



LOOKNorth

Program Overview

LOOKNorth

William Jefferies
Executive Director

*Remote sensing innovation for
sustainable resource development*

LOOKNorth



- Leading Operational Observations and Knowledge for the North
- 1 of 21 Canadian Centres of Excellence for Commercialization & Research (CECR)
- Launched January 2011 as a 5 year program
- **Validates and commercializes Remote Sensing technologies to support safe and sustainable development of northern natural resources**



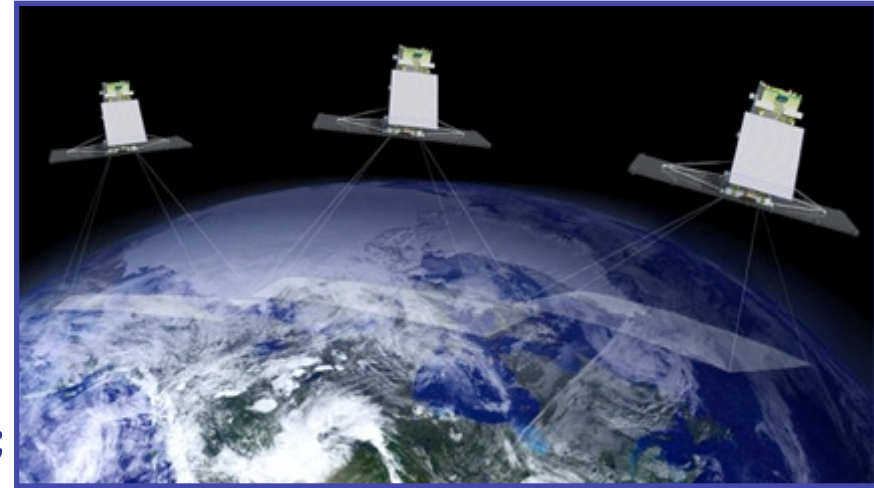
Government of Canada
Networks of Centres
of Excellence

Gouvernement du Canada
Réseaux de centres
d'excellence



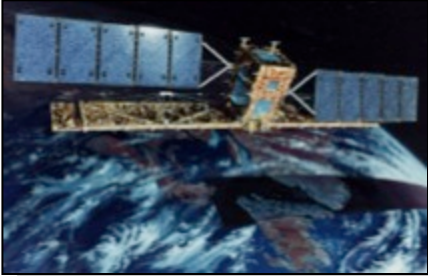
LOOKNorth Objectives

- Identify needs and technology gaps for Northern resource development
- Develop opportunities for Canadian small-medium enterprises (SME) and researchers by creating the business case and co-funding technology validations as a precursor to long-term implementation;
- Guide research and development (R&D) and technology commercialization where gaps presently exist;
- Enable transfer of relevant technologies from international research to Canada; and,
- Facilitate information sharing amongst stakeholders in Northern development including industry.



C-CORE Expertise

Remote Sensing



Capability enables monitoring of surface and subsurface environments, assets and activities to maximize operational performance and mitigate risk.

Risk analysis to determine potential threat to infrastructure, ice management plan design, suitability of infrastructure to meet or deal with ice management requirements.

Provide R&D advice and services, particularly in the areas of risk analysis, finite element and numerical analysis, field studies and ice lab testing.

Ice Engineering



Geotechnical Engineering



In-house facilities include:

- Canada's largest geotechnical centrifuge, with refrigeration capability to simulate arctic environments;
- an associated earthquake simulator;
- model-crafting, mechanical, electrical and soils labs.

LOOKNorth Program Execution

- **Sector Assessments**

- *Industry consultations with O&G, mining, transportation, hydro-electricity industry ; Drives our programs*

- **Technology Validation Projects**

- *Industry co-funded projects executed by SME partners; LOOKNorth will develop, advise & help manage*

- **R & D Program**

- *Internal research on specific themes not otherwise addressed; Current themes include Land Cover Change, Oil spills, Ice mass lifecycle*

- **Outreach Program**

- *Sector specific and northern outreach workshops to raise technology awareness, engaging Northern stakeholder groups*

Technology Validation Projects

Desired Impacts

- improvements in safety of personnel;
- reduction of operational risk;
- increased benefits to Northern people;
- acceptance of a technology as a standard by a regulatory body;
- development of highly-qualified personnel (HQP), jobs created, potential revenues.

