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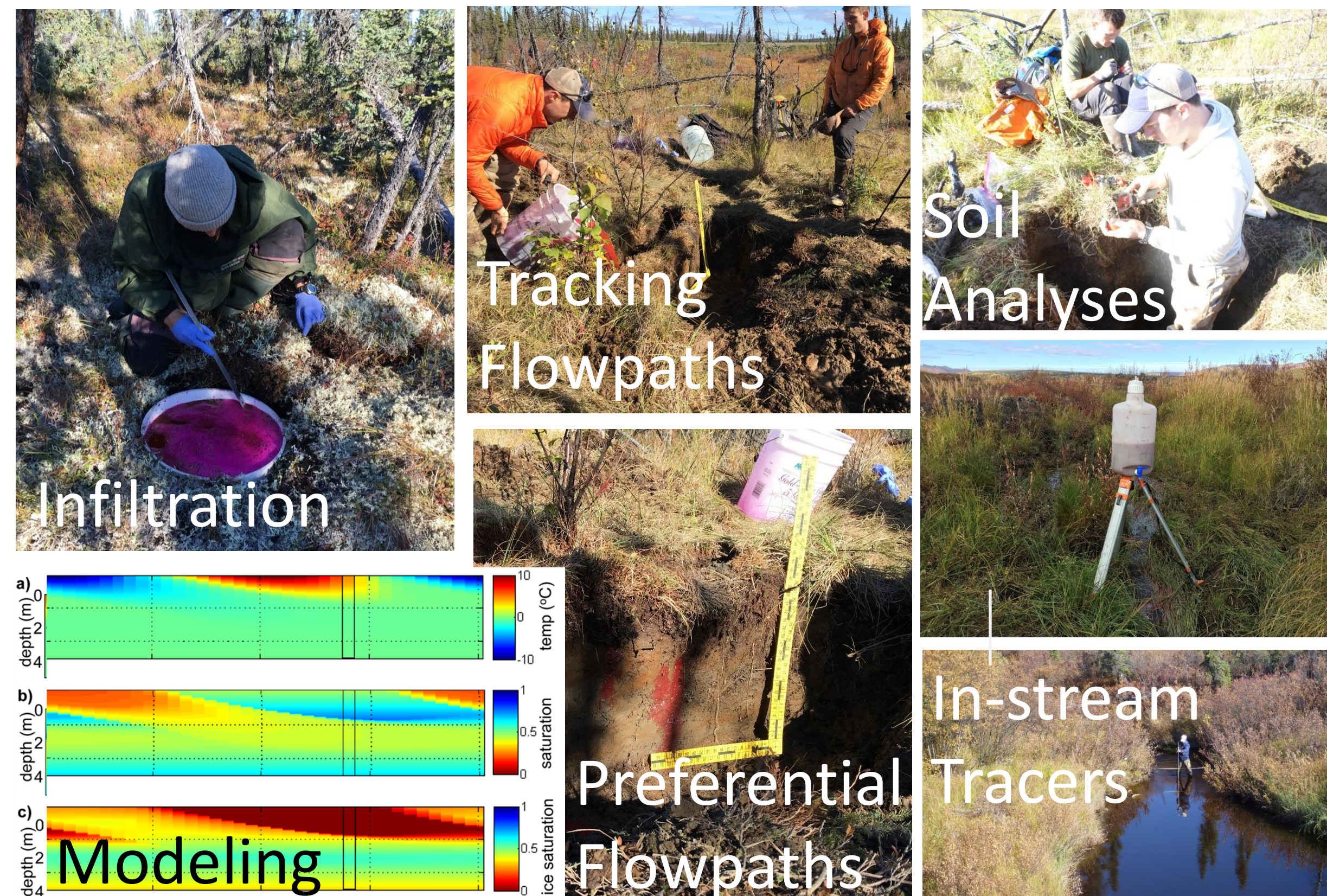
Study Initiatives

The overarching goal of this project is to investigate the vulnerability of the water cycle, hydrology, and the aquatic carbon (C) cycle to changing permafrost conditions across boreal northwestern North America. We have undertaken an integrated interdisciplinary research campaign comprised of field, remote sensing, and modeling approaches to evaluate the response of boreal landscapes to change in the 'plumbing' that controls water movement and distribution, change in the source and chemical composition of C delivered to inland waters, and change in the rates and processes that control organic and inorganic C processing by inland waters and their emissions of carbon dioxide (CO₂) and methane (CH₄) to the atmosphere. Field data collected during summer 2016 campaign focused on (1) 11 watershed sites along the Dalton and Steese Highways and (2) 21 lake sites in the Yukon Flats National Wildlife Refuge.

