'The Ice We Want Our Children to Know': SIKU Project in Alaska and Siberia, 2007-2008

By Igor Krupnik

This paper presents an overview on the origins, structure, and current activities under the Sea Ice Knowledge and Use (SIKU) project, which is a part of the International Polar Year (IPY) 2007-2008 science program. The project's acronym, SIKU, is also the basic word for sea ice (siku) in all Eskimo languages from Bering Strait to Greenland. The SIKU project was started in 2006 and will continue until 2010. Local experts from more than 20 northern communities in four countries participate in SIKU studies conducted by several teams from five nations: Canada, U.S., Greenland, Russia, and France. The program is run as an alliance of several individually funded activities, including two major core grants from the 'Shared Beringia Heritage' program of the U.S. National Park Service and the Government of Canada Program for IPY for the Canadian component called Inuit Sea Ice Use and Occupancy Project (ISIUOP).

The key goal of the SIKU initiative is to document indigenous knowledge about Arctic ice and polar residents' use of the ice-covered marine environment under the impact of climate warming and rapid social change. SIKU activities include ice and weather monitoring by community observers, interviews with elders and hunters, and compilation of local dictionaries of sea ice terms in indigenous languages. These and other activities exemplify the key mission of the SIKU project, namely, to advance polar resident participation in IPY and to strengthen their contribution to the scholarly studies of Arctic climate change. By its very nature, the SIKU project embodies the inclusive character of IPY 2007-2008; its reliance on sharing and collaboration; and its appeal to the Arctic people.

The SIKU project originated as a follow-up to several recent efforts in the documentation of local knowledge and use of sea ice (*Gearheard et al. 2006, Laidler 2006, Oozeva et al. 2004*). When the call for the prospective IPY activities was issued in 2005, Dr. Claudio Aporta from Carleton University in Canada and I submitted a joint proposal for the SIKU initiative, for which we agreed to work as Principal Co-coordinators (*see http://gcrc.carleton.ca/siku*).

