

DYNAMICS OF COLORED DISSOLVED ORGANIC MATTER IN THE CLIMATE CHANGING ENVIRONMENT OF NORTHERN SIBERIA

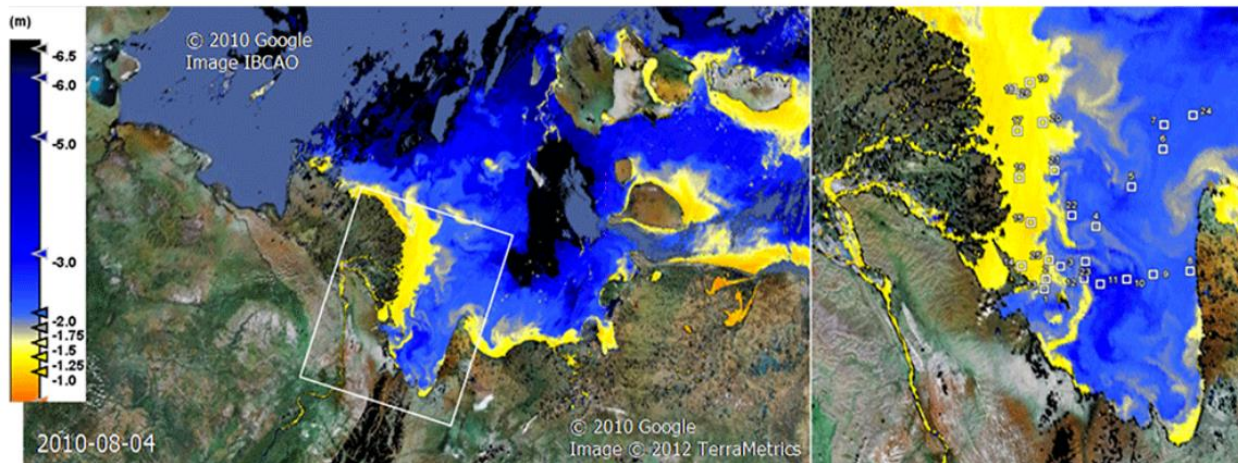
Rafael Gonçalves-Araujo
Alexandra Kraberg
Astrid Bracher

Presentation outline

- Introduction
 - The Lena River Delta
 - Dissolved Organic Matter (DOM)
- Material and Methods
- Results and discussion
- Further analysis

INTRODUCTION

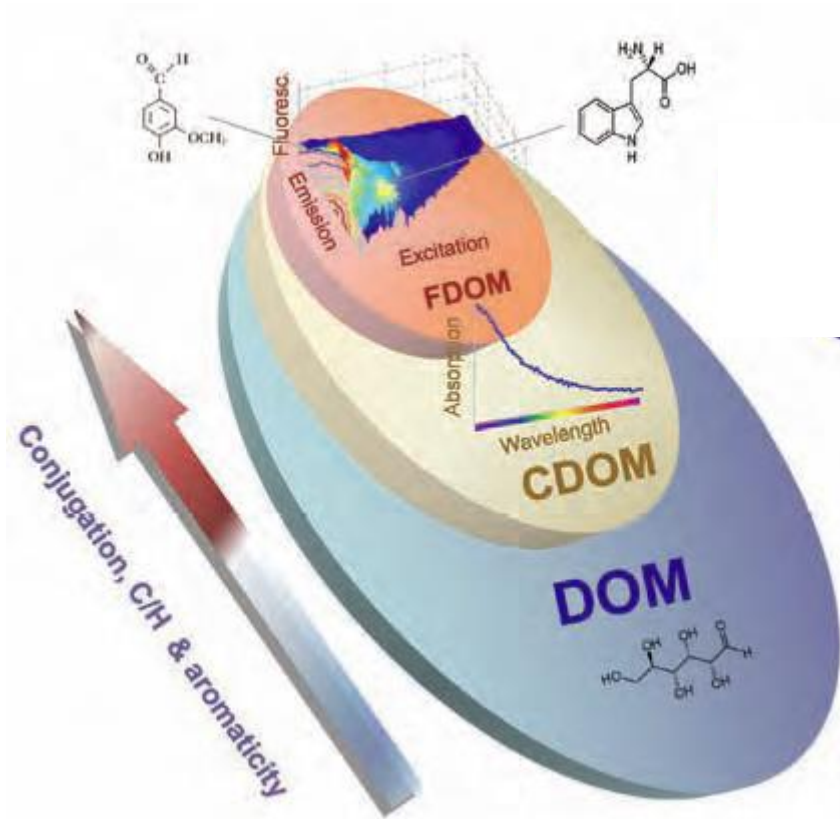
- The Lena River Delta
 - One of the largests rivers in the world
 - ~20% total fresh water in the Arctic Ocean (Cauwet & Sidorov, 1996)
 - Greatest discharge of organic matter in the Arctic
 - Stedmon et al. (2011)
 - Under climate changing pressure (Yang et al., 2002)
 - Permafrost thaw → river discharge (Lyon & Destouni, 2010)