Subsurface Characterization

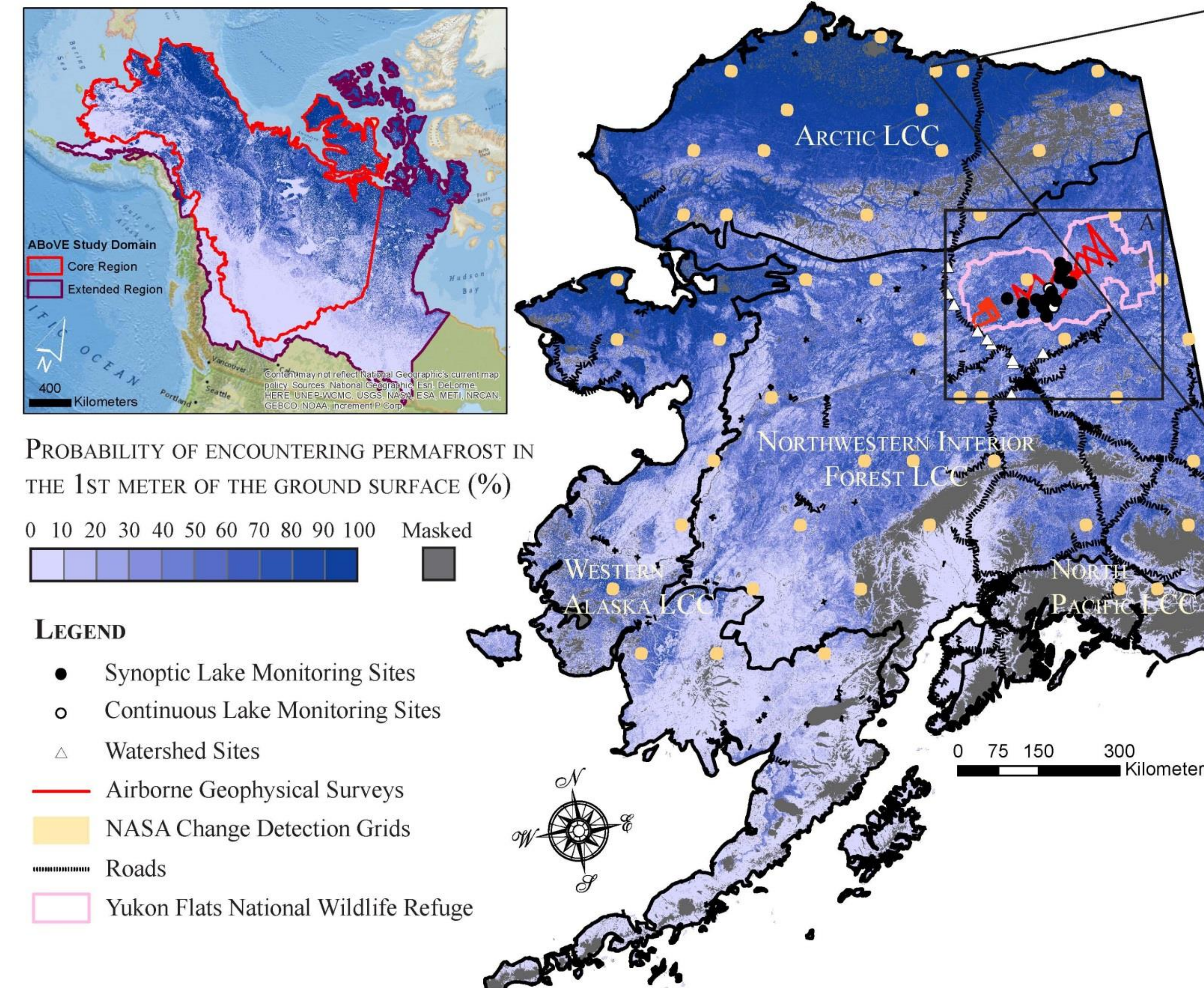


Subsurface Hydrology



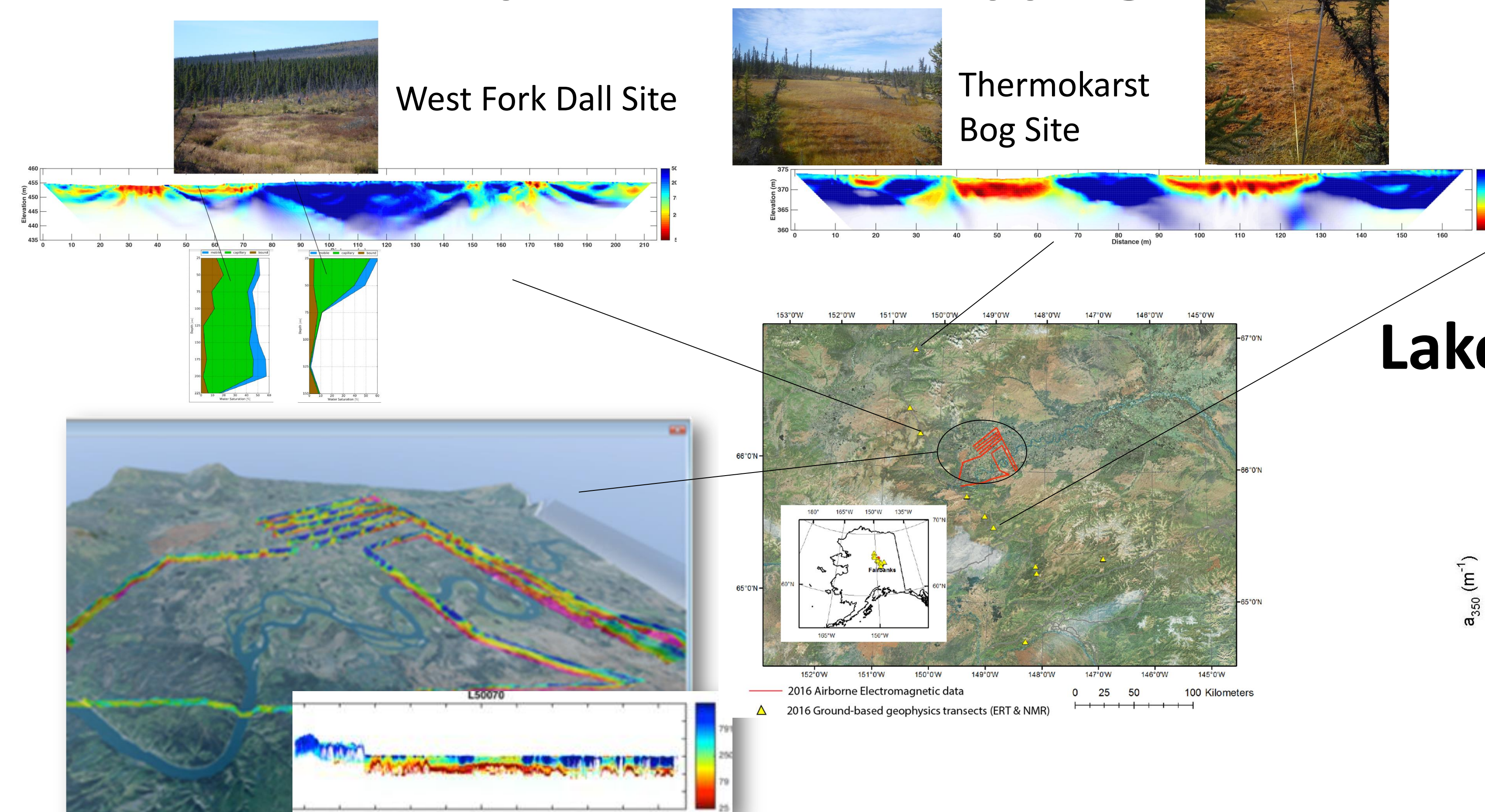
Dye infiltration experiments enabled quantification of soil water flux and visualization of preferential flowpaths. Soil samples at depth were collected for laboratory analyses of hydraulic and thermal properties to be used as input for cryohydrogeologic modeling. In-stream tracers were used to detect stream inflows in contrasting soil and permafrost conditions.

