ARCTIC-COLORS implementation strategy

→ High level considerations
→ Implementation schedule discussion
→ Jump starting Arctic Colors
→ Sampling campaign logistics on land and water
→ Other
Consideration 1: many assets to coordinate and fund

- large research vessels
- small boats
- seagliders
- buoys
- autonomous platforms
- space-base RS
- airborne RS, unmanned aerial vehicles (UAVs)
- Base camps, overland transport, transport planes, helicopters

Integrated Ocean Observing System (IOOS)
Integrative Observational Approach

- Not a traditional oceanographic campaign with a few major cruises
- Diverse array of measurement approaches proven to be effective in the Arctic for **year-round measurements and sampling**
  - Ice camps, ATVs, sleds (lower river, delta, landfast ice regions)
  - Small boats and small ships (lower river to nearshore seas)
  - Medium and large icebreakers (nearshore to outer shelf seas)
  - Deployable small vessels for shallow-water and near ice work
- Helicopter-enabled sampling
- Moorings, floats, buoys, gliders and other autonomous vehicles
- Airborne and satellite remote sensing
Consideration 2: large spatial extent

Arctic - COLORS
Coastal Land Ocean Interactions

Watersheds of the six largest arctic rivers (included in PARTNERS project (2003-2007) and Arctic Great Rivers Observatory.

Map by Greg Fiske, WHRC

Victoria and Banks Islands in the Canadian Archipelago – CHARS
(CHARS: Canadian High Arctic Research Station)
Polar Knowledge Canada Program
Consideration 3: Budget - PI Leadership will be key

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost ($K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROSES Awards to Science Teams</td>
<td>40,050</td>
</tr>
<tr>
<td><em>(Pre-Arctic-COLORS, Field Campaign and Modeling, and Synthesis)</em></td>
<td></td>
</tr>
<tr>
<td>Ships, Helicopters, All-Terrain Vehicles</td>
<td>25,173</td>
</tr>
<tr>
<td>Airplane Remote Sensing</td>
<td>9,480</td>
</tr>
<tr>
<td>Project Management</td>
<td>5,000</td>
</tr>
<tr>
<td><strong>TOTAL Costs of Arctic-COLORS</strong></td>
<td><strong>79,703</strong></td>
</tr>
</tbody>
</table>

Table 5.1. Summary of Costs for Arctic-COLORS. See § 8.1 for details.
Consideration 4: Upcoming and ongoing Arctic research in the Arctic Colors Neighborhood
Consideration 4: Upcoming and ongoing Arctic research in the Arctic Colors Neighborhood

Table 5.1 Timeline of Ongoing and Upcoming Arctic Observing Programs

<table>
<thead>
<tr>
<th>Project</th>
<th>Region</th>
<th>2016</th>
<th>2018</th>
<th>2020</th>
<th>2022</th>
<th>2024</th>
<th>2026</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBON</td>
<td>Chukchi</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBO</td>
<td>Bering, Chukchi and Beaufort shelves</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUSALCA</td>
<td>Chukchi-E. Siberian Sea</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beaufort Gyre</td>
<td>Beaufort</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MARES NOPP PARTNERSHIP</td>
<td>Coastal Beaufort</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic-COLORS</td>
<td>Coastal zone between Mackenzie and Yukon R.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABoVE</td>
<td>Canadian Arctic and Alaska boreal and tundra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPRB</td>
<td>Chukchi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentinelle Nord</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Former Notional Timeline for Arctic COLORS

