early age, because the training extends into the adolescent, teenage and throughout adult years. In reality, the training that a hunter endures never ceases and learning is continual throughout one's life. During these early stages of learning you are never alone as your father, extended family members, and members of your crew offer their protection and share what they have learned with you. Thus, one's twilight years as a hunter become one's strongest memories, as it is during this phase that you absorb the most crucial information that your teachers share with you. Words for sea ice and weather conditions were always acquired at that very early stage and they stayed for life.

Many traditional sea ice definitions include terms that are found within the confines of certain invisible boundaries that are ingrained in hunters' mind but are completely lost to the outsiders. Their meaning may be revealed only through collaboration with the users of the ice in each particular region. When explained by the users or via associated stories, a definition may include what is known about a place above or below the ice, at the bottom of the sea, or even across time, like in our ancestral stories that not necessarily follow a linear perspective. Language expressions, like "sigulavagu" or "*when the sea comes with ice*" projects the uniqueness of the language, in which such words exist and can be spoken to others. The sea, when it 'comes with ice' is an anticipated event; the sea ice thus becomes a part of the hunters' lives for a season when ice plays its most important functions for survival. Of course, the weather always remains an important player in defining the ice conditions, as are also currents, winds, waves, and tides.

In the past, knowledge of weather prediction without instruments that give measurements to temperature and winds was an absolute necessity. It was a part of life that played very strongly in every hunter's training in the skills of successful provider. Today, modern technology has a stronger saying, because we get all these weather and storm forecasts over the radio, TV, and the Internet. But it is important that some of the old ways of weather and ice prediction remain with us. It should be taught by the older hunters and be learned by the new generations. This is our true ilisimiksaavut –"what we must know."

Our Inupiaq language is beautifully descriptive and the right use of the language as in the title of this book, *Kinikmi Sigum Qanuq Iilitaavut (Wales Sea Ice Dictionary)* defines that expressiveness to the reader. It is a very appropriate title. It is a part of an expression

in many terms that continues to be applied today at least among some hunters, as they used to be spoken in the Kinikimiut boats of the past. The ancestral stories always emphasized the importance of hunting and of the proper use of words, when talking about ice, as well as about animals and people. What is critically important today is to keep the language of hunting alive and even more so in places where indigenous language is at a questionable survival.

Today's hunters, who are now entering the age when their fathers commonly became the captains of their family whaling crews have, perhaps, seen the last extremes of ice conditions that their ancestors once knew intimately. During my early years and even in the 1970s and 1980s, the sea and ice conditions were expected to remain the same as they were in past. The hunters thus knew what types of ice and what species of sea mammals to expect each season. Today, the movement of many migratory animals and birds has changed because of irregular weather extremes that we were told are connected to 'climate change.' Those irregular extremes were first felt by the people who watch the ice on a daily basis and who for years tried to give testimony that something was amiss in their natural setting. In our community, sea ice still plays a prominent role; but changes we see have become so extreme and the seasons have shifted so dramatically that it is now difficult to expect how hunting continues to play a role in replenishing family food stores that must provide for the people during the winter.

To make it more difficult, many of the old hunters who were teachers to the younger generations are gone. The stories that they shared continue to resonate the importance of our fathers' knowledge that they passed to us. Telling their stories is an expression of gratitude to them; so, by using our old words for ice



“Wales school building and children, June 1922” (Photo, Alfred M. Bailey, Denver Museum of Nature and Science, BA21-619)

we continue to think about our teachers when we step on it or even talk about it.

My father was born in 1913 and he could have been very well pictured in the photograph among other Wales school students that was taken by Bailey in June 1922. It is too bad that the students are unrecognizable; otherwise, this photo would be a treasure to Wales residents today. This is the building where I spent my last grammar school days, before I left the school in 1961 for Mt.

Edgecumbe in Sitka. The school was taken down in 1960 or 1961, when a new school was erected in its location. The replacement school was burned to the ground again in 1996 and once again a new school building was erected on the original site the following year. In a similar way, the stories that our Kijikmiut teachers once shared with us continue to surface in our memories regardless of the changes that have become so important in this day.



On February 9, 2007, Matt Druckenmiller from the Geophysical Institute of the University of Alaska Fairbanks is drilling to measure the thickness of the land-fast ice, *tuaq*, about four miles north of Wales. The smooth flat surface of land-fast ice, *tuaġikuq* is covered with small pressure ridges *iunilaurat*, that are formed closer to the shore.

