

Optical Characterization of Coastal Arctic Waters

– An NRL Research Endeavor

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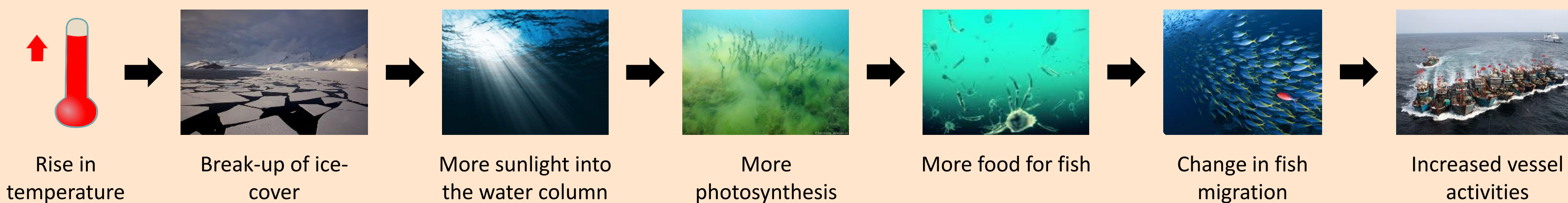
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Objective

- ❖ Characterize the optical properties of coastal Arctic waters and their geospatial variations in preparation for developing Arctic remote sensing tools

Motivation



Environmental changes have security implications!

- The Navy needs a remote sensing capability to monitor environmental changes in the Arctic
- Development of remote sensing tools require quantitative information of optical properties of Arctic waters
- Arctic water constituents released from thawing permafrost expected to have unique optical properties
- Quantitative optical characterization of coastal Arctic waters is key to developing Arctic remote sensing tools

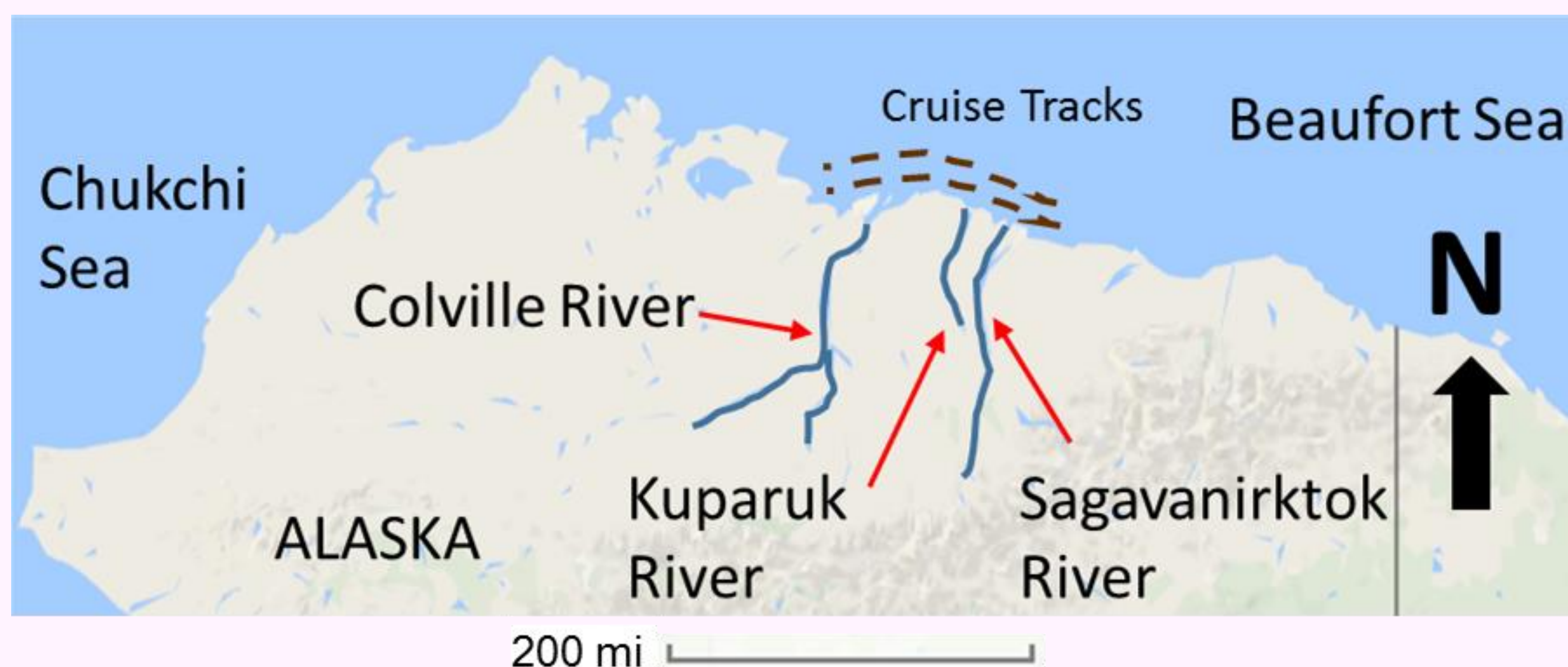
Research Questions

- ❖ What are the optical properties of constituents in coastal Arctic waters?
- ❖ How do the optical properties vary as a function of constituent composition and inland watershed characteristics?
- ❖ What improvements can we expect in remote sensing retrievals due to the knowledge of the optical properties?
- ❖ What are the critical radiative transfer relationships for coastal Arctic remote sensing?