Arctic Boreal Vulnerability Experiment
2016-2024

PACE Launch in 2022-2023
Arctic Boreal Vulnerability Experiment 2016-2024

Sentinel North (U. Laval, Canada) ~2017-2023

Notional Timeline
<table>
<thead>
<tr>
<th>Research Vessel</th>
<th>Details</th>
<th>Cost US K$/day</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private vessels</td>
<td>32 ft (out of Barrow)</td>
<td>$5.5</td>
<td>Able coastal vessels are available at a lower cost than the larger ice-capable vessels</td>
</tr>
<tr>
<td></td>
<td>77 ft (out of Russian Mission)</td>
<td>$8.8</td>
<td><a href="http://www.norsemanmaritime.com/">http://www.norsemanmaritime.com/</a></td>
</tr>
<tr>
<td></td>
<td>132 ft (out of Prudhoe Bay)</td>
<td>$28</td>
<td><a href="http://www.ntcl.com">http://www.ntcl.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="http://www.rvannikamarie.com/">http://www.rvannikamarie.com/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Details on vessel, port and cost from C. Polashenski.</td>
</tr>
<tr>
<td>USCGC Healy</td>
<td>Berth space for 50 scientists</td>
<td>~$50</td>
<td><a href="http://www.uscg.mil/pacarea/cgcHealy/">http://www.uscg.mil/pacarea/cgcHealy/</a></td>
</tr>
<tr>
<td>UNOLS R/V Sikuliaq</td>
<td>Berth space for ~25 scientists</td>
<td>~$45</td>
<td><a href="https://www.sikuliaq.alaska.edu/">https://www.sikuliaq.alaska.edu/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Owned by the National Science Foundation and operated by the University of Alaska</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fairbanks</td>
</tr>
<tr>
<td>CCGS Louis S. St. Laurent</td>
<td></td>
<td></td>
<td><a href="http://en.wikipedia.org/wiki/CCGS_Louis_S._St-Laurent">http://en.wikipedia.org/wiki/CCGS_Louis_S._St-Laurent</a></td>
</tr>
<tr>
<td>CCGS Amundsen</td>
<td></td>
<td>~$60</td>
<td><a href="http://www.amundsen.ulaval.ca/">http://www.amundsen.ulaval.ca/</a></td>
</tr>
<tr>
<td>I/B Oden</td>
<td></td>
<td></td>
<td><a href="http://en.wikipedia.org/wiki/Oden_(1988_icebreaker)">http://en.wikipedia.org/wiki/Oden_(1988_icebreaker)</a> and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="http://polar.se/en/om-oss/forskningsplattformar/fartyg/">http://polar.se/en/om-oss/forskningsplattformar/fartyg/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operated by the Swedish Polar Research Secretariat</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="http://www.sprs.org">http://www.sprs.org</a></td>
</tr>
<tr>
<td>RV Araon</td>
<td></td>
<td></td>
<td><a href="http://en.wikipedia.org/wiki/RV_Araon">http://en.wikipedia.org/wiki/RV_Araon</a> and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="http://eng.kopri.re.kr/home_e/contents/e_3400000/view.cms">http://eng.kopri.re.kr/home_e/contents/e_3400000/view.cms</a></td>
</tr>
</tbody>
</table>
Other discussion topics

1. Logistics: what have we missed that may affect the budget or timing
- Platforms
- Specifications
- Favorable attributes/capabilities
- Cost
CCGS Amundsen
Technical Characteristics

The Canadian research icebreaker CCGS Amundsen is a Class-1200 medium-size icebreaker based in Quebec City, Canada. The electric diesel engines of the CCGS Amundsen, which generate 11 155 kW, and the adjusted shape of the hull allows for navigation at 3 knots in more than 1 metre thick ice. The vessel was designed to have great autonomy at sea: it can travel 15 000 nautical miles at cruising speed without calling port. The CCGS Amundsen is an efficient, versatile and cost-effective ship to conduct scientific research of international calibre in the Canadian Arctic.