Wales Inupiaq Terms for Sea Ice

Matthew Druckenmiller

When I first visited Wales in September 2006, I immediately felt honored to have landed in what felt like a special and powerful place. It was autumn, the sea was free of ice, winds were at rest, and clear beautiful views of the surrounding mountainsides and distant islands helped me to orient myself at the tip of a continent, extending into a sea that separates two oceans. I was told this gift of peaceful weather was an answer to the drums resounding from the annual Kingikmiut Dance Festival that the village was currently hosting. My visit came with intentions of explaining to the community the sea-ice research I wished to do, and of seeking people interested in assisting with the project. As a student of many years, it did not take me long to realize I was now in an environment I knew little about.

My interest in learning about sea ice extends beyond the use of scientific instrumentation, such as specialized devices for measuring ice thickness or images from satellites that monitor the ice from above, hundreds of miles away. I am interested in learning about ice through careful observations that are accompanied by a personal perspective on how the ice is important to life and the surrounding environment. Scientists often see a world where the unknown and unexplained abound, yet where meaningful interpretations can be found. The local sea ice expertise that resides with the Inupiat people of Wales is a powerful example of how attentive observers derive meaningful interpretations from a complex and ever-changing environment. The people of Wales understand how marine mammals, birds, and fish respond and interact with the

powerful forces of nature—the ice, the winds, the currents, and the warm rays from the sun.

In recent years, much of Arctic science has focused on observing current environmental change, such as thinning of sea ice, melting of glaciers, thawing of permafrost, and the arrival of new species from lower latitudes. As a scientist interested in understanding the formation and dynamics of the shore-fast ice near Wales, I may visit a few times each year to take measurements of ice thickness and may possess a detailed collection of satellite imagery. Still, I will always lack the opportunity or ability to properly observe the entire annual cycle. The thickness of the local shore-fast ice has many influences, including when the ice first formed, whether or not it blew or drifted out at any point in the year, the degree of rafting and ridging, and the intensity of the winter's cold temperatures. The people of Wales are always better qualified to describe the condition of the local ice environment – its stability based on where it's ridged and grounded (*tunjuruaq*), where cracks in the shore-fast ice (*quppait*) exist, and where and when extensions in the shore-fast ice (*uuyuaq*) may have formed. I imagine that in the years past, the people of Wales used these words and many others recorded in this dictionary to discuss the ice cover as they consulted the wind and the currents and decided when to launch their *umiut* during the spring sea mammal hunts. Today scientists join indigenous hunters as ones interested in the state of sea ice, which is a unique and central characteristic of life in the coastal regions of the High North.

Scientists looking to understand how sea ice may be different in today's warming climate must value the interconnectedness of the environmental forces that drive the change. Nevertheless, physical scientific measurements only tell one part of a larger complex story. Like grouping the remaining pieces of an incomplete puzzle, scientists like to organize what they know and especially what they are in process of learning. Scientific terms for sea ice and scholarly classifications of ice types generally relate to how the ice forms, grows and eventually breaks up, the movement and deformation of ice, and the size and abundance of a given type of ice. Many of the scientific terms are related to the needs of big-ship navigation and do not necessarily reflect what may uniquely exist or take place in a specific location. Scientific terms usually are quite general and apply over very large areas; many terms may refer to conditions found anywhere in the Arctic or Antarctica. However, the Inupiaq terms used in Wales often describe things that are observed locally and may not apply elsewhere. For example, *sigu atqruuaq*, which means "pack ice that has drifted north then drifted back south with the wind driven current", is a term that only exists for the Bering Strait, yet is relevant to those interested in the exchange of sea ice between the Bering and Chukchi Seas.

The Kijikmiut words for ice that are carefully compiled in this dictionary not only help classify different types of ice around Wales and in the adjacent area of the Bering Strait but ultimately help scientists understand what classifications should exist in order for useful research to be done. In addition to the importance for communities and climate studies, local sea-ice knowledge is also relevant to navigation, industry, biological surveys, and other very specific operations in Arctic waters. For example, terms such as *ataafuk* (ice shelf under water; can be dangerous if it lifts and

surfaces) and *qaqataruaq* (a shelf in the shore-ice or on a floe that hangs over the water), help us to consider which types of ice are dangerous and can inform both the sea-ice studies as well as improve safety awareness on the ice.

While the publication of this dictionary represents a gift from the Kijikmiut ("people of Wales") to the readers, I believe our joint effort also highlights the need for a broader sharing of knowledge about sea ice. As people in Wales and in other Arctic communities are privileged to the knowledge of their Elders, polar scientists are often entrusted with great resources to study sea ice. Therefore, it is a responsibility and an honor for science to share its stories of discovery, as much as it is for Elders to share their knowledge with the younger generations. This dictionary may serve as a reminder of these responsibilities. As we all will be privileged to learn from hunters and Elders, who continue talking about Arctic ice in the words of their ancestors, scientists, similarly, should be encouraged to share their research with the people who live by the Arctic ice. With this comes the opportunity to learn together, to exchange ideas, and to experience one another's culture.