Heim et al. (2014)

INTRODUCTION

• Dissolved Organic Matter (DOM)



Stedmon & Álvarez-Salgado, 2011

Coble (2007)

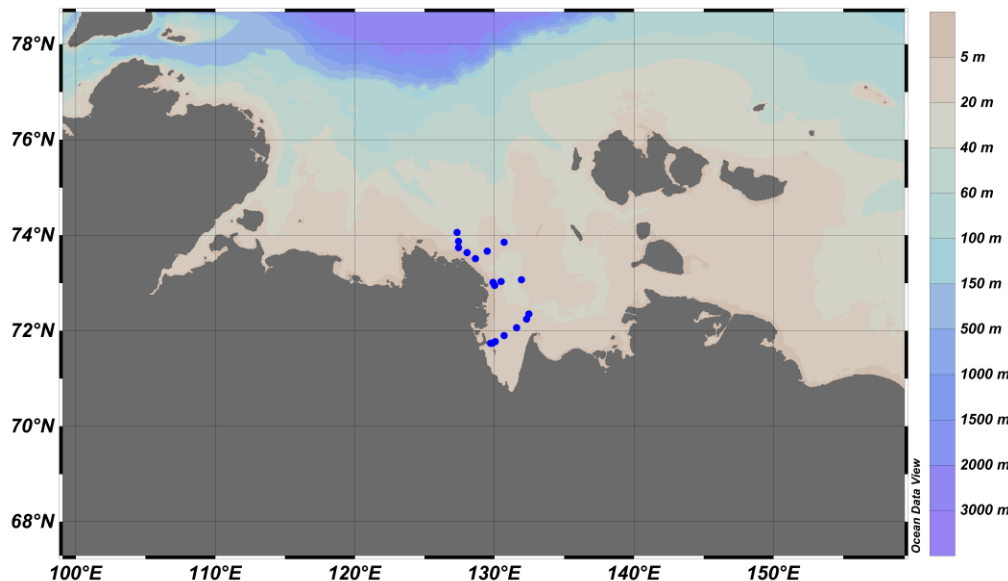
- Humic acids
 - Fulvic acids
 - Degraded protein
 - others
-
- Autochthonous
 - Allochthonous

- Chromophoric DOM (CDOM)
- Fluorescent DOM (FDOM)

MATERIAL AND METHODS



- Sampling
 - Lena Delta – Expedition (1-7 Sep. 2013)
 - 18 Oceanographic stations
 - 4 transects



- CTD casts (Temp/Sal)
- Water samples (DOM)
 - 2-5 samples (depth)
 - 60 water samples