Near Surface Permafrost Mapping



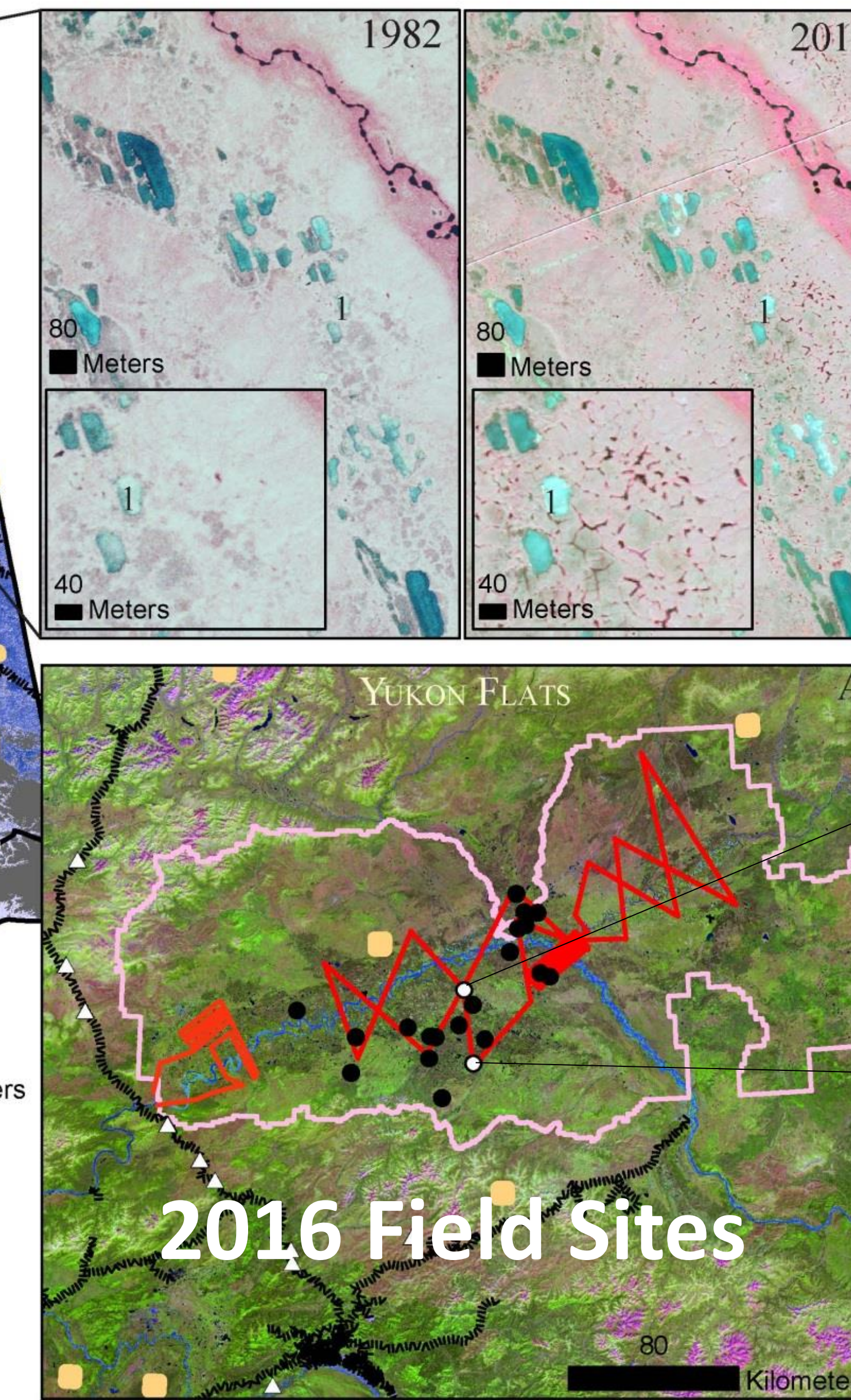
Field measurements, time series analyses, and remote sensing observations will be incorporated into an integrated modeling framework to improve the understanding of the spatial distribution of landscape properties and processes within the ABoVE domain and how interactions among environmental factors contribute to the sensitivity of permafrost landscapes to change.