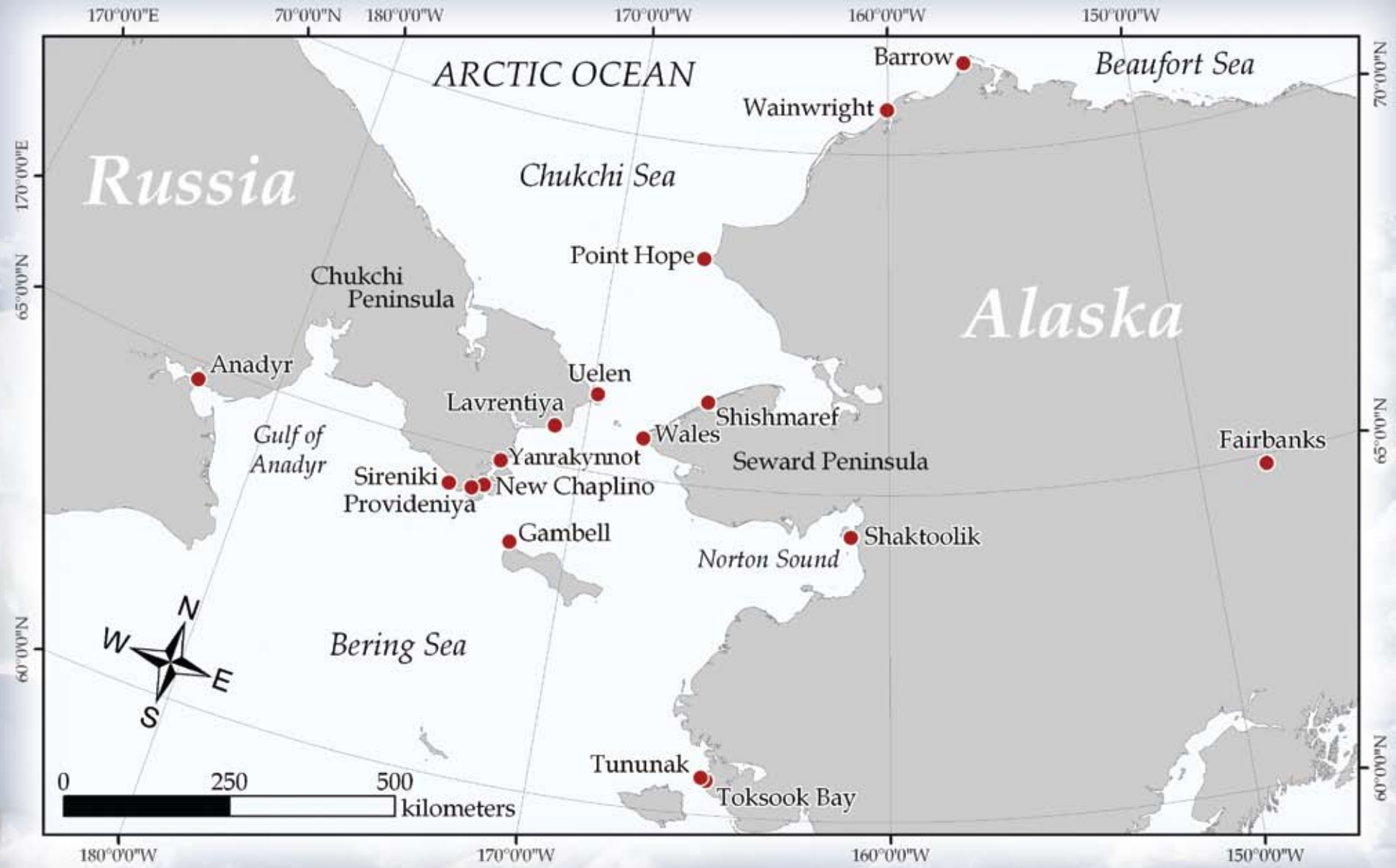
SIKU-Alaska Activities

SIKU efforts in Alaska were launched in spring 2006, almost a year before the official start of IPY 2007-2008. Eventually, indigenous experts from seven Alaska communities (*Figure 1*) became partners in SIKU-Alaska studies. The main features of the SIKU-Alaska effort are its focus on knowledge and heritage documentation and on the integration of observations by local experts to help introduce these data into science models of sea ice dynamics, marine animal distribution, and ecosystem shift.

Specific SIKU-Alaska activities may be summarized as follows. In the village of Wales, daily sea ice and weather observations by Winton Weyapuk, Jr., have been conducted since winter 2007 (*Figure 2*) under the National Science Foundation (NSF) sponsored SIZONeT (Seasonal Ice Zone Network) project headed by Dr.

Figure1. SIKU project activities in Alaska and Chukotka.

Map courtesy of Matthew Druckenmiller


170°0'0"E
70°0'0"N
180°0'0"W
170°0'0"W
160°0'0"W
150°0'0"W
ARCTIC OCEAN
Barrow
Beaufort Sea
Wainwright
Russia
Chukchi Sea
Point Hope
Chukchi
Peninsula
Alaska
Anadyr
Uelen
Lavrentiya
Shishmaref
Gulf of
Anadyr
Wales
Fairbanks
Yanrakynnot
Seward Peninsula
Sireniki
New Chaplino
Provideniya
Gambell
Shaktoolik
Norton Sound
N
W
E
S
Bering Sea
Tununak
Toksook Bay
0
250
500
kilometers
180°0'0"W
170°0'0"W
160°0'0"W
150°0'0"W
70°0'0"N
65°0'0"N
60°0'0"N
170°0'0"E

Hajo Eicken from the University of Alaska Fairbanks (UAF). Work in Wales is very much focused on the integration of local hunters' knowledge with modern geophysical methods, such as the use of coastal ice radar, satellite imagery, and on-ice and air-borne thickness measurements. SIKU studies in Wales also include the compilation of the 112-page Wales Inupiaq Sea-Ice Dictionary of some 120 local sea ice terms (*Weyapuk and Krupnik 2008*) (*Figure 3*) and the analysis of historical photography, specifically, the review of several dozen photographs of sea ice hunting taken in Wales by biologist Alfred Bailey in spring 1922.

In Gambell on St. Lawrence Island (Figure 4) daily observations of local ice and weather conditions began in Spring 2006 by Leonard Apangalook, Sr., and will be conducted for three full years. Work in Gambell also includes interviews with hunters and survey of the historical records on local ice and subsistence hunting practices since the late 1800s (*Krupnik 2009*).

In Shishmaref SIKU activities are integrated into Josh Wisniweski's Ph.D. study at UAF that includes daily observations of ice and weather conditions, and subsistence hunting, preparation of a bilingual dictionary of local Iñupiaq ice terms used by Shishmaref hunters, and development of cultural curriculum materials for the local school.

In Barrow on the arctic shore, studies are focused on the integration of local hunters' observations with the geophysical instrumental records under the NSF SIZONeT project. On Nelson Island in the southeastern Bering Sea, another NSF-sponsored project by Ann Fienup-Riordan, Mark John, and the Calista Elders Council collaborates with SIKU-Alaska in the preparation of local dictionary of the Yup'ik sea ice terms, mapping local use of sea ice, and interviews with Yup'ik elders on hunting and sea ice conditions, both past and present.

Photograph courtesy of Matthew Druckenmiller

Figure 2. Winton Weyapuk, Jr., on the shore-fast ice off Wales, Alaska.