- Name: CCGS Amundsen (formerly the CCGS Sir John Franklin)
- Year built: 1979 (Burrard dry dock, B.C.)
- Year retrofit: 2002-2003 (Les Méchins dry dock, QC)
- Ice class: Arctic class 3
- Overall length (m): 98.33
- Breadth (m): 19.51
- Draft (m): 7.18
- Displacement (t): 5 911
- Power (kW): 11 155
- Propulsion: 6 diesel electric generators 2950 hp (18 000 hp diesel)
- Shaft horsepower: 13 960 hp (15 000 hp with overload)
- Cruise range (nm): 15 000 @ 14 knots
- Maximum speed: 16.5 knots
- Maximum capacity: 83 persons
- Crew: 30 to 40
- Science berths: 43
- Deck cranes: 4
- Helideck/hangar: Yes
- Helicopter: BO 105
- Hydraulic A-frames: 2
- Scientific winches: 5
- Acoustic well: Yes
- Internal moon pool: Yes
- Dynamic positioning system: Yes
- Launches/barge: 3
- Internal communications network
- Internet access: Yes (E-mail at sea system)
- NOAA SCS server system
~$60k/day, but no transit costs if any ongoing work in the Western Arctic

Scheduling: 9 months out minimum, typically 1 year works if you can be flexible

Available in 2017, with some mooring work scheduled in the Beaufort

Laval is applying for Canadian Gov funds to reduce cost of research on the Amundsen

Keith Lévesque <Keith.Levesque@arcticnet.ulaval.ca>
### Vessel Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td>119.6 m</td>
</tr>
<tr>
<td><strong>Breadth</strong></td>
<td>24.4 m</td>
</tr>
<tr>
<td><strong>Draft</strong></td>
<td>9.9 m</td>
</tr>
<tr>
<td><strong>Freeboard</strong></td>
<td>6.4 m</td>
</tr>
<tr>
<td><strong>Gross Tonnage</strong></td>
<td>11345.0 t</td>
</tr>
<tr>
<td><strong>Net Tonnage</strong></td>
<td>3403.0 t</td>
</tr>
<tr>
<td><strong>Cruising Range</strong></td>
<td>23000 nm</td>
</tr>
<tr>
<td><strong>Endurance</strong></td>
<td>205 d</td>
</tr>
<tr>
<td><strong>Cruising Speed</strong></td>
<td>16.0 kts</td>
</tr>
<tr>
<td><strong>Maximum Speed</strong></td>
<td>20.0 kts</td>
</tr>
<tr>
<td><strong>Fresh Water</strong></td>
<td>200.00 m³</td>
</tr>
<tr>
<td><strong>Fuel Capacity</strong></td>
<td>3500.00 m³</td>
</tr>
<tr>
<td><strong>Fuel Consumption</strong></td>
<td>24.00 m³/d</td>
</tr>
</tbody>
</table>

**CCGS Louis St. Laurent**
CCGS St. Laurent
- Large helipad
- Can break more ice (get us there earlier, stay later)
- More endurance
- Expensive ($95k/day (Can))
- 10m draft, more difficulties close to shore
- Administrative issues
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, Overall</td>
<td>420'0&quot; (128 meters)</td>
</tr>
<tr>
<td>Beam, Maximum</td>
<td>82'0&quot; (25 meters)</td>
</tr>
<tr>
<td>Draft, Full Load</td>
<td>29'3&quot; (8.9 meters)</td>
</tr>
<tr>
<td>Displacement, Full Load</td>
<td>16,000 LT</td>
</tr>
<tr>
<td>Propulsion</td>
<td>Diesel Electric, AC/AC Cycloconvertor</td>
</tr>
<tr>
<td>Generating Plant</td>
<td>4 Sultzer 12Z AU40S</td>
</tr>
<tr>
<td>Drive Motors</td>
<td>2 AC Synchronous, 11.2 MW</td>
</tr>
<tr>
<td>Shaft Horsepower</td>
<td>30,000 Max HP</td>
</tr>
<tr>
<td>Propellers</td>
<td>2 Fixed Pitch, 4 Bladed</td>
</tr>
<tr>
<td>Auxiliary Generator</td>
<td>EMD 16-645F7B, 2400kW</td>
</tr>
<tr>
<td>Fuel Capacity</td>
<td>1,220,915 GAL (4,621,000 liters)</td>
</tr>
<tr>
<td>Cruising Speed</td>
<td>12 knots @ 105 RPM</td>
</tr>
<tr>
<td>Max Speed</td>
<td>17 knots @ 147 RPM</td>
</tr>
<tr>
<td>Icebreaking Capability</td>
<td>4.5 ft @ 3 knots (continuous)</td>
</tr>
<tr>
<td></td>
<td>8 ft (2.44 m) Backing and Ramming</td>
</tr>
<tr>
<td>Science Labs</td>
<td>Main, Bio-Chemical, Electronics, Meteorological, Photography</td>
</tr>
<tr>
<td>Accommodations</td>
<td>19 Officer, 12 CPO, 54 Enlisted, 35 Scientists, 15 Surge, 2 Visitors</td>
</tr>
</tbody>
</table>
USCG Healy