Deep Permafrost Mapping

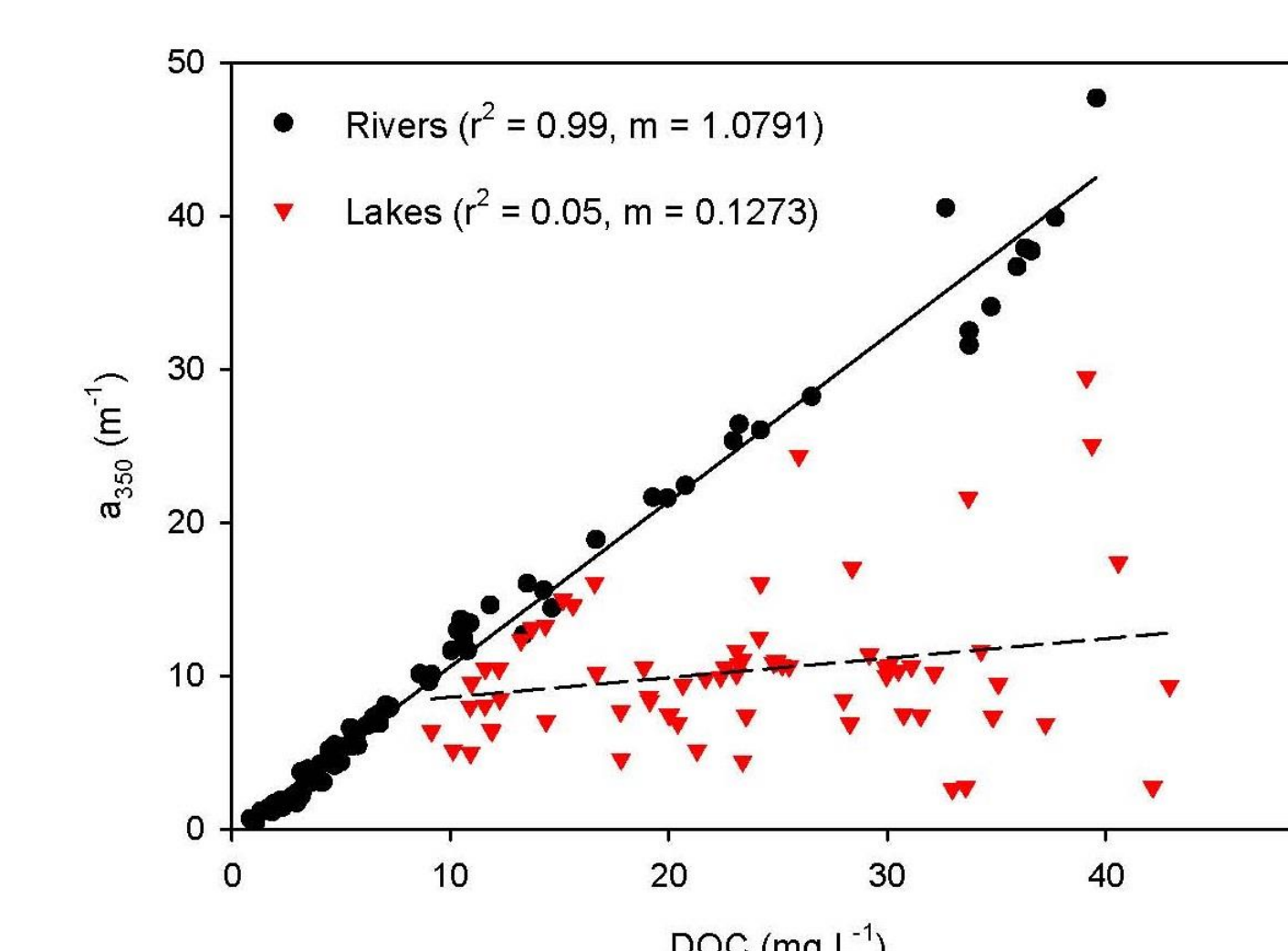


An Airborne ElectroMagnetic (AEM) survey flown in March 2016 in the western Yukon Flats yielded a rich resistivity data set, which will be used to interpret spatial and vertical distribution of permafrost and lithology. Flight line total = 300 km. Results will be combined with surface water distribution mapping and 30-year lake area trend analyses to evaluate surface and subsurface hydrologic connectivity in the context of lake dynamics.

