



IDENTIFYING & INCORPORATING LOCALLY MEANINGFUL INDICATORS INTO THE POLAR PREDICTION PROJECT

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RESEARCH INTERESTS



- Inuit knowledge, language, and use of arctic environments (terrestrial and marine);
- human dimensions of environmental change;
- Indigenous research methodologies and ethics; and,
- linking Inuit and scientific knowledge systems to support decision-making and education.

PRESSING ISSUES

(FROM THE SCIENCE PLAN)

- the challenge of translating scientific success into societal value
- better understanding weather-related decision-making and communication processes (to account for situational context of the user)
- improve methods of evaluating impact and measuring social and economic value
- erosion / failure of cultural tools and traditional knowledge in some situations (potential to enhance and complement scientific predictions)

BACKGROUND

- Community-based sea ice research in Cape Dorset, Igloolik, and Pangnirtung, Nunavut
- 2003 - 2011
- characterizing the importance, uses, and changes of sea ice from Inuit expertise

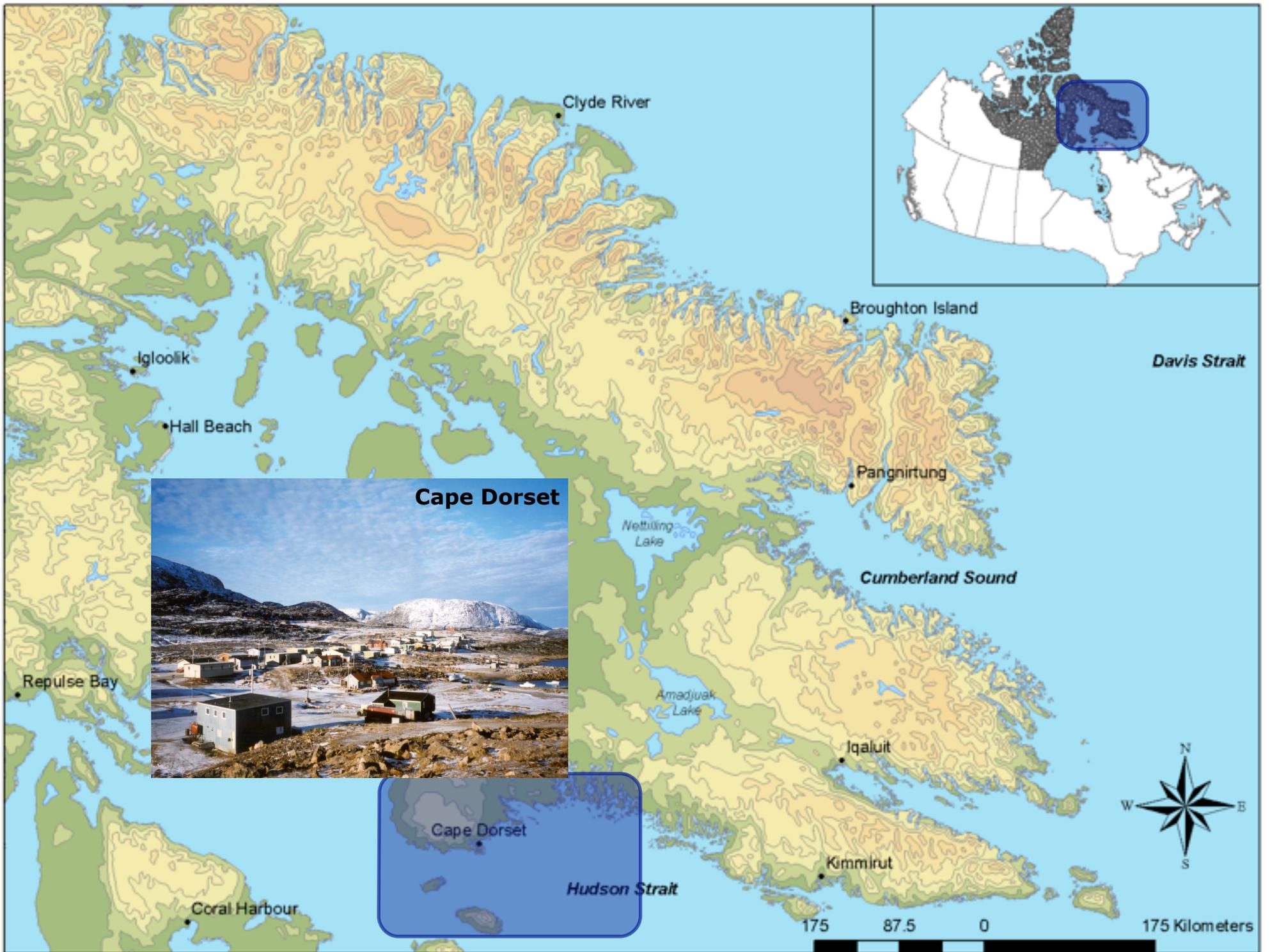




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SEA ICE

Inuktitut (& WMO) terminology helps to identify important indicators of key stages of sea ice freeze-up and break-up.