- Familiarity (used during ICESCAPES)
- $60k+/day (not verified, may be more)
- Break ~3m ice if necessary
- Long endurance
- 9+m draft, more difficulties close to shore
- Administrative issues
## R/V SIKULIAQ Characteristics

### General Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, Overall</td>
<td>LOA</td>
<td>261 feet</td>
</tr>
<tr>
<td>Length, Design Waterline</td>
<td>LWL</td>
<td>237 feet 0 inches</td>
</tr>
<tr>
<td>Beam, Max across reamer</td>
<td>Bmax</td>
<td>52 feet</td>
</tr>
<tr>
<td>Beam, Max across hull amidship</td>
<td>Bmidship</td>
<td>48 feet</td>
</tr>
<tr>
<td>Depth, Keel to Main Deck</td>
<td>D</td>
<td>28 feet</td>
</tr>
<tr>
<td>Draft, Design Waterline</td>
<td>TDWL</td>
<td>18 feet 9 inches</td>
</tr>
<tr>
<td>Freeboard, Design Waterline</td>
<td>FDWL</td>
<td>8 feet 9 inches</td>
</tr>
<tr>
<td>Displacement at Design Waterline</td>
<td></td>
<td>3,665 long tons</td>
</tr>
<tr>
<td>Propulsion Power</td>
<td>P</td>
<td>5,750 BHP</td>
</tr>
</tbody>
</table>

### Performance

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endurance</td>
<td>45 days</td>
</tr>
<tr>
<td>Endurance, Hotel Only</td>
<td>60 days</td>
</tr>
<tr>
<td>Range</td>
<td>11 knots</td>
</tr>
<tr>
<td>Cruise Speed</td>
<td>transit speed</td>
</tr>
<tr>
<td>Max Speed, Calm Open Water</td>
<td>V\text{calm}</td>
</tr>
<tr>
<td>Max Speed, 4 M Sea (13.1 ft)</td>
<td>V\text{s s 5}</td>
</tr>
<tr>
<td>Level Ice at 2 knots</td>
<td>Ice thickness</td>
</tr>
<tr>
<td></td>
<td>3 feet</td>
</tr>
</tbody>
</table>
Sikuliaq Specs

<table>
<thead>
<tr>
<th>Capacities and Working Areas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Berths</td>
<td>24</td>
</tr>
<tr>
<td>Crew Berths</td>
<td>20 crew plus 2 marine technicians</td>
</tr>
<tr>
<td>Science deadweight</td>
<td>100 long tons</td>
</tr>
<tr>
<td>Aft Deck 20' ISO Van Services and Twist Lock</td>
<td>3 Fixed locations</td>
</tr>
<tr>
<td>Fwd Deck 10' ISO Van Services and Twist Lock</td>
<td>1 Fixed location</td>
</tr>
<tr>
<td>Science storage</td>
<td>8,000 cubic feet</td>
</tr>
<tr>
<td>Science Labs</td>
<td>2250 square feet</td>
</tr>
<tr>
<td>Deck Working Area</td>
<td>4360 square feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consumables</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel, at 95%</td>
<td>170,000 gallons</td>
</tr>
<tr>
<td>Fresh Water, at 100%</td>
<td>13,150 gallons</td>
</tr>
<tr>
<td>Water making capacity</td>
<td>6,000 gallons/day</td>
</tr>
<tr>
<td>Provisions</td>
<td>60 days</td>
</tr>
<tr>
<td>Holding capacity</td>
<td>24 hours</td>
</tr>
</tbody>
</table>
UNOLS Sikulialaq

