

MORSE User Consultation Workshop Meeting Notes

The following notes attempt to capture the key discussion points during the CSA and ESA sponsored MORSE User Consultation Workshop, held at St. John's, Canada, on November 12 and 13, 2008. These meeting notes pertain primarily to the four thematic sessions and the concluding discussion. For more information, please see:

- the MORSE Workshop Program Booklet (which contains the workshop agenda and presentation abstracts),
- the presentations themselves (in PDF format) and
- the MORSE Workshop Summary (which also contains a summary of the sessions).

All of these documents can be found at www.morse-arctic.net.

Session 1 – Environmental Monitoring of Land, Water & Air

The main points covered during the discussion at the end of Session 1 were the following:

- The presentations addressed mainly the marine side of the coastal environment. MORSE should reach out to permafrost scientists who are studying the terrestrial side of the coastal environment also.
- MORSE can contribute by:
 - Sponsoring demonstration projects;
 - Planning background missions;
 - Processing archive data.
- There was discussion of the required frequency of acquisitions for archive data; one statement was that one good set of high resolution images per year is sufficient for erosion studies, while another view was that a higher frequency was required, for example, to study the effects of a storm event (just before and just after). Scientists want as much data as possible, and they do not know future needs; for example, to study phytoplankton, high resolution is needed in space and time. It was suggested that large amounts of data could be collected over areas of high scientific interest, like the Lena and Mackenzie deltas.
- A need was expressed for better tools for searching archives to find cloud-free scenes with desired attributes. The Canada Centre for Remote Sensing is working on an archive of several satellite sensors with advanced search capabilities.
- It was pointed out that in addition to high resolution images of a local area, the big picture is needed too, in order to understand distant transport mechanisms, weather systems, and other aspects of context.
- There is a need to inform scientists of the benefits of remote sensing, and this would lead to more exploitation of EO data by Arctic scientists.
- NASA has been invited to join MORSE.
- Information about Arctic waves and currents could be obtained from EO data.

Session 2 – Mapping, Characterization and Changes of Arctic Coastal Areas

The key points covered during the discussion at the end of this session were the following:

- MORSE should reach out to experts in coastal oceanography.
- Sovereignty information is more sensitive at the coast than inland.
- Integration of old data with new data is a challenge; ICESat is a critical data source, because it has absolute accuracy everywhere uniformly.
- SAR-based interferometric data can provide good planimetric accuracy without the need for ground control points.
- The Canadian Hydrographic Service already collaborates with the Danes and might also be open to collaborating in the development of capabilities.
- ESA launched an Invitation to Tender on permafrost, and held a workshop in February 2008.
- Coasts are inherently inter-disciplinary: the atmosphere, hydrology, land, rivers, erosion, biology, oceanography and other disciplines come into play. It is challenging to get all the players together. Sea ice can protect the coastlines from erosion. We need other disciplines working together.

Session 3 – Sustainable Economic Development of Natural Resources in Arctic Coastal Areas

The major points raised during the discussion at the end of this session were the following:

- The presentations talked about preservation and conservation, but were silent on sustainable resource development.
- The needs of northern aboriginal and non-aboriginal communities, governments, industry and NGOs share common aspects, such as ice conditions, coastal erosion, high and low water lines and habitat.
- Marine Protected Areas are important for sustainable fisheries.
- The arctic is changing fast. Biodiversity must be protected there.
- EO data can be used as a template on which other data (e.g. in-situ) can be added.
- The issue of high bandwidth communication to the north and processing facilities in the north was discussed. These facilities are available in some areas, not available in others. Data compression algorithms may help. The proposed High Arctic Research Station may provide processing and interpretation in the north without having to communicate with the south.
- There is a wide range in scale. Some requirements are for local high resolution data. Other requirements are for synoptic data.
- We need to establish baselines and understand processes to support environmental damage assessment.

- The Near-shore Ice Complex (NIC) is important for erosion, travel, habitat and migration of species, etc.
- Be careful when producing maps of the arctic: Canada has not extended its claim to the North Pole. However, ecosystems do not respect boundaries, and we have to monitor the entire ecosystem.
- What is the definition of 'coastal area'? How far inland and how far out from shore should the coastal areas go? The MORSE program intends to leave the definition flexible, and include the entire Canadian Arctic archipelago.