Landscape Change Detection

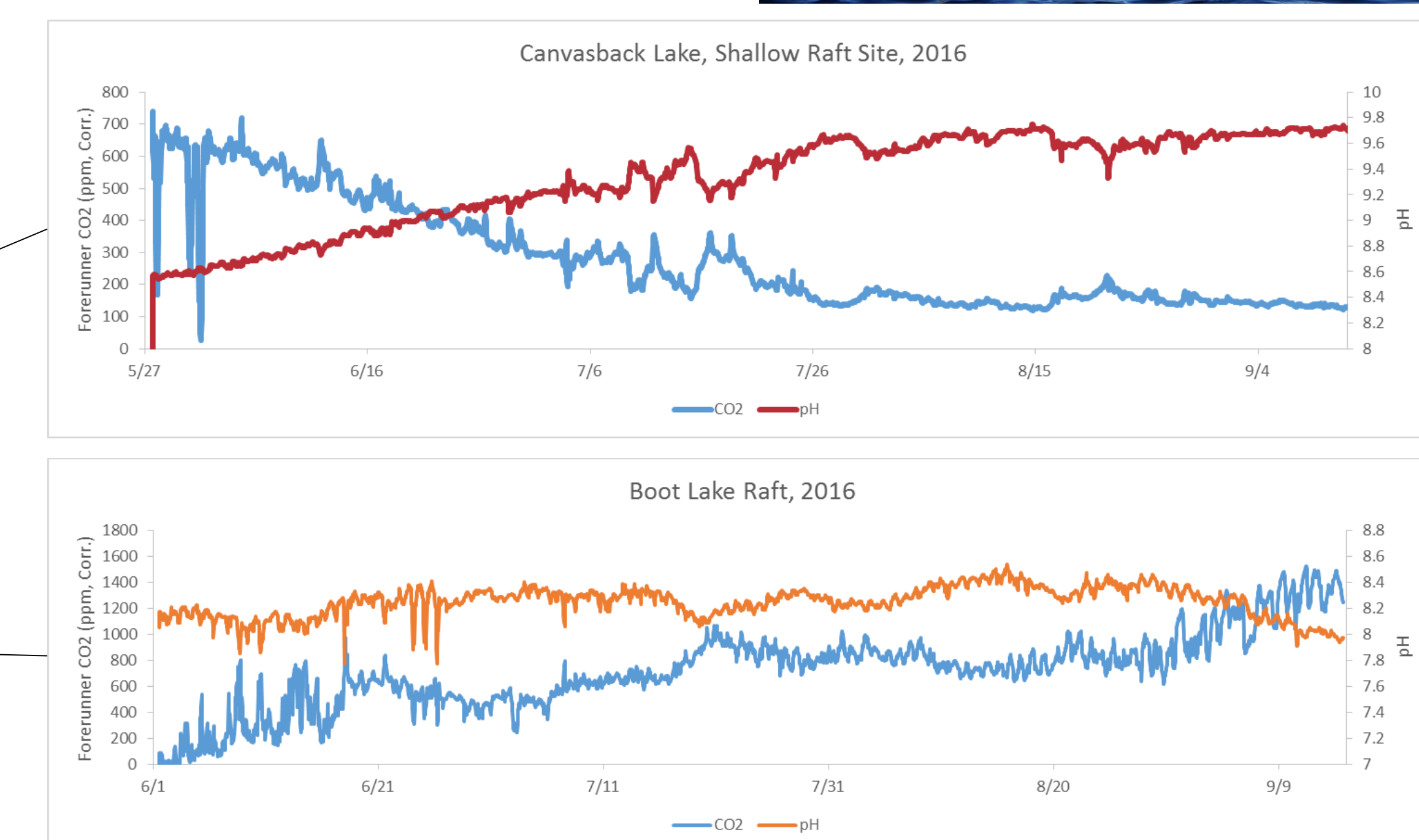
