Arctic - COLORS

Arctic-Coastal Land Ocean Interactions

Project PIs:

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http://arctic-colors.gsfc.nasa.gov
Coastal Arctic as an integrated land-ocean-atmosphere-biosphere system
Revised Overarching science goal:
to quantify the biogeochemical response of the Arctic nearshore ecosystem to rapidly changing terrestrial fluxes and ice conditions.
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
## Scoping Study Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Event</th>
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<tbody>
<tr>
<td>2014</td>
<td>Jan</td>
<td>Kick-off</td>
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<tr>
<td></td>
<td>June</td>
<td>1st Community Workshop</td>
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<td></td>
<td>Nov</td>
<td>2nd Community Workshop</td>
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<tr>
<td>2015</td>
<td>Aug</td>
<td>Draft Report posted for comments</td>
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<td></td>
<td>Sept</td>
<td>Submitted Final Report to NASA</td>
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<td></td>
<td>30d</td>
<td>NASA posted for 30-day comment</td>
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<td></td>
<td>Nov</td>
<td>NASA Panel Review</td>
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<td>2016</td>
<td>Febr</td>
<td>We received Panel Summary</td>
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<tr>
<td></td>
<td>Aug</td>
<td>Open Community Workshop</td>
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<td></td>
<td>Dec</td>
<td>Submission of revised Report</td>
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Panel Conclusion: Arctic-COLORS is of potential high merit, but needs further study/planning to resolve science or other issues.

“An Arctic coastal experiment represents an important and timely opportunity for [NASA] because of the rapidly changing Arctic Environment.”
Panel Recommendations - Science Objectives

Overall: More specificity in overarching aim and science questions

The science plan should align specific proposed measurements with the particular knowledge gaps to be filled, which should be tied back to the hypotheses to be tested (Recommendation 1).

Either narrow the focus of the proposal to eliminate the role of the atmosphere or expand the proposal by making more explicit linkages between the atmosphere, ocean and land (Recommendation 2).

The writing team should revisit the question of what ecological problems and biogeochemical processes are most important and what sorts of measurements would need to be made to attack those problems quantitatively (Recommendation 3).

Distinguish between cases where climate change signals might be detectable, scientific cases where the primary outcome will be establishing a current baseline, and those cases where the primary impact of the project will be the development of new algorithms (Recommendation 11).
Panel Recommendations - Implementation Objectives

Either prioritize (on quantitative grounds) or justify (in terms of ecological contrasts) why such a **broad range of experimental sites** is necessary (*Recommendation 4*).

Develop a clear strategy for linking **year-round measurements** with those associated with the **intensive field campaigns** given the newly prioritized set of scientific goals, as appropriate (*Recommendation 5*).

**Dependencies and complementarities** with other programs (e.g. ABoVE, BOEM, LTER, USGS, NACP/OCB CCARS, etc.) In particular, the linkages to ABoVE, and relevant operational timelines must be more explicit...Collaborating with USGS could be invaluable for extending ARCTIC COLORS data for more than the few years of field work proposed here (*Recommendation 7*).

Similarly, what are the synergies/relationships between Arctic-COLORS and other programs (e.g., ABovE) that could help **mitigate certain risk**? Or, is dependency on an external program a risk in itself? (*Recommendation 10*)

*Recommendation 13: ...*
Solicit input from the community on overarching science aim and science questions
Thursday afternoon  Group discussion on Arctic COLORS revised science questions

Friday morning  
- More discussion on Arctic COLORS revised science questions
- Optimizing/constraining the Arctic COLORS Study Domain (core and extended regions) (R#1, #4, #6)
- Optimizing the Arctic COLORS Field Measurements Program (process studies and synoptic surveys) (R#4, #5)

Friday afternoon  
- Arctic COLORS Implementation Plan (R#6,#8, #9, #12)
- Arctic-COLORS within the context of other U.S. agency programs and international initiatives (R#7, #10)
- Next Steps
Revised Hypothesis and Top-Level Science Questions

**Hypothesis** – *It is not too late to establish a baseline for characterizing biological and biogeochemical conditions in the nearshore Arctic.*

**Top Level Science Questions:**

1. Effect of Land on Sea (rivers, thawing permafrost, coastal erosion)
2. Effect of Ice on Sea (snow, landfast ice, sea ice)
3. Effects of future warming land on sea and future melting ice on Sea – seasonal and interannual first, and then future scenarios/predictions