Proposals are rated against the following criteria:

- impact of a successful technology validation project;
- degree of innovation implemented;
- percentage of sponsor co-funding;
- value of in-kind contributions;
- suitability of the proposed solution; and
- potential for international sales.

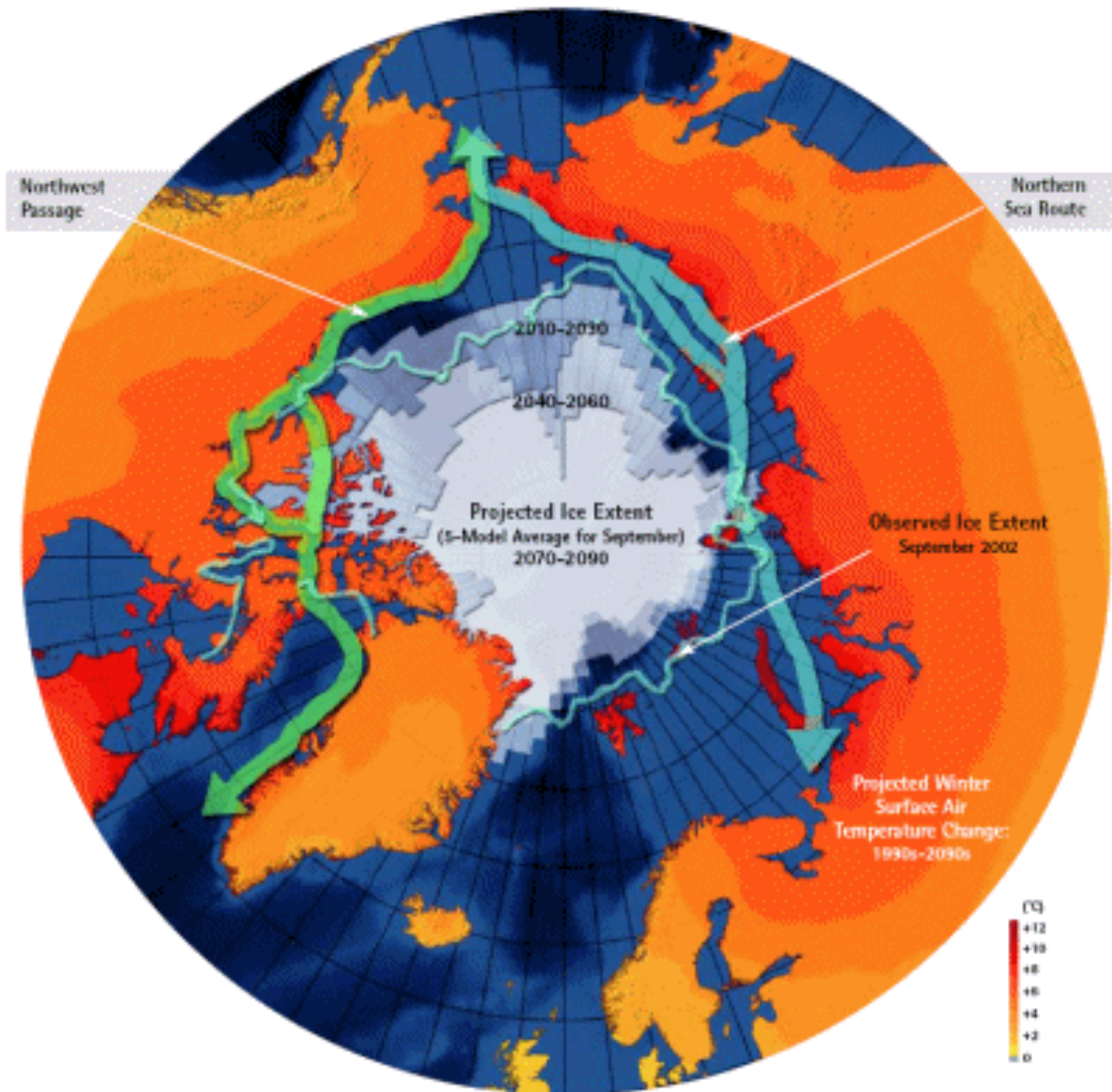


LOOKNorth Interest in Maritime Surveillance

- Maritime transportation is vital to northern life & development
 - *Most northern communities are supplied by sea*
 - *Commercial resource development relies on sea transportation*
 - *Indigenous peoples' activities revolve around the sea*
- Problem – there is limited information on maritime situational awareness for non-government organizations or individuals