- Stationed at UAK (Tom W. knows a lot about it!)
- $39-45/ day (US)
- Light duty icebreaker
- Comes in from the west, so may be more amenable for shoulder seasons
- State of the art!
- Can serve as hotel
- Only 45 day endurance/ 60 hotel
NTCL - Northern Transportation Company Limited

Proud of our Heritage
From 1934 in "Waterways", Alberta to today on the East Coast of Canada, the Western Arctic, and in particular along the Mackenzie River, our roots, not just our name, show who we are and who we serve. Our relationship with the communities we reach each season strengthens both these roots and our responsibility to these customers. As we close in on our 80th sealift season, and reflect back on the progress of the North and the promise of the future, NTCL is more committed than ever to relationship building and helping the people and companies of the North succeed in all they do.

Providing innovative, efficient transportation alternatives and great customer service are the hallmarks of our capabilities today and will remain so for the future. Nearly 80 years has taught us a lot and building off what we have learned will help us continue to offer you the best service possible.

NTCL Mission Statement
"We proudly deliver northern solutions and opportunities in challenging environments"

Sailing Schedule
The 2014 Shipping Schedule is now available:

Latest Schedule Changes:
If you have not requested to be added to our email schedule distribution list please email kw@ntcl.com with the subject line please add me

River Schedule 2014-09-26
The 2014 Shipping rates are now available:

New Flat Rates on Many Commodities!
2014 Cargo Rates – All Commodities

CONTACT US WITH YOUR LARGE CARGO NEEDS – WE CAN PROVIDE AN ESTIMATE TODAY!

- All NTCL terminals are now open to accept cargo!

Driving directions to the Hay River terminal

News Articles
Changes at NorTerra but business as usual for NTCL
Changes with NTCL's parent company NorTerra.

Follow this for …
NTCL is now on Facebook and Linkedin!
NTCL is now on Facebook and Linkedin!

Like us …
New Contact Numbers for Hay River Terminal
Please be advised – contact numbers for the …

