

Sustaining Arctic Observing Networks
Edmonton, Alberta
April 9-11, 2008

New Technologies for Cold Climates Break-Out Group

There was a general recognition that technology will play a critical role in any observational network. While the workshop dealt with both the sources of innovation and technology most presentations dealt with new and emerging technologies that were either being applied in the Arctic or that have Arctic applications. There were also common issues raised in terms of the application of these technologies in the North by presenters and the other workshop presenters.

Sources of technology and innovation:

- Adaptation or adoption of technologies traditionally used in the north- often developed to support other activities such as northern travel, living or resource harvesting.
- The adoption and adaptation of technologies and technologies from elsewhere, also often developed to support other activities and or other purposes.
- The development of new technical innovations by people who are most aware of needs and environmental conditions in the north.

Emerging Innovations and Technologies Presentations: Most presentations focused on technologies now being applied to monitoring.

- Two presentations (Ian Glenn, ING Engineering & Justyne Nicincka, NOAA) of remotely controlled aircraft (drones) and advantages and potential obstacles to the application of this technology.
 - Regulatory issues which are currently being worked through.
 - Aircraft size varies from very small to remotely controlled transport aircraft.
 - Ability to be utilized in high risk environments or to carry out high risk maneuvers.
 - The smaller drones have low fueling costs since payloads do not include the weight and needs of operators- just instrument packages. They still require flight crews.
 - Range: there was a description of a drone flying across the Atlantic on approximately 1.5 gallons of fuel.
 - Modern drones are quiet resulting in limited wildlife harassment, a concern raised by other participants. This characteristic made drones not equipped with noise generators less desirable for search and resource missions because of the need to attract victims attention to the aircraft.
- Jon Thorleifson (Defense R&D Canada), while focusing on the surveillance and other needs of the Department of National Defense, discussed innovations that they have or are developing to deal with arctic environments which could be of use to others. An example was an innovation used to install and protect cabled shore based marine monitoring networks from shoreline storm and ice damage.

- They have drilled a sloping cable “conduit” into the substrate from the shore based station out beyond and below the region posing the hazard.
- Claude Labine (Campbell Scientific) has been involved in developing and supplying instrument packages for researchers in the Arctic since the early 1970’s. Many of these were weather, permafrost and other environmental monitoring stations. A recent innovation was the installation of a video camera that was incorporated on a weather station with a signal that can be accessed remotely by satellite. The camera is used to gain a real time image of the opportunity to land aircraft at the site before launching a site visit avoiding the cost of aborted missions. Obviously the camera provides a visual image of the site which is useful for scientific and not just logistical purposes.
 - Phillipe Bonnet (University of Copenhagen) spoke about under the ice monitoring systems being used in lakes in Greenland
 - Mairi Best (University of Victoria- Neptune Project) outlined what is probably Canada’s largest remotely accessible cabled marine monitoring network currently being deployed to monitor the Juan de Fuca Plate and associated marine environment. The station is part of an international marine monitoring network. To date no component of the network is being installed in Arctic and Antarctic waters. The adaptation of the shoreline cabling innovation being tested by Defense R&D Canada could make such an array more feasible in polar waters.

Common Issues and Opportunities identified from discussions:

- Robustness and flexibility of systems
- Power supplies and band width limiting factors in many installations
- Ability to function autonomously
- 4 dimensional data collection on a real time basis
- Access to information such as weather or ice conditions that can be used to enhance safety both for scientists and communities.
- Use of systems and networks for educational and environmental appreciation / interpretation functions
- Support can be often provided by northern communities
- Northern applications when associated with northern communities or institutions (example colleges) can test bedded for other polar applications.
- When applicable northerners should be consulted on needed adaptations of technology to maximize benefits and applications

Participants included:

- Claude Labine, Campbell Scientific
- Jon Thorleifson, DRDC
- Helmut Epp, Geomatics, Government of the Northwest Territories
- Song Lianchen, Chinese Meteorological Administration
- Yu Jixin, Chinese Meteorological Administration
- Lisa Darby, National Oceanic and Atmospheric Administration
- J.A. Gagné, Department of Fisheries and Oceans, Government of Canada

- Jagtar Sandhu, Health Canada
- Brian Barnes, University of Alaska
- Craig Tweedie, University of Texas, El Paso
- Don Forbes, Geological Survey of Canada, Natural Resource Canada
- Sue Dobson, National Research Council, Canada
- Georgina Lloyd, Indian and Northern Affairs Canada
- Kumiko Azetsu-Scott, Department of Fisheries of Ocean, Government of Canada
- Jussi Paatero, Finnish Meteorological Institute
- Gilles Fournier, Environment Canada
- Ed Hudson, Meteorological Service of Canada
- Christian Haas, University of Alberta
- Humfrey Melling, Department of Fisheries of Ocean, Government of Canada
- Svein Vagle, Department of Fisheries of Ocean, Government of Canada
- Jane Eert, Department of Fisheries of Ocean, Government of Canada
- Bob Van Dijken, Yukon IPY coordination office
- Philippe Bonnet, University of Copenhagen