The words in this dictionary were born from generations of observations of the human and natural world. When words are lost, the knowledge that lives in those words is vulnerable to the same fate. However, knowledge preserved throughout time helps us not only to interpret our surroundings today but to remember the world's history, and the history it has shaped for those privileged to walk the land or navigate the icy landscape that lives on the sea. With a growing personal fascination with sea ice and arctic waters, I am thankful for the opportunity to learn these Inupiaq terms for sea ice that have existed for countless generations and spoken by the descendants of those past.

Learning About Sea Ice and Its Use from the Kinikmuit

Hajo Eicken and Igor Krupnik

Sea ice in a changing Arctic

Over the past few years, Arctic sea ice has received increasing attention by the public, mostly in the context of Earth's climate warming and environmental change. Newspaper and television coverage typically discuss the shrinking and thinning of Arctic ice by referring to scientific studies based on satellite data or climate models. While scientifically accurate, this type of information from satellites or computer models is generally collected at a very coarse resolution and it provides only a limited view of the characteristics of the ice itself.

Consider, for example, the finding that the Arctic sea ice summer extent has decreased by about 10% per decade for the past three decades, with a dramatic reduction of almost 25% below the previous record minimum in 2007 (Stroeve et al., 2008). The satellite data entering into these observations are usually taken for a single day when ice extent is at its lowest level, typically in the first half of September. As the satellite orbits the Earth, each spot measurement, a so-called 'pixel,' is pieced together into a large mosaic of the Arctic. A pixel covers roughly 16 by 16 miles (25 by 25 km). The entire width of Bering Strait is covered by four such pixels. The portion of the sea that can be seen by an observer at Wales, as pictured on the many photographs featured in this book, accounts for less than 10% of a single pixel.

This coarse scale is sufficient for a general study of how Arc-

tic sea ice helps regulate Earth's climate, most importantly by reflecting sunlight away from the ocean. However, such data is of less value if we want to learn about how marine mammals utilize different ice types or to get practical information for coastal communities that rely on shore-fast and drifting ice for hunting, transportation, and other use.

In a changing North that experiences not only a warmer climate and ice retreat, but also increasing ship traffic and industrial activities, demand is great for more detailed information about the characteristics of the ice cover and its seasonal waxing and waning. Planning and oversight associated with these various activities requires both broad and in-depth understanding of the ice, typically for a particular location. For this, answers to many specific questions are to be found, for example: How do ice movement and under-ice currents vary with season and distance from shore? In order to assess potential impacts of increasing human activities in the Arctic, information from one scientific discipline is often not enough.

Also, sea ice can be thought of not only as an inert material, like a solid rock, but also as a *process* that links different parts of the ocean and coastal land environment, and determines how animals, people, the ocean, and the land interact with one another in a specific local setting. These different interactions depend not only on the amount of ice but also very much on the type of ice and its

properties. To understand it, other questions are to be answered. How much multi-year ice is embedded in the ice pack? How deeply grounded and how stable is the coastal shore-fast ice? During fall freeze-up, is the ice forming as slush and pancake ice or does the ocean freeze quietly with sheet ice? The list goes on and on.

Scientists' and users' perspectives on sea ice

Scientists approach these types of research questions often by breaking down the task into many smaller, manageable pieces. Each of these pieces is then studied by a group of experts from a specific discipline. While this approach is well proven and highly successful for many types of scientific research, it may not be always appropriate for keeping track of, and finding explanations to the changes in the ice cover and its impacts on the environment, marine ecosystems, and human uses of the ice.

A very different way of studying the ice is tied to its practical use, for example as a provider of food or a platform for travel and other activities. In Alaska, Inupiaq or Yupik knowledge of sea ice is derived largely from close, repeated observation and building of a vast body of knowledge that is continually tested and reaffirmed or modified by time spent observing the ice from shore, in boats, and on the ice itself.

A number of studies have already documented and discussed Inuit, Inupiaq, and Yupik sea-ice expertise in great detail (Nelson 1969; Krupnik et al. 2010; Krupnik and Jolly 2002; George et al. 2004; Oozeva et al. 2004; Gearheard et al. 2006; Laidler 2006; Laidler and Ikummaq 2008; Laidler and Elee 2008). Thanks to this work, it can be argued that indigenous communities across the Arctic are aware of the depth and extent of environmental change that is presently affecting their regions. People who are engaged

in daily activities on ice and on the land, those who rely upon traditional knowledge and close monitoring of the environment can usually notice change at an earlier stage than do scientists who use models and instrumental observations. While generally focused upon a particular location, this systematic knowledge of hunters and other subsistence users provides a broad and in-depth perspective on the formation, growth and decay of sea ice, its seasonal and annual variations, and long-term change.