During the winter 2008-2009, local ice observations will continue in Gambell, Wales, Barrow, Shaktoolik, and, hopefully, also on Nelson Island, to produce a record for two or even three winters (2006-07, 2007-08, 2008-09). Four local sea ice dictionaries are to be completed in Barrow, Shishmaref, Nelson Island, and Shaktoolik, with the associated educational materials for participating communities.

SIKU-Chukotka Activities

Presently, SIKU-related activities are conducted in five communities in Chukotka, with support from local hub communities Anadyr and Provideniya, and the Russian Institute of Cultural and Natural Heritage in Moscow.

In the village of Uelen in the southern Chukchi Sea, the documentation of local sea ice knowledge is supported by the Chukotka Branch of the Far Eastern Research Institute (SVKNII) in Anadyr. It features daily sea ice observations (since 2006), interviews with elders, a dictionary of sea ice terms in the Chukchi language (*Figure 5*), and collection of historical data on local weather and ice conditions. In the town of Lavrentiya, Boris Alpergen and Elizaveta Dobrieva are working on the documentation of the Naukan Yupik knowledge of sea ice, producing an illustrated bilingual ice dictionary. In Sireniki, a mixed Yupik and Chukchi community in the northern Bering Sea, Aron Nytawyi, one of the few local speakers of the Yupik language, has compiled a dictionary of some 60 Yupik ice terms, with the associated safety rules. Since 2007, the Russian Beringia Park in Provideniya has supported three local ice monitors in the communities of New Chaplino, Yanrakynnot, and Sireniki, as its contribution to the SIKU project. Village monitors supply daily records on ice and weather conditions, subsistence activities, and marine mammals and birds. Russian SIKU researchers from Anadyr, Provideniya, Moscow, and St. Petersburg (*Lyudmila Bogoslovskaya, Boris Vdovin, and Igor Zagrebin*) participate in the collection of data on sea ice use and marine mammals, and processing of historical records on ice and climate change in Chukotka (*Krupnik and Bogoslovskaya 2008, Vdovin and Evstifeyev 2008*). An important component of the SIKU-Chukotka program is public outreach (*Figure 6*) and education.

For the second IPY winter of 2008-2009, the Russian SIKU team plans to continue ice observations in three Chukotka communities (Uelen, New Chaplino, Yanrakynnot), complete three sea ice dictionaries in local languages, process historical ice and climate records, and disseminate project results through scholarly publications and community outreach. The SIKU-Chukotka team has already produced five publications in Russian and English, and it envisions a

major volume of Russian SIKU contributions in 2010.

Conclusion: Major SIKU Science Issues

The role of the SIKU project in the documentation of local knowledge and use of sea ice and in advancing Arctic residents' participation in IPY 2007-2008 is difficult to overestimate. The key science implications of the SIKU program can be summarized as follows.

Firstly, local SIKU studies have produced massive sets of new data on sea ice, climate, subsistence activities, and other relevant information for over 20 indigenous communities across the Arctic. The data collected by local indigenous observers during three past winters will be an invaluable source of information for future researchers, particularly in the studies of transition from a multi-year to the first-year ice regime, and of the ways of knowing, watching, and using the ice by polar residents during the time of IPY 2007-2008.

