What other should know about our CBM program in case they are interested in using our protocols and materials

By Olivia Lee

**Program title:** Seasonal Ice Zone Observing Network (SIZONet) and Alaska Arctic Observatory and Knowledge Hub (AAOKH)

**Running organisations:** University of Alaska Fairbanks

**Start and end date:** April 2006 – current funding will end in 2019

**Main objectives of the program:** The SIZONet program was a long-term observing program to provide data responsive to the needs of scientists and stakeholders. SIZONet included instrumented observations such as: shore-based and drift-ice measurements of ice motion, key mass-balance variables and airborne ice thickness. One component of SIZONet involved collaborating with coastal communities in northern and western Alaska to document sea ice, weather and wildlife observations with goals to preserve and pass on local and traditional knowledge of sea ice and its use. After funding for SIZONet concluded, the community observing component was continued through AAOKH. The AAOKH program goals includes working with local experts to empower and support communities to conduct scientific measurements that relate to community concerns. The AAOKH has an observing focus on changes in the cryosphere (snow, ice, permafrost) and its effects on the seasonal cycle of subsistence harvest activities.

**Were the objectives partly or fully achieved?** The objectives are partly achieved. The AAOKH program is still developing further to expand the number of communities participating in observing efforts, and adding new observation types (e.g. permafrost observations) to be more supportive of community information needs. Development of protocols for more systematic observations of sea ice, wildlife and weather are also being developed to allow more robust analysis of observations.

**How are the data used and by whom?** The data are collected by indigenous community members who are compensated for their observations. The observations are sent to researchers at the University of Alaska Fairbanks to archive in a web-accessible database. Data have been used by community members to track trends in sea ice and weather in their own communities. For example community observers and elders in Wales, Alaska have been using the database to compare annual changes in sea ice freeze up and break up dates to share with their community. The data have also been used by scientists studying changes in sea ice, and ice conditions affecting sightings of marine mammal subsistence species. For example, a PhD graduate student used the database to supplement her analysis of coastal sea ice conditions in comparison to remote sensing sea ice data. In the future when sea ice change becomes even more prevalent, impacting winter storms, erosion and coastal infrastructure, the data may for instance enable communities to seek assistance from agencies such as the Federal Emergency Management Agency or Army Corps of Engineers for support to coastal community coastline protection.

**What were the most important achievements?** The sea ice observing protocols have recorded over a decade of coastal sea ice conditions with a focus on the most important aspects of sea ice and weather at the time. Collaborating with indigenous sea ice experts have also allowed the monitoring effort to incorporate local and traditional knowledge by putting current ice observations in the context of historical knowledge, and preserved the use of native language terms. Several SIZONet observers were respected elders in their communities whose knowledge has been preserved and can be shared with future generations.

**Which were the main challenges encountered and solutions found?** The program is encountering two challenges. First, it is challenging to identify community observers who are committed to consistent observing effort. Building collaborative partnerships with communities takes time, and involves a relationship-building process. The AAOKH Science Steering Group, which includes indigenous community representatives, helped to establish these relationships in some AAOKH communities. Second, slow and expensive internet service in northern Alaska communities makes it challenging to implement web-based technology for observers to send observations for QA/QC and archiving, and may also be difficult for communities to use web-based tools to access the data. Improvements to high-speed internet access is expected soon for several coastal northern Alaska communities.

**What are the expectations towards the future development of the program and what are the conditions to meet them?** Funding for the AAOKH program is stable for the 5-year program duration, but the future continuation of the program will depend on community interest and perceived value of the observing program. While there may be general interest in continued monitoring of cryosphere change, further development of the program could benefit from creating analysis products that allow these observations to contribute more effectively to decision-making (e.g. planning for long-term changes in subsistence harvest activities). The development of a web-based AAOKH Knowledge Hub is planned as a tool to inform communities of other related observing efforts, but may also serve as means for communities to share adaptation strategies related to subsistence impacts from ice and permafrost change. We are also currently testing the development and use of a mobile app for smart phones and tablets to help improve the data flow from observers to the database. Current data flow methods from observations sent by email or postal mail to the University research contact who then manually enters data into the database is time consuming. However, we anticipate that some of our older observers may not feel comfortable transitioning to mobile technology applications for data collection, and hence some of the current methods for data collection and database entry may be necessary to continue.

**Other comments for potential users of the protocols and materials.** The SIZONet observing protocols allows a narrative description of sea ice, weather and wildlife that allows the observer to emphasize content that he considers most relevant, that is also based on observing guidance provided by the research scientist collaborators. This protocol is valuable for recording local traditional knowledge, but can make it difficult to analyse the observations for management of natural resources. The observing guidelines for ice, weather and wildlife observations are not often referred to by observers after making one or two observations to contribute. The observing guidelines are most helpful for recruiting new observers to the AAOKH program that need to know what type of observations to report. In contrast, the protocols for using the CTD instruments for coastal water measurements are useful at almost every data collection instance. These protocols are printed and laminated to be carried into the field for easy reference. The combination of technology and specific series of steps for collecting and uploading data in the coastal water measurement protocols can be hard for observers to remember. The printed written instructions make it easier to complete the data collection and sharing tasks.

More structured, systematic observing protocols may be needed if the goal of the CBM program is to specifically inform management needs using a robust statistical analysis of the observing data. Sometimes the use of statistical analyses increases the likelihood that management agencies listen to the community members.