Session 4 – Safety, Security and Sovereignty Issues

The major discussion points at the end of Session 4 were the following:

- The mandates of different agencies sometimes converge; how should we feed data into different user streams?
- The solutions cost money. Cost is an issue. For example, estimates for the cost of the Exxon Valdez clean-up range between \$20 – 60 Billion!
- The presentations confirmed the need for coastal base mapping and topographic base mapping. Parts of northern Canada are not mapped at a detailed level. (This is also true for parts of Greenland.) At current funding levels, it will take many years to complete the detailed mapping of northern Canada.
- In the future, assimilating huge volumes of data, visualization, modeling and data fusion will be challenges.
- Are we collecting information for responding to crises or for legal action? There is a difference between stopping a terrorist/criminal activity and prosecuting it. For example, Canada caught the Norwegian Hells Angels in the Canadian Arctic but did not prosecute them, because the government would have had to divulge the details of our sources, and they did not want to do that. Google Earth blurred out the White House, and they also blur out playgrounds.
- Environment Canada has a renewed interest in detecting oil under ice.
- ISTOP (Integrated Satellite Tracking of Pollution) has apparently been successful in reducing the number of infractions of dumping oil near Newfoundland. This may be a combination of propaganda, education and deterrence.
- Polar Epsilon will implement a new Maritime Satellite Surveillance Radar (MSSR) mode for RADARSAT-2 which will be able to detect vessels with lengths in the range 20 – 25 metres. The coverage of this mode will be almost as wide as ScanSAR Wide.
- We should use choke point analysis in the northern surveillance. In other words, we could watch the entry and exit points of the Arctic, rather than watching the whole Arctic.

Concluding Discussion

This section describes the key discussion points raised during the Concluding Discussion Session.

- Goal accomplished to broaden the understanding between data providers and a wide variety of users.
- Some new applications and new opportunities for cooperation for multiple users; examples: wildlife habitat, coastal sensitivity characterization, ecological integrity and coastal base mapping.
- Data accessibility is an important issue; Good precedence exists, e.g. during the International Polar Year (IPY), the Global Inter-agency IPY Polar Snapshot Year (GIIPSY, see <http://bprc.osu.edu/rsl/GIIPSY/>) has systematically collected blanket coverage of both poles, including interferometric coverage and intensive coverage of certain ‘super-sites’; data sets are available free for research use.
- MORSE represents an opportunity to continue the spirit of GIIPSY after IPY; ‘super-sites’ might include the Mackenzie and Lena deltas, the straits between Greenland and Canada, Spitzbergen and others.
- Full ASAR coverage available daily in Image Mode and Wide Swath mode over the entire Arctic; systematic 3-day coverage between ASAR and RADARSAT-2.
- ESA plans to turn off Image mode in the next month unless users complain; ASAR data can be processed for a nominal fee.
- Perceived lack of expertise in remote sensing, although automated tools have improved in recent years and there are people with experience in the use of these tools.
- Polarimetry is inherently complex; CSA and ESA spend large sums of money for capacity building, but not everyone understands polarimetry; MORSE could conceivably plan training sessions and/or sponsor the development of tools that are easier to use.
- Programs like EOADP (Earth Observation Application Development Program) and EOMD (Earth Observation Market Development) help to stimulate partnerships between End Users and the private sector, and also develop capabilities in the private sector.
- Need to communicate and possibly engage members of the MORSE ‘family’ who could not attend the workshop; ESA and CSA will continue to reach out to these people to understand user needs, build partnerships and discuss plans for the future.

Feedback on this workshop report will be requested from those who attended. Specific responses to the “Author Guidelines” questions will be solicited from the presenters to gather more detailed information. Next, the presentations and workshop findings will be analyzed to produce a User Requirements Document. This document will capture User Needs of the Arctic Coastal community as completely and clearly as possible. This document should be distributed by mid January. Feedback on this document will again be stimulated.

As mentioned at the beginning of the workshop, subsequent MORSE actions will include:

- Development of Partnerships with End-User Organizations;
- Development of Products and Services, and Demonstrations towards Operationalization;
- Outreach and Sharing of Results.

The workshop outcomes put CSA and ESA into a position to consider the main user requirements and consider the issue of an RFP and an ITT to support the development of products & services and demonstration projects within operational settings. Results from ensuing projects will be shared publicly. For a more complete description of the MORSE Implementation Plan, see *www.morse-arctic.net*.