

Figures courtesy of Brice Grunert, Ph.D.

Introduction

Although the world's oceans contain as much carbon as the atmosphere, the nature of its cycling is not yet as well modeled. Various field-based and satellite data analyses contribute to improvements in developing estimates for coastal and estuarine carbon processes. During summer 2019, I participated in an Earth Institute-funded internship with the Land-Ocean-Atmosphere Interactions group at City College of New York, led by Prof. Maria Tzortziou, who also holds a research role at Columbia-Lamont. This group is currently focused on the Long Island Sound and the Yukon River delta. Two approaches include:

- Correlating remotely sensed satellite and observational data from field cruises
- Statistical analysis of spectral (absorbance, fluorescence) data from water samples

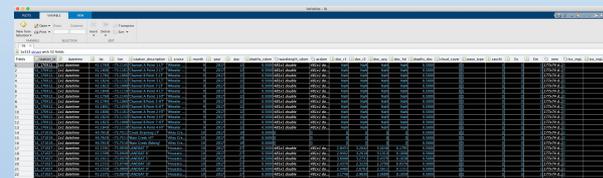


Figure 1. A suite of water quality and radiometry variables corresponding to matching date-times and field stations were grouped in a Matlab structure

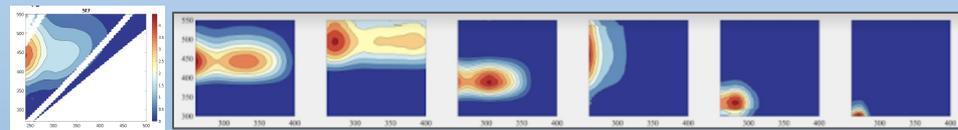


Figure 2 a. and b. Dissolved organic carbon can be categorized using its absorbance and fluorescence characteristics (2a) using Principal Component Analysis (PCA), shown here as six “fingerprints” (2b) used to classify organic carbon present in aquatic ecosystems (Grunert et al., in submission)

Methods and work scope

- To improve the lab's capacity to manage its suite of satellite and observational data, a broad data management framework was necessary. Two years of observational water quality data were compiled into a Matlab data structure that can be easily queried, edited, and expanded.
- Water samples collected from a series of field cruises in the Yukon River delta were processed using a spectrofluorometer 1, 3, 10, and 24 days after collection

Discussion

Water quality variables can be better studied using database management tools, such as those presented here in Matlab, in conjunction with complex analyses characterizing the temporal and spatial changes in structure and function of aquatic dissolved organic matter, presenting an opportunity to refine estimates of coastal carbon budgets.

