

Arctic - COLORS

Arctic-Coastal Land Ocean Interactions

Arctic-COLORS is A NASA OBB - Field Campaign Scoping Study that aims to improve understanding and prediction of responses of terrestrial fluxes, productivity, biodiversity and foodwebs in the rapidly changing Arctic coastal zone, and assess vulnerability, responses, and feedbacks of coastal ecosystems, communities, and natural resources to current and future pressures.

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<http://arctic-colors.gsfc.nasa.gov>

Focusing Science Goal, Ho & Questions



SUGGESTED Overarching Science Goal:

To quantify the biogeochemical response of the Arctic nearshore ecosystem to rapidly changing terrestrial fluxes and ice conditions.

Revised Hypothesis:

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



Why this focusing?

- Specific to the Arctic
- Specific to the Arctic nearshore
- Global significance
- Re-aligned atmospheric impacts and consequences
- Re-aligned human component
- It IS about processes and fluxes and not about budgets
- It is about BOTH biogeochemistry and ecology as they are inter-related

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 change: warming land and melting ice on sea

(seasonal and interannual first, and then future scenarios/predictions)

1. Effect of Land on the Sea

- How does variability in riverine fluxes affect biogeochemical transformations in the nearshore zone?
- How do freshwater carbon, nutrient and sediment loadings to the coastal zone change as a result of permafrost thawing within the watershed?
- How do freshwater carbon, nutrient and sediment loadings to the coastal zone change as a result of coastal erosion?
- Is the relative magnitude of inputs from rivers, thawing permafrost and coastal erosion changing across the coastal Arctic seasonally and interannually?

2. Effect of Ice on the Sea

- How does the coastal snow and ice cover impact nearshore net ecosystem productivity by controlling rates of transport/mixing and by modulating light availability?
- What controls do ice/snow conditions impose on terrestrial fluxes into the nearshore environment?
- Seasonality: How does the timing of sea ice formation/retreat, length of sea ice cover and ablation, snow accumulation, and the morphology of the coastal ice zone influence coastal ecology and biogeochemistry?

3. Effects of future change: warming land and melting ice on sea

- What is the future biogeochemical response of the Arctic nearshore ecosystem to rapidly changing riverine inputs, permafrost and coastal erosion?
- What is the future biogeochemical response of the Arctic nearshore ecosystem to rapidly changing sea-ice, land-fast ice and snow?
- How would net ecosystem productivity in the Arctic nearshore environment respond to changing scenarios of terrestrial fluxes and ice conditions?

Those who live in, work and engage with the Arctic have the most at stake in a rapidly changing environmental context

Their input will be sought early in the research planning to inform and refine critical research targets, during field program, and later to ensure findings are communicated effectively.

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COastal Land Ocean inteRactionS in the Arctic

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