qinu (frazil / grease ice)

kanngutiit (none)

siku (first year ice)

tuvaq (fast ice)

qainngu (ice foot)

sikurraq (grey ice)

atuqsarutuq (none)

sarva (polynya)

Polar Record (2008) Vol. 44, Iss. 228, 229, & 231

<http://sikuatlas.ca> (Cape Dorset Terminology module)

WEATHER

Definitions (and translations) of weather conditions require careful consideration for local uses.

e.g. “Blizzard”

Environment Canada

- temperatures below freezing
- widespread low visibility (<1km) due to snow / blowing snow
- sustained wind speeds / gusts of 40km/hr or more

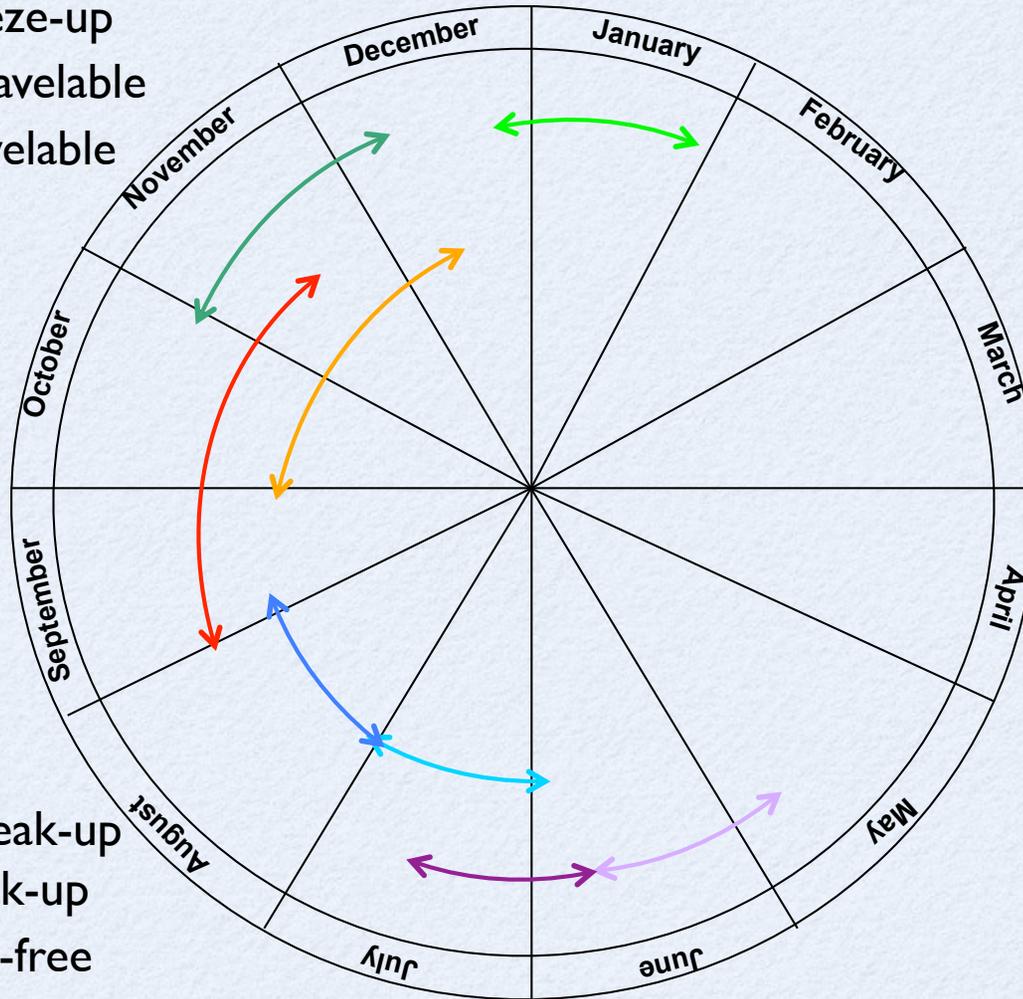
Hunters and Elders

- low visibility = not being able to see snowmobile skis
- blizzard with fresh snow falling dissipates faster than a blowing snow storm
- know wind direction