Arctic Shipping Routes



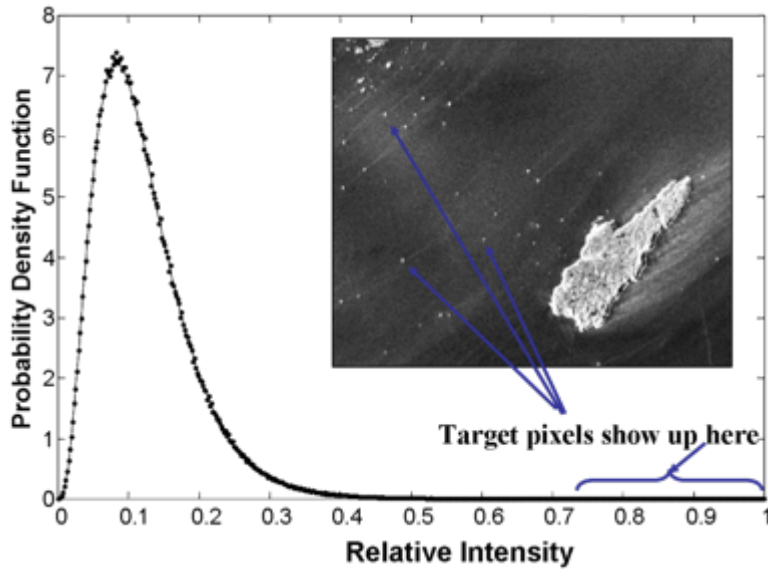
- Reduction in the extent and duration of sea ice supports an increased shipping season through the Northern Sea Route and the NorthWest Passage
- Most of the Arctic is poorly charted and poorly monitored

Melville Bay

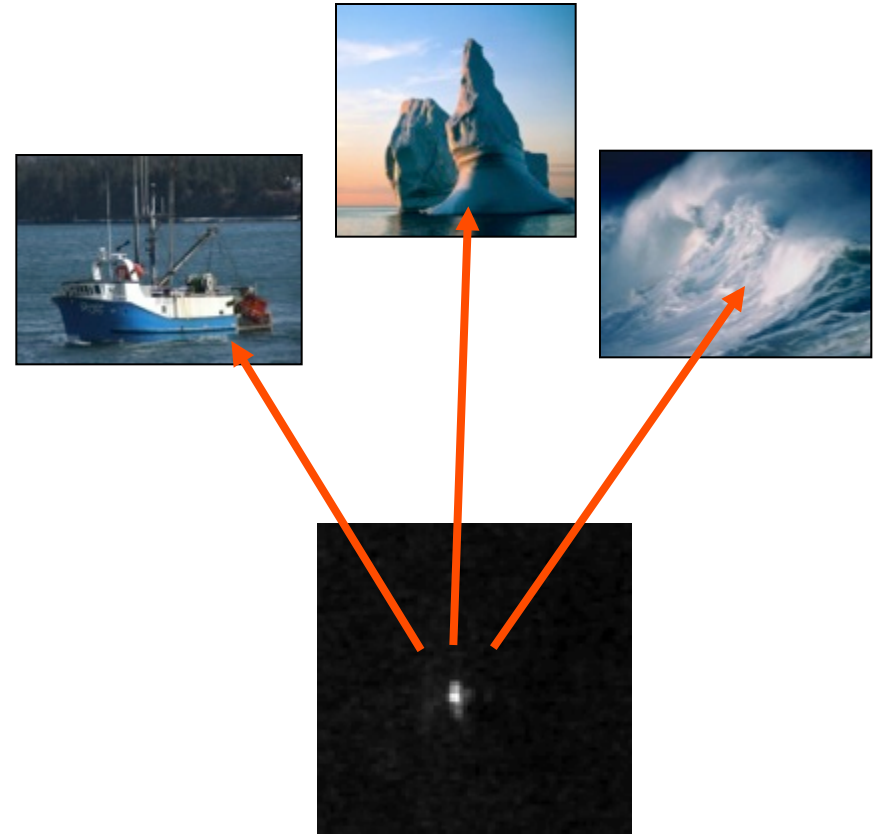


- How to tell a ship from an iceberg?