Research Tasks

- 1) Determine concentrations, composition, and optical properties of constituents in coastal Arctic waters
- 2) Investigate relationships between constituent composition and optical properties and their geospatial variations
- 3) Estimate improvement in remote sensing retrievals due to knowledge of optical properties and develop spectral relationships for Arctic remote sensing

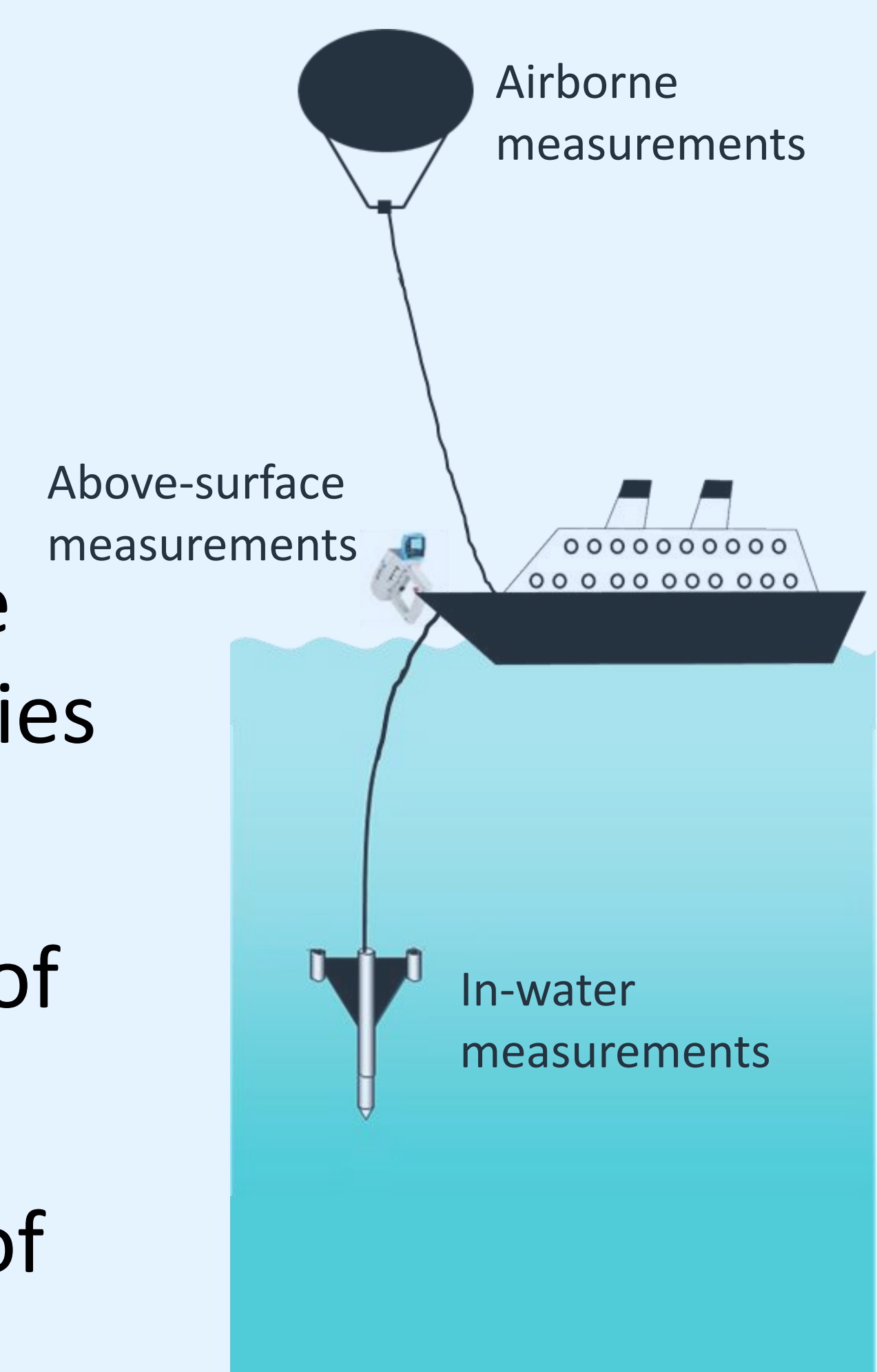
Study Area



- Three largest rivers draining northern Alaska
- Drainage basins underlain by permafrost, differ in size, precipitation, water discharge, elevation, slope, etc.
- Differences in the amount/ type of material transported

Field Campaign

- ❖ Two weeks in Jul/Aug 2020
- ❖ Along and at different distances from the northern Alaskan coast
- ❖ In-water, at-surface, and airborne measurements of optical properties
- ❖ Detailed measurements of composition and concentrations of Arctic water constituents
- ❖ Geospatial analysis of the effect of drainage basin characteristics



Payoff

- ❖ An as-yet-non-existent **remote sensing capability** crucial for monitoring the changing Arctic environment