Environment Canada Workshop Report (2009)

INDICATORS OF CHANGE

- Previous freeze-up
- Recent freeze-up
- Previous travelable
- Recent travelable



- freeze-up
- break-up
- thickness
- floe edge position
- temperature / predictability
- wildlife behaviour / health
- presence / movement of multi-year ice

e.g.
Cape Dorset
seasonal sea
ice change

- Previous break-up
- Recent break-up
- Previous ice-free
- Recent ice-free

Book chapters (2006, 2010)

LINKS TO OBSERVATIONAL DATA

Local indicators are relevant and identifiable using various observational data.

e.g. instrumental data

- temperature
- wind speed and direction
- CIS egg codes / ice charts

e.g. remote sensing

- SAR (synthetic aperture radar) imagery

We need to identify and understand opportunities, challenges, and implications of making these linkages.

INSTRUMENTAL DATA

e.g. Igloolik, Nunavut

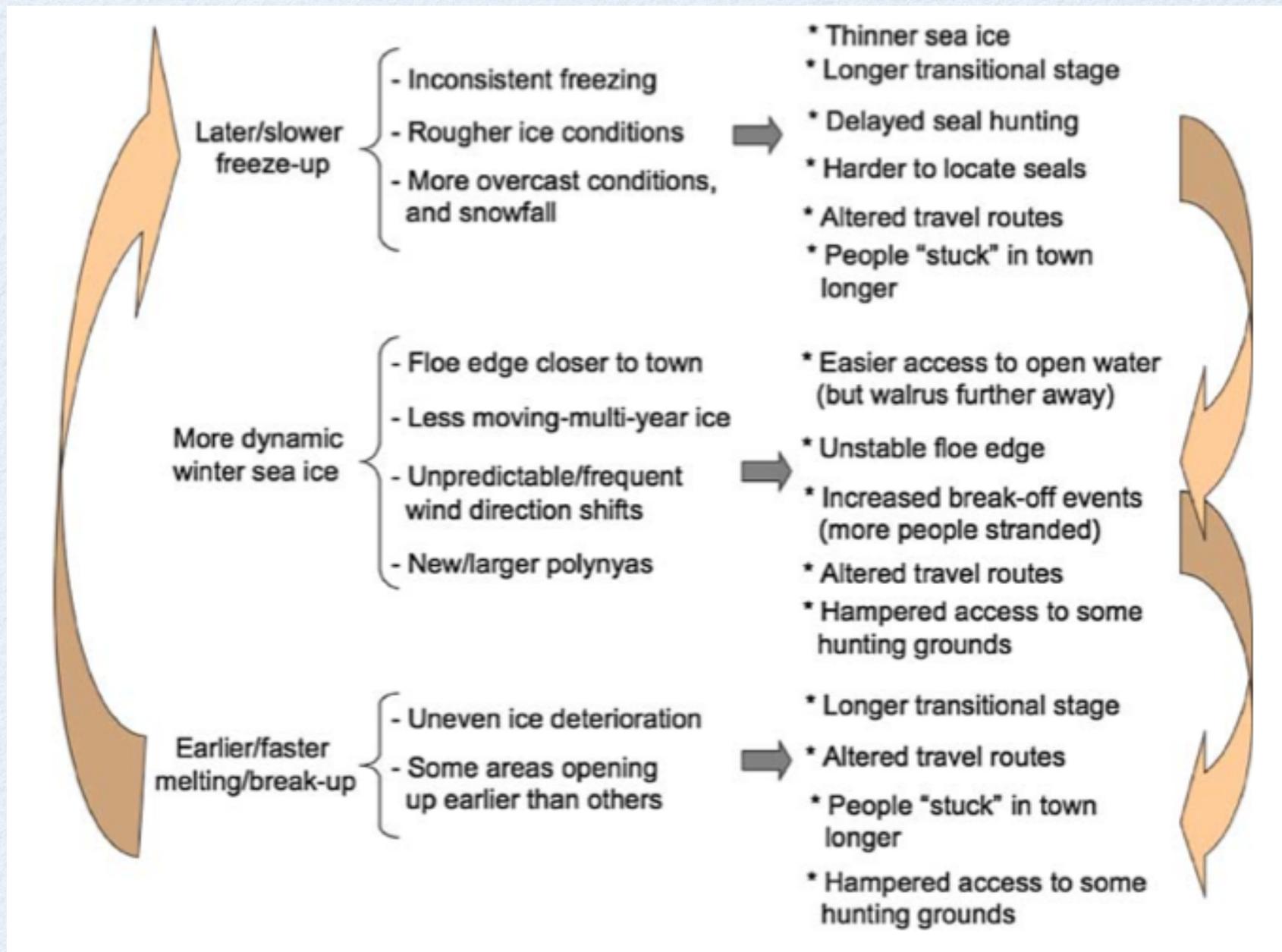
Local Observations

- later freeze-up (1 month later, based on travel or hunting)
- shifting / more unpredictable prevailing winds
- earlier break-up (1 month earlier, based on travel or hunting)

Trends Recorded

- later freeze-up (1 week / decade with 9 / 10 ice concentration)
- shifting wind direction and speed based on wind roses
- earlier break-up (6 days / decade with 5 / 10 ice concentration)