Elements of Iceberg Surveillance with SAR

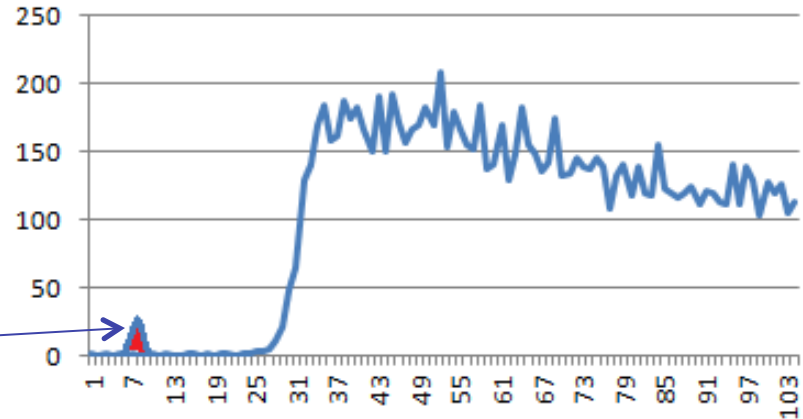
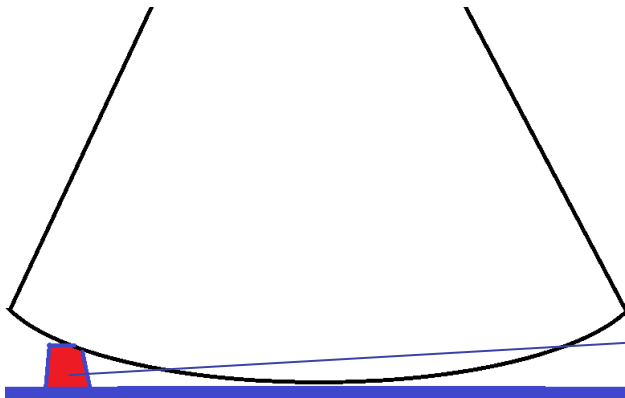


Detection

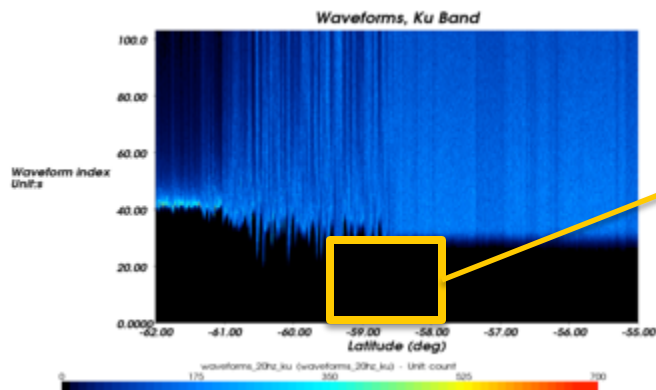


Discrimination

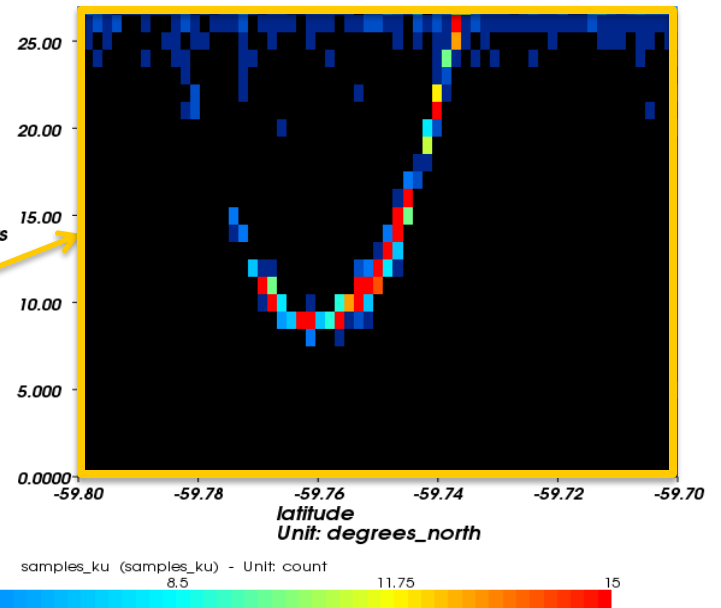
Iceberg detection from Radar Altimeter



Targets emerging from sea
Iceberg ships, lighthouse, small islands can
be detected in the noise part of waveforms.