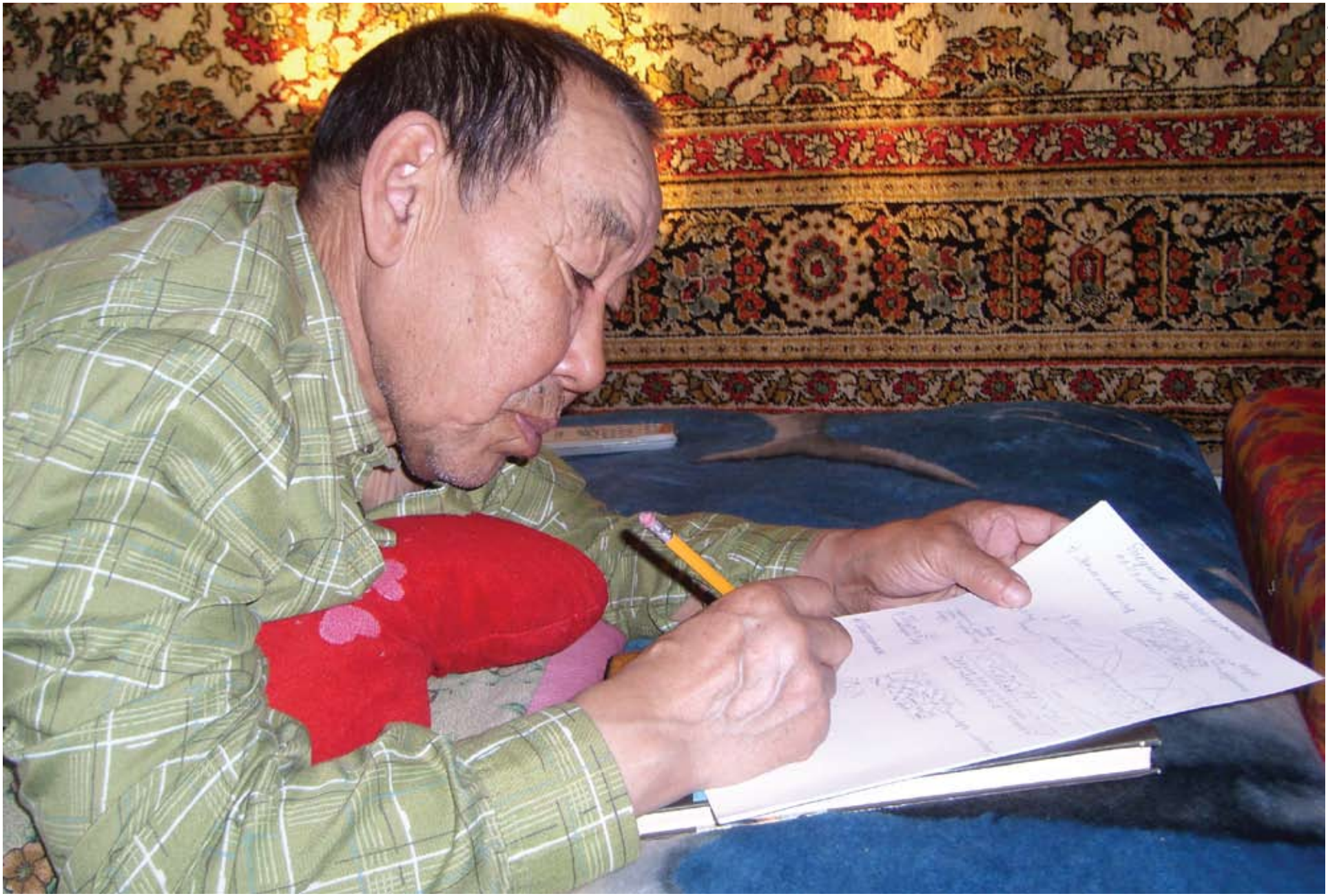
Secondly, access to the Arctic residents' knowledge via SIKU data and publications will impact the ways physical scientists view and interpret polar ice. Many ice scientists are now open to the value of indigenous knowledge. They are currently looking into new ice parameters to be added to their models, other than the overall extent or thickness, such as ice age, safety, strength, and local variations, very much as is already described by indigenous ice users.

Thirdly, scientists traditionally con-

Figure 3. Cover page of the *Wales Iñupiaq Sea Ice Dictionary* (Weyapuk and Krupnik 2008).

Photograph courtesy of Igor Krupnik

Figure 4. Ice pressure ridge built of thin winter ice off Gambell, St. Lawrence Island. The ridge was destroyed and washed away shortly by a strong storm.



Photograph courtesy of Victoria Goltseva

Figure 5. Roman Armaergen, 69, local hunter from the village of Uelen, makes pencil drawings to illustrate the Uelen Chukchi sea ice dictionary.

centrate on the long-term ice dynamics as an indicator of climate change. The users' perspective, to the contrary, focuses on the short-term variations in each winter, like the specifics of the freezing and thawing processes, and the occurrence of break-up and freeze-up events. Again, we currently witness much greater interest among ice scientists in the seasonal, monthly, or even daily ice dynamics, which is remarkably close to the indigenous perspective. This convergence may expand the application of local users' vision to the scholarly ice and climate models.

Fourthly, SIKU studies will greatly advance our knowledge of traditional Eskimo/Inuit sea ice terminologies and ice classifications. Under the SIKU project, at least a dozen indigenous sea ice 'dictionaries' and scores of local ice classifications are to be collected from Bering Strait to Greenland. The diversity of the Eskimo ice terminology is striking, as only but a handful of basic terms, such as siku itself, are common across the Eskimo language area. Each regional or dialectal list of ice words also shows strength in a particular type of ice or ice-related phenomena typical to a certain area that are of particular importance to local users.

Last, but not least, in many northern communities indigenous terms and classifications for sea ice are being rapidly replaced by English or Russian terminologies; in some places only a few elderly experts retain the old knowledge. The sea ice is also changing rapidly, so that many types of ice, for which there are terms in local languages, cannot be observed anymore. If these trends continue the documentation of indigenous knowledge may become the last reservoir of detailed information on the former ice regimes that could be swept away by the Arctic warming. In the long-term perspective, this may be the most important outcome of the SIKU project and its lasting contribution to the IPY 2007-2008 program.

Photograph courtesy of Victoria Golbtseva

Figure 6. SIKU community presentation in Uelen (March 2008). Victoria Golbtseva (to the left) speaks to local elders about the documentation of sea ice knowledge.

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