LOCAL IMPLICATIONS

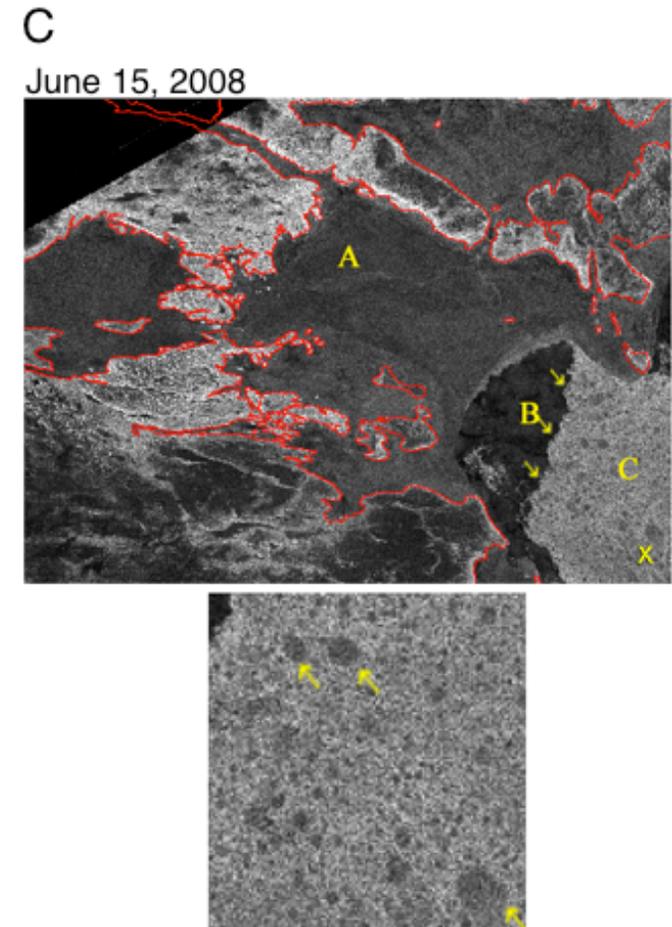
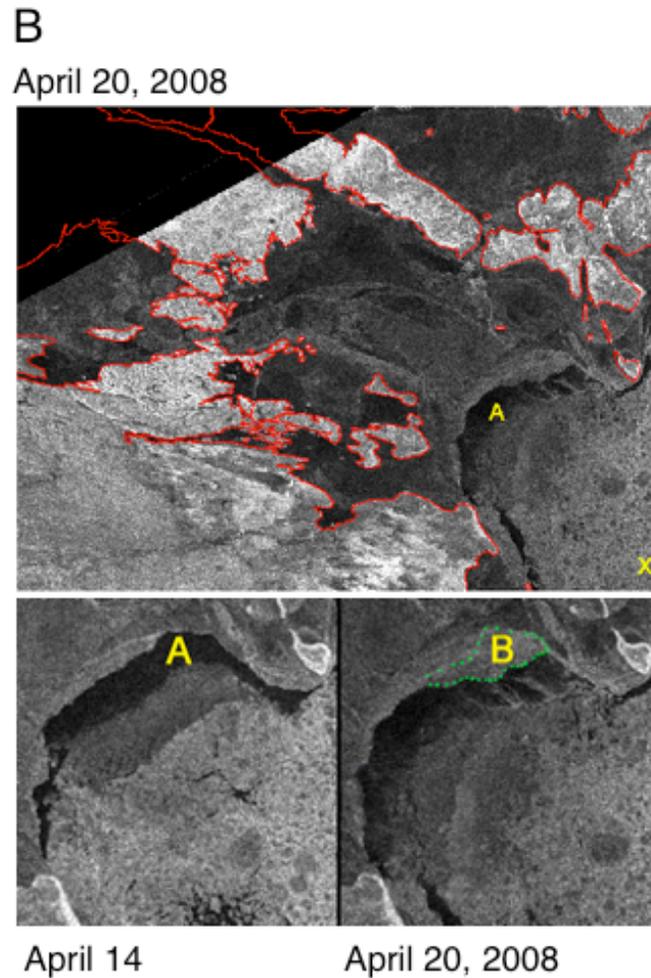
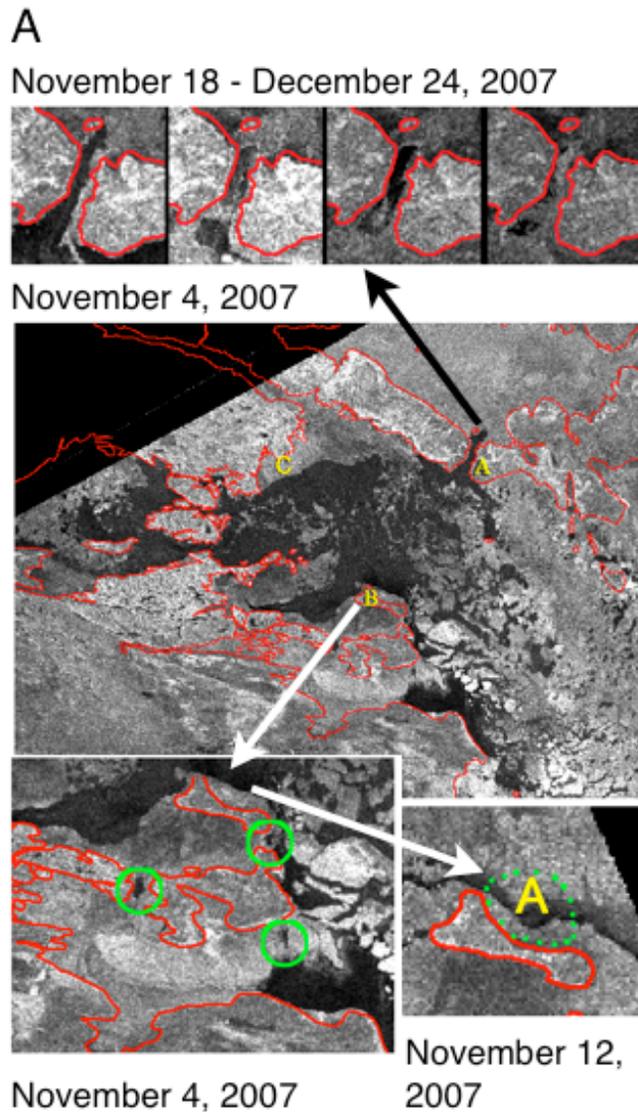


REMOTE SENSING

Opportunities	Challenges
Seeing what is on (or within/under) the ice	SAR image interpretation
Monitoring seasonal/long-term sea ice changes	Image spatial resolution
Hazards assessment	Frequency of image acquisition
Planning travel routes	SAR image representation capabilities
Facilitating search and rescue operations	Technological limitations

- clouds
- moon stages / tidal cycles / currents
- geographic reference points
- winds
- snow
- algae
- moving / multi-year ice
- seasonal relations
- animal behaviour
- surface ice conditions
- openings and edges
- comparative changes over time

LOCAL IMPLICATIONS



Fury and Hecla Strait
(sea ice use region around Igloolik)

MOVING FORWARD

- How can we better identify and incorporate locally meaningful indicators into the Polar Prediction Project?



CONSIDERATIONS

- defining indicators
- community uses and decision-making related to available forecasting services
- various societal implications/benefits
- defining thresholds
- community-based monitoring
- spatial scales
- temporal coverage
- data management and analysis
- collaboration and future research planning
- key researchers to consult/involve

KEEP IN TOUCH



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