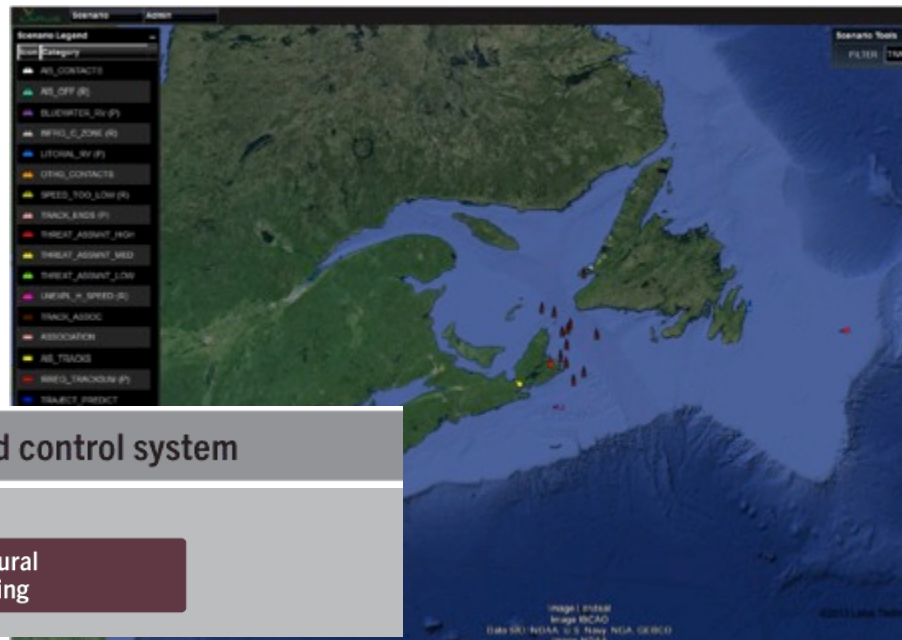
Dimension index of 104 elements
Unit: count



- Ship based UAV surveillance to support Arctic navigation
- Ice monitoring, mammal avoidance



- Real time automatic target analysis based on behaviour
- Uses computational intelligence, adaptive learning and predictive modelling



API for integration with customer's command and control system

▶ JDL level 4 – Process refinement

Resource management

Procedural learning

▶ JDL level 3 – Impact assessment

Course of action recommendation

Response assessment

Situational learning

▶ JDL level 2 – Situation assessment

Classification

Trajectory prediction

Contact anomaly detection

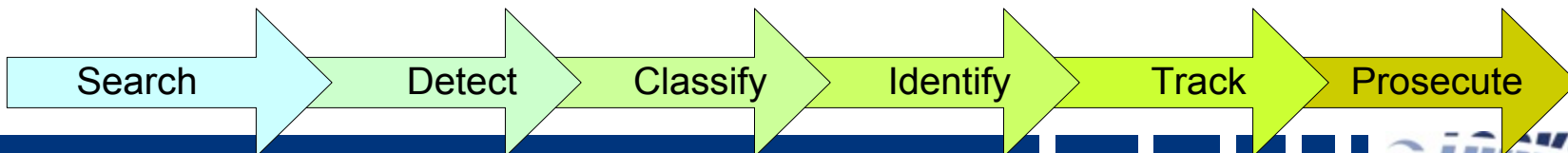
Track anomaly detection

Anomaly assessment

Intent assessment

Threat assessment

Feature extraction



NPC Oil Spill Detection and Modeling in the Hudson and Davis Straits

- To assess current capabilities for oil spill detection and impact prediction in the Hudson and Davis Strait areas.
- Review of movement and weathering of oil in Arctic waters, the use of remote sensing technologies for Arctic oil spill monitoring, and the modeling of oil fate and trajectories in the presence of sea ice.
- An assessment of local capabilities and gaps to respond to oil spills was performed, and recommendations formulated to increase the local capacity for effective oil spill response.