View all articles →
Region/ towns served by NTCL
<table>
<thead>
<tr>
<th>Vessel (click for details)</th>
<th>H.P.</th>
<th>Speed (knots)</th>
<th>O.A. Length</th>
<th>Moulded Breadth</th>
<th>Moulded Depth</th>
<th>Running Draft</th>
<th>Voyage Class</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.V. Alex Gordon</td>
<td>7200</td>
<td>15.5</td>
<td>205’</td>
<td>45’</td>
<td>18’2”</td>
<td>14’2”</td>
<td>Home Trade I</td>
<td>Arctic Class 2</td>
</tr>
<tr>
<td>M.V. Jim Kilabuk</td>
<td>7200</td>
<td>15.5</td>
<td>205’</td>
<td>45’</td>
<td>18’2”</td>
<td>14’2”</td>
<td>Home Trade I</td>
<td>Arctic Class 2</td>
</tr>
<tr>
<td>M.V. Nunakput</td>
<td>4300</td>
<td>12</td>
<td>167’6”</td>
<td>47’9”</td>
<td>10’6”</td>
<td>6’</td>
<td>Home Trade II</td>
<td>Western Arctic – Barrow to Taloyoak</td>
</tr>
<tr>
<td>M.V. Pisurayak Kootook</td>
<td>4300</td>
<td>12</td>
<td>160’</td>
<td>40’</td>
<td>10’6”</td>
<td>6’6”</td>
<td>Home Trade II</td>
<td>Western Arctic – Barrow to Taloyoak</td>
</tr>
<tr>
<td>M.V. Pat Lyall</td>
<td>4300</td>
<td>12</td>
<td>160’</td>
<td>40’</td>
<td>10’6”</td>
<td>6’6”</td>
<td>Home Trade II</td>
<td>Western Arctic – Barrow to Taloyoak</td>
</tr>
<tr>
<td>Vic Ingraham</td>
<td>4500</td>
<td>12</td>
<td>154.6’</td>
<td>50’</td>
<td>9’6”</td>
<td>3’9”</td>
<td>Minor Water I</td>
<td>Great Slave Lake &amp; Mackenzie River</td>
</tr>
<tr>
<td>M.V. Edgar</td>
<td>5600</td>
<td>14</td>
<td>153’3”</td>
<td>52’1”</td>
<td>9’6”</td>
<td>3’9”</td>
<td>Home Trade III</td>
<td>Western Arctic – Western Arctic – Up to 20 miles offshore</td>
</tr>
<tr>
<td>M.V. Henry Christoffersen</td>
<td>4500</td>
<td>14</td>
<td>153’3”</td>
<td>52’1”</td>
<td>9’6”</td>
<td>3’9”</td>
<td>Home Trade III</td>
<td>Western Arctic – Western Arctic – Up to 20 miles offshore</td>
</tr>
<tr>
<td>M.V. Kelly Ovayuak</td>
<td>5600</td>
<td>14</td>
<td>148’3”</td>
<td>52’1”</td>
<td>9’6”</td>
<td>3’9”</td>
<td>Home Trade III</td>
<td>Western Arctic – Up to 20 miles offshore</td>
</tr>
<tr>
<td>M.V. Jack McNiven</td>
<td>4500</td>
<td>14</td>
<td>148’3”</td>
<td>52’1”</td>
<td>9’6”</td>
<td>3’9”</td>
<td>Home Trade III</td>
<td>Western Arctic – Up to 20 miles offshore</td>
</tr>
<tr>
<td>M.V. Keewatin</td>
<td>3375</td>
<td>12</td>
<td>126’6”</td>
<td>38’1”</td>
<td>12’1”</td>
<td>8’10”</td>
<td>Home Trade II</td>
<td>Hudson Bay</td>
</tr>
<tr>
<td>M.V. Marjory</td>
<td>1100</td>
<td>10</td>
<td>81’1”</td>
<td>29’6”</td>
<td>7’9”</td>
<td>3’6”</td>
<td>Home Trade III</td>
<td>Western Arctic – Up to 20 miles offshore</td>
</tr>
</tbody>
</table>
Northern Transportation Company
- Extensive river and estuary work experience
- First Nation owned (possibility of contacts/connections)
- Can accommodate ~12 scientists
- Willing to serve as a hotel or staging platform
- Lab space available/ specifics unknown
- Discussed cost of $30k/day (Can)
**Equipment transport:** Air shipments are typically expensive and each team must budget accordingly. Typical transport rates into Alaskan villages vary between $0.50/lb and $1.5/lb, dimensional weight, for parcel size and shape objects, with considerably higher costs for large and irregular items. Large aircraft (e.g. 737 combi’s) fly into Barrow, Kotzebue, Nome, and other larger towns in Alaska, enabling most parcels to be moved. However, aircraft size is typically limited to Cessna Caravans (208’s) when flying into smaller villages, which substantially limits the maximum size of objects that can be moved to smaller villages. Northern Air Cargo provides jet freight service to larger communities such as Barrow, Nome, and Kotzebue. Several companies, including Northern Air Cargo and Evertts, specialize in bulk cargo, while RAVN and Alaska Airlines have priority parcel moving services. Services are typically available several times a week. Other transfer options include Arctic Air Alaska (http://arcticairalaska.com) and Air Arctic (http://www.airarctic.com/fbo/), which provide charter air services. Rental costs for vehicles are generally high in Arctic towns and villages. In smaller villages, obtaining a rental vehicle is quite difficult, as many towns do not have a dedicated business for renting equipment. In these instances, it is sometimes possible to rent personal vehicles and transport services. Several companies including Northern Transportation Company Limited (http://www.ntcl.com) also provide coastal and river shipping during ice-free periods in the Mackenzie River basin, which is a viable option for moving larger equipment to most small villages. If larger vessels are used, some cargo can be loaded at their homeports prior to the field season.