Extensive observation also allows members of northern communities, like Wales, to benefit from the resources and services the ice offers to them, such as access to game, a platform for travel and watching for animals, a place to butcher the kill, educate young hunters, and even to rest—and to do it in a safe and effective manner. User-based hunters' knowledge of ice can contribute substantially to broader understanding of ice formation and dynamics, as demonstrated through our project, in earlier studies, and in many testimonies of indigenous experts at community and scholarly meetings. Hunters and other local users of sea ice keep track not only of one, but of several dozen or possibly more characteristics of the ice environment, related to biology, geophysics and the weather conditions.

Such a holistic, multifaceted vision of ice as a *process* rather than a material—a 'frozen water'—has been the most effective way for local observers to recognize many signals of Arctic change that people in Wales and other northern communities see happening. When scientists also recognized the signals of environmental shifts in the Arctic region in the late 1990s, Bering Strait and the North Alaskan coastal zone became crucial locations for tracking changes in the polar ice cover and associated trends in marine life. This is why so many scientists are now coming to places like

Wales, Diomedes, Gambell, Barrow, and other Alaskan communities to partner with local residents in the documentation of their knowledge about ice and marine life.

We have been fortunate and privileged in having Kinjikiut experts from Wales share their knowledge and understanding of ice in their native area for this book. Only a small portion of what is really known by hunters and elders is documented in this 'ice dictionary'. This expertise is precious to the studies of Arctic change and to the preservation of the Kinjikiut tradition alike. The Kinjikiut knowledge of the ice is of special value because of the location of their community. Positioned at the junction between two oceans and two continents, in a region with complex and highly variable ice patterns, the Kinjikiut thrived for many centuries because they have mastered successfully the use of both the shore-fast and drifting ice environment.

In an attempt to examine sea ice and its changing nature from different perspectives, we have been working at the interface between the local users' perspective (that is, the knowledge of Inupiaq and Yupik hunters) and western science. Now, with support of local experts like Winton Weyapuk, Jr., in Wales, Joe Leavitt in Barrow, Paul Apangalook and Leonard Apangalook, Sr., in Gambell, Chester Noongwook in Savoonga, Roman Armaergen in Uelen, Russia, and others, we are comparing ice observations within the context of our different interests and visions. Hence, taken as a whole, detailed observations from several communities across the Bering Strait region can shed light on today's large-scale shifts in the ice regimes, changes in marine animal behavior, and the impact of those changes upon people's use of the ice.

On the users' side this new collaboration includes an extended monitoring of the local ice conditions, an examination of

the yearly ice cycle from the users' perspective, and collection of many traditional terms and definitions of sea ice, as exemplified in this 'dictionary' that includes over 120 Kinjikiut terms. On the scientists' side, we examine remote sensing data from satellites and coastal ice radars, various ice distribution charts, as well as on-ice measurements of thickness and properties.

Whereas our study is locally-tied to certain communities in the Bering Strait region and in Northern Alaska (see map on page 6), it is a part of a much larger effort that is currently underway as a part of the International Polar Year 2007–2008 program. The *SIKU* project, as well as the ongoing work by Shari Gearheard and her partners (2006), is aimed at building a comparative framework for the examination of sea ice knowledge of indigenous ice experts from many communities in Canada, Greenland, Alaska, and Chukotka. Such an ambitious study of Arctic people's knowledge of ice has never been undertaken before. It will offer an invaluable and much anticipated term of reference to the scientists' models and projections that address the current changes in Arctic ice in a broader trans-polar and regional way.

Windows to the past

Working with local partners and learning indigenous knowledge of ice may help scientists advance their research in many other areas. One of the most promising applications is expanding the time range of scientific records. Satellite images of sea ice are available since the 1970s only. Records of local weather stations, with rare exceptions, are silent on the status of ice, its dynamics and major types. Many historical sea ice charts of the early explorers cover the High Arctic areas that are far away from the coastal zone and from the practical issues of today. Thus, applying the knowledge

of Arctic residents scientists interested in former ice conditions in the North may literally open certain ‘windows’ to the past that are, otherwise, closed to them.