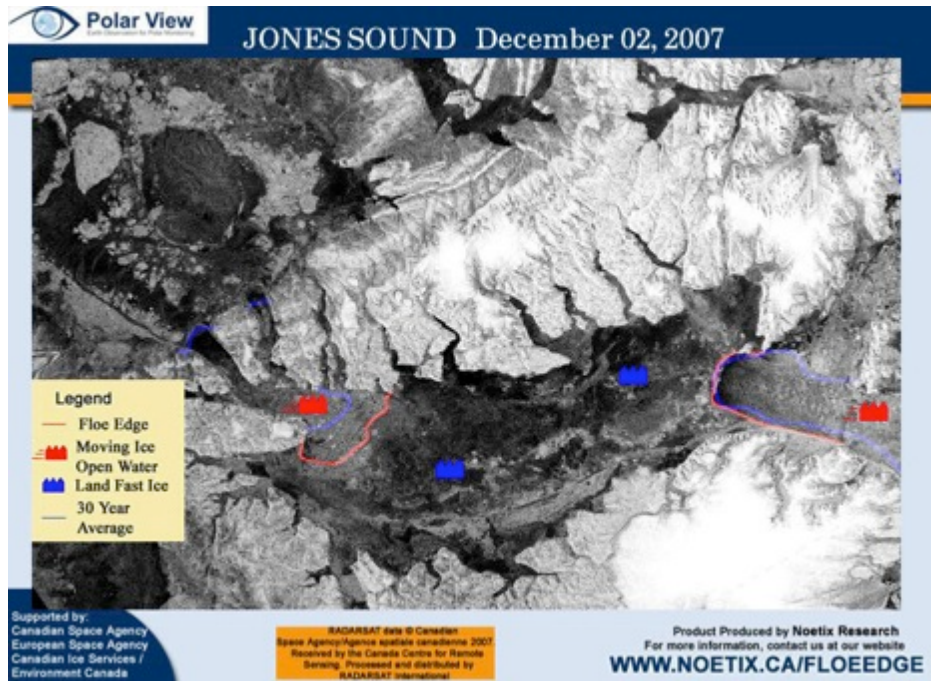


Clearpath Robotics

- Faster, cheaper more accurate surveillance of tailings ponds
- Hydrographic, water and air quality surveys



Community Ice Services



Floe Edge Maps provide communities with easily accessible, daily information on ice conditions



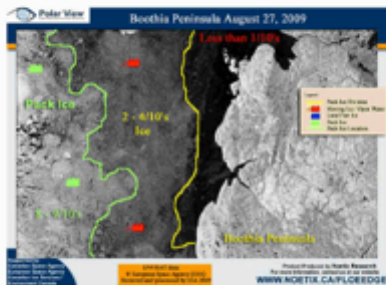


Promotional Website and brochures created

Arctic Tourism Service

Analyzed Service Products

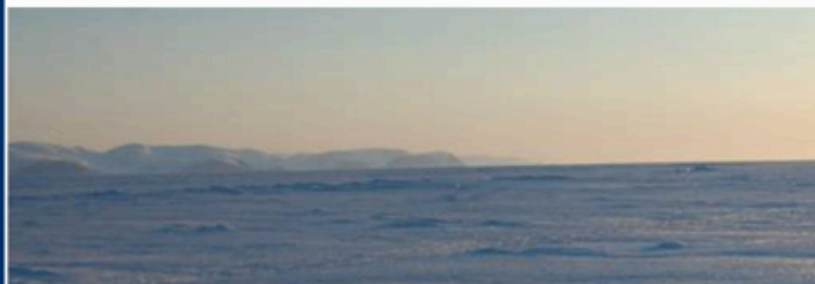
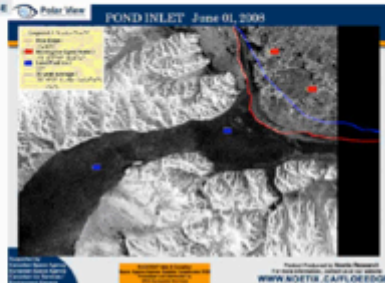
Analysed products delineate ice concentration, ice edge, motion, and wind speed.



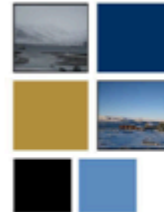
Pack Ice Product
The pack ice edge product delineates the pack ice edge and ice concentrations using satellite radar and optical imagery.

Floe Edge Products

Floe edge location and surface ice conditions are identified from satellite radar imagery. This product is appropriate if over ice excursions are envisioned.



Cruise Industry



Arctic Tourism Service

Short Term Planning and Operational Support



KONGSBERG

Monitoring Service - Users



**ROYAL CANADIAN MARINE
SEARCH & RESCUE**
Saving Lives on the Water



Going Forward

- Increased co-operation with established earth observation players
- Focus technology demonstrations on winning applications
- Expand relationship with research community
- Help commercialize successful projects
- Sustainability

Thank-you!



LOOKNorth

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