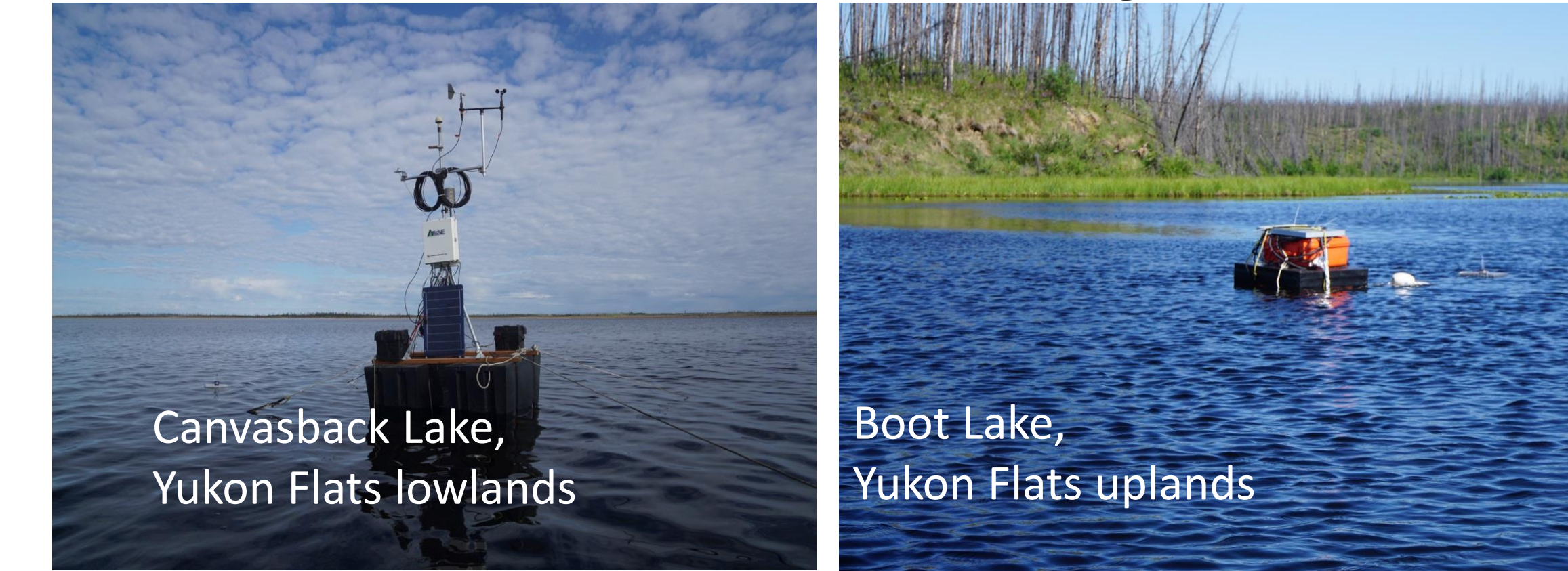