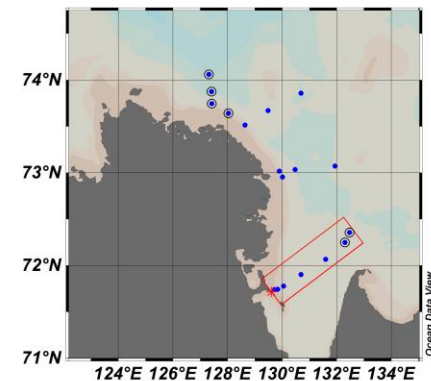
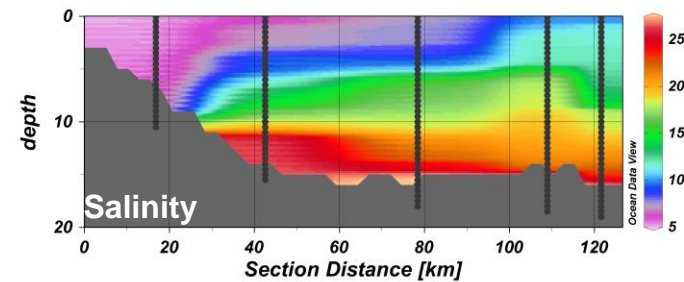
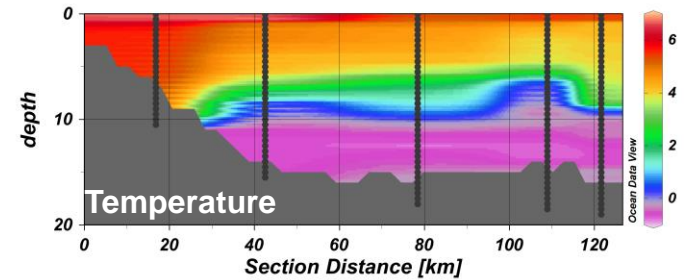
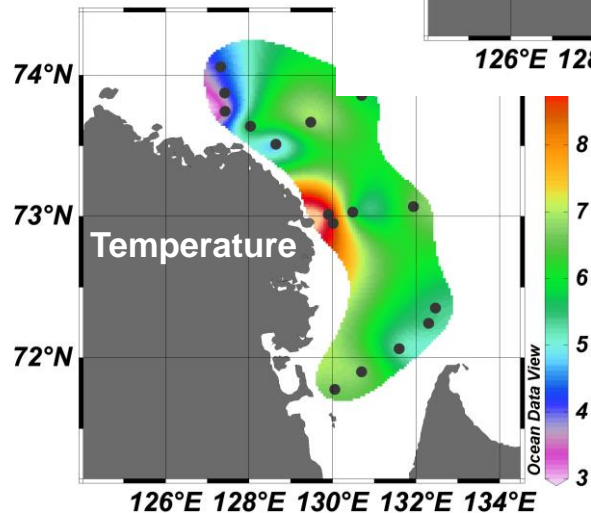
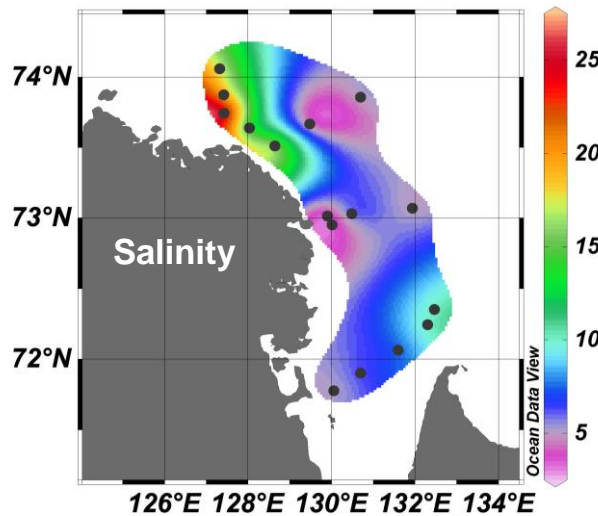
MATERIAL AND METHODS

- Water sample/data processing
 - 0.2 μ m filters
 - Samples kept cooled (4°C) until analysis
 - Spectrofluoroscropy
 - HORIBA-Aqualog[®] Spectrofluorometer
 - Excitation-emission matrices (EEMs)
 - Total CDOM absorption @ 350nm
 - Parallel Factorial Analysis (PARAFAC)
 - DrEEM toolbox for MATLAB[®] (Murphy et al., 2013)