The wealth of knowledge that today’s Kinjikiut experts may bring to the old historical sources was well demonstrated when people commented on Alfred Bailey’s photographs of ice hunting in 1922. Only a portion of this information is presented in the captions to Bailey’s images published in this book. Many are worth noting, like Winton Weyapuk’s discussion of temperatures and lack of snow melt in May 1922 in one of the photos (p.80), unusual by today’s standards. Another facet of the former ice dynamics can be seen in Bailey’s photos featuring hunters wearing snowshoes, *taglut*, on young ice in springtime (pp. 11, 80). Evidently, the spring melt in the old days went through a longer (or slower?) process of thawing and refreezing that led to the wide-spread formation of young unstable ice, *siguliaq*, in April and May. Today, the spring disintegration of ice goes so fast in May, even in April, that there is hardly any need for special implements, in order for hunters to be able to walk over unstable spring ice.

In a similar way, other historical sources may be carefully re-read through a Kinjikiut eye to the great advancement of our knowledge about past ice conditions. For example, the recent book of letters and diaries written by Ellen Kittredge Lopp (Lopp-Smith and Smith 2001) between 1892 and 1902 contains numerous references to ice and weather events, ice conditions, start of spring whaling and walrus hunting that may serve as good evidence of ice dynamics in the Wales area.

For example, the Kinjikiut crews were actively hunting walrus on the moving ice floes in early-mid June, even in late June in 1893, 1898, 1901, and also in 1922, during Bailey’s visit. Today,

walrus commonly pass northward through Bering Strait on the retreating ice in mid- or late May and by early June there is no ice left off Wales anymore, as happened in 2007 and 2008. Even more fruitful would be applying the knowledge of today’s experts to the early weather logs of the first missionaries and teachers from the 1890s, as was done in our St. Lawrence Island project (Oozeva et al. 2004). That would allow us extend our knowledge of the ice dynamics in the Bering Strait area by over a hundred years, back to the time of commercial whalers and the first International Polar Year of 1882–1883.

Adaptation, continuity, and change

Local sea-ice knowledge, such as the many terms and stories about ice compiled in this dictionary, may play an important role in guiding adaptation to a changing Arctic, both as a result of climate warming and socio-economic change. The challenges and opportunities that go hand-in-hand with the rapid change that is sweeping across the North require careful and responsible planning and action. The earlier and more pronounced expression of global climate trends in the Arctic has already forced the people of northern Alaska to devise ways in which traditional lifestyles can be adapted in the face of change.

The photographs compiled in this book showing modern-day activities on ice in comparison with those documented by biologist Alfred Bailey in 1922 contain a powerful message of continuity and change. The striking similarities and apparent continuity in the way Wales hunting crews organize their activities and gear on ice today and eighty-nine years ago is an illustration of people’s resilience. It is also a testimony to their attachment to certain ways of using and behaving on ice that may be potentially vulnerable

under the condition of rapid climate or socio-economic change. At the same time, the rapidity with which the hunting gear used by the Kinjikiut crews has been modernized to increase the efficiency and success in hunting indicates that the hunters are very adept at exploring new ways.

Moreover, the story of the resumption of the bowhead whaling in the ice leads off Wales in 1970 after a gap of many decades (in which two of our project team members participated as young men) suggests that even in the face of adversity and loss of expertise, a sustainable way forward can be found. Many other indigenous communities in the region, like Savoonga, Kivalina, Diomede, as well as Sireniki, Lorino, Uelen in Russia have also resumed whaling in leads and drifting ice in the past two to three decades. They have demonstrated enormous resources of innovation and resilience in the use of ice. This stock or resilience and innovation possessed by the polar residents of today will be, perhaps, their strongest asset in facing the challenges of future change.

This perspective is not meant to trivialize many prospective impacts of rapid climate or social change in the polar regions and the upheaval it may create in people's lives. Challenges such as relocation of coastal communities under the threat of coastal erosion; potential shifts in distribution of marine mammals due to new ice patterns; or the socio-economic transformations brought by environmental change indicate that a concerted effort by many interested parties will be needed to deal with adversity in the face of change.

We see our book and our partnership with the Native Community of Wales as a contribution to that common effort. It points to the importance of local knowledge and of a long history of observing and responding to change that may be crucial to people's

preparedness for what likely will be a vastly different Arctic that their children and grandchildren are to inherit. It is our shared hope that by the time of the next International Polar Year in 2057, the Kinjikiut words for sea ice recorded in this book will be used in hunters' boats and on ice in the Bering Strait.



Killed bull walrus is pulled for butchering on the edge of the drifting ice floe. June 26, 1922.

(Photo: Alfred M. Baile, Denver Museum of Nature and Science, BA21-430)

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