Lake and River CDOM vs. DOC



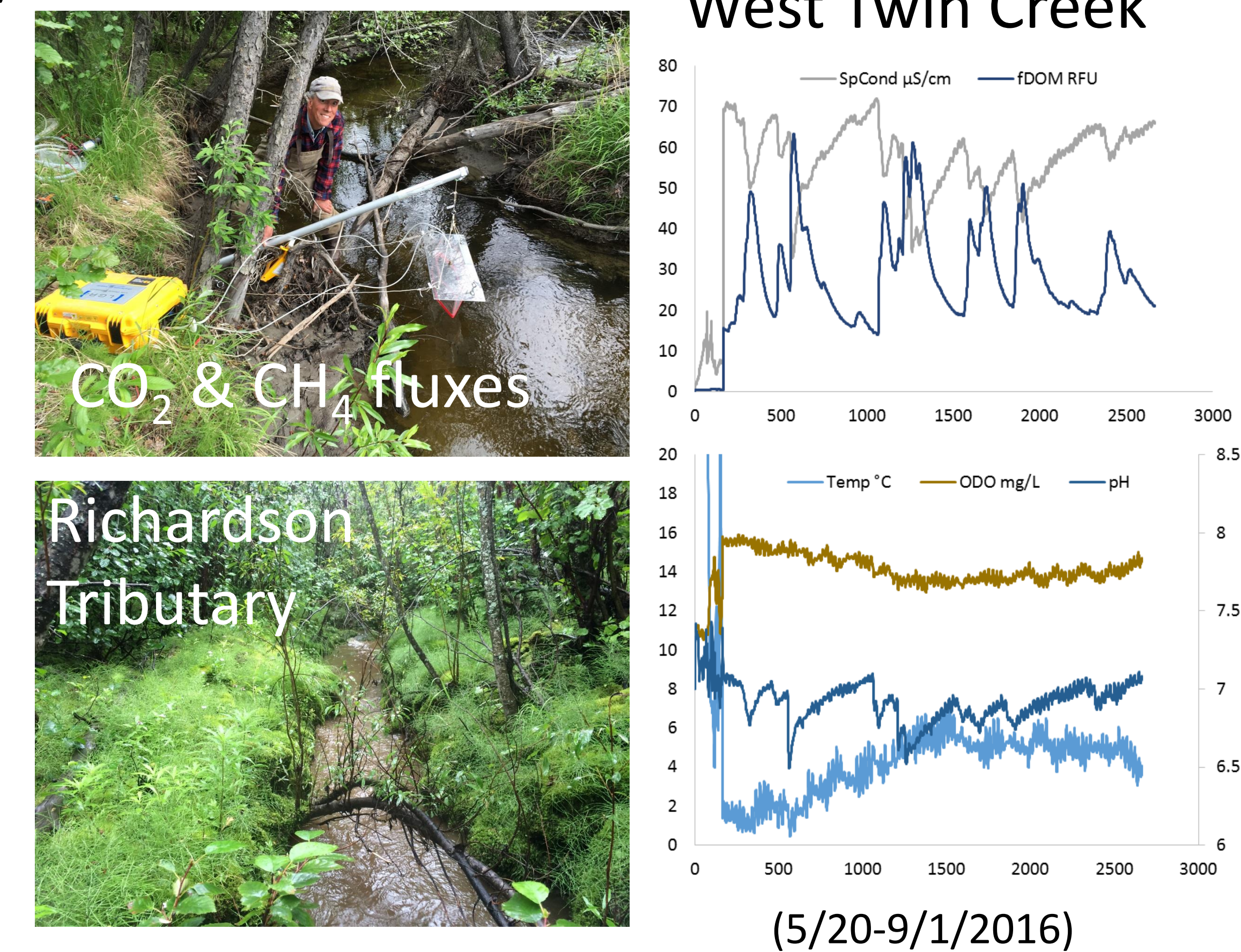
Dissolved organic carbon (DOC) concentration vs. chromophoric dissolved organic matter (CDOM) measured in road site streams (black circles) and Yukon Flats lakes (red triangles). These data, together with lignin and FT-ICR-MS, will help fingerprint DOM sources to lakes and rivers. Application of CDOM absorption may improve spatial and temporal resolution of DOC fluxes and DOM dynamics.

Lake Chemistry



Continuous sensors were installed at Canvasback Lake in the lowlands of Yukon Flats and at Boot Lake on the upland loess plateau to monitor pCO₂ and other conditions during the ice-free period. Lake water chemistry, stable isotopes, ¹⁴C, CO₂ & CH₄ fluxes, and DOC degradability were measured from an additional 19 lakes sampled in 2016.

Stream Discharge and Chemistry West Twin Creek



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This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.