RESULTS AND DISCUSSION



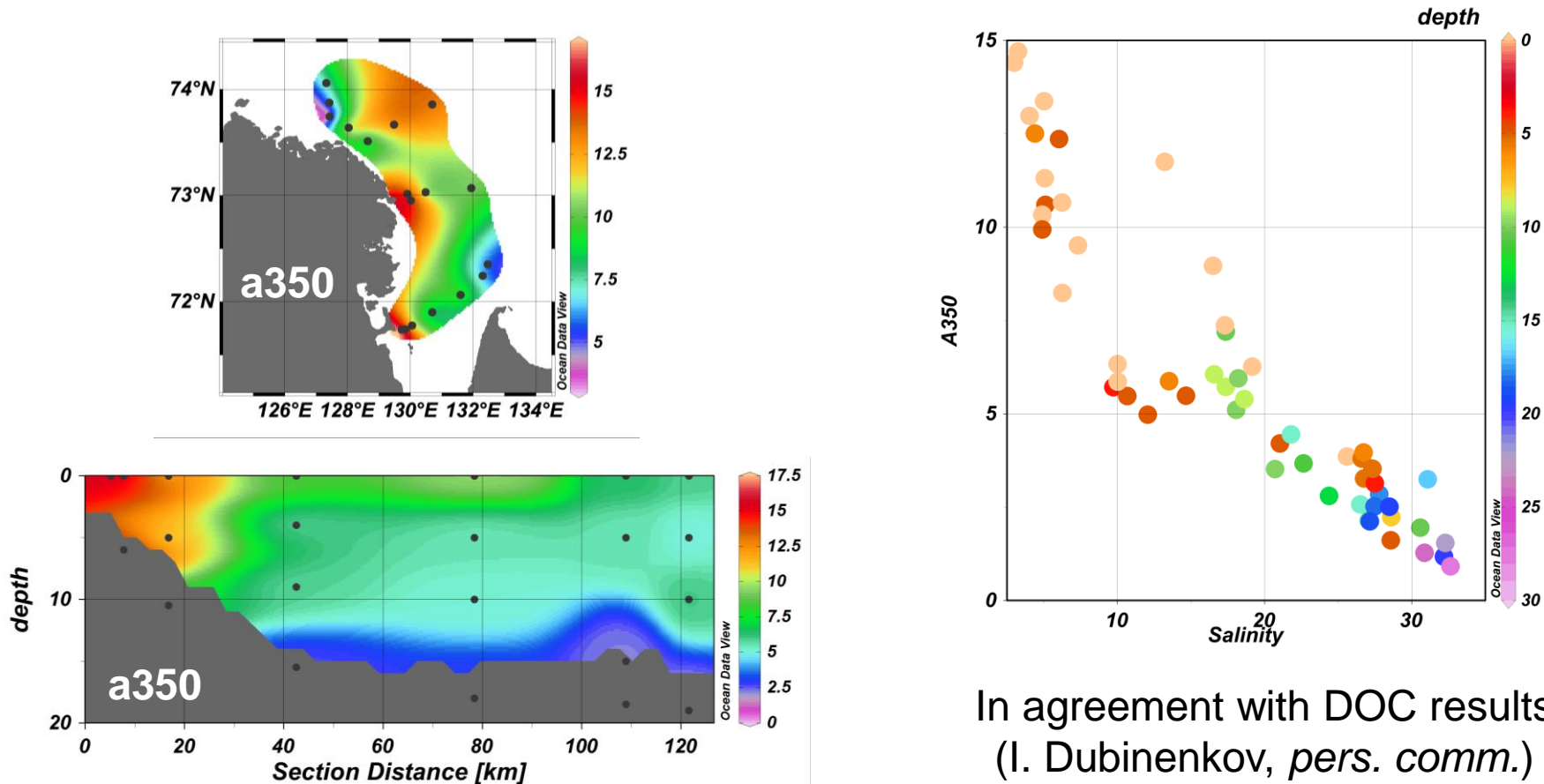
- Hydrography



RESULTS AND DISCUSSION



- CDOM absorption at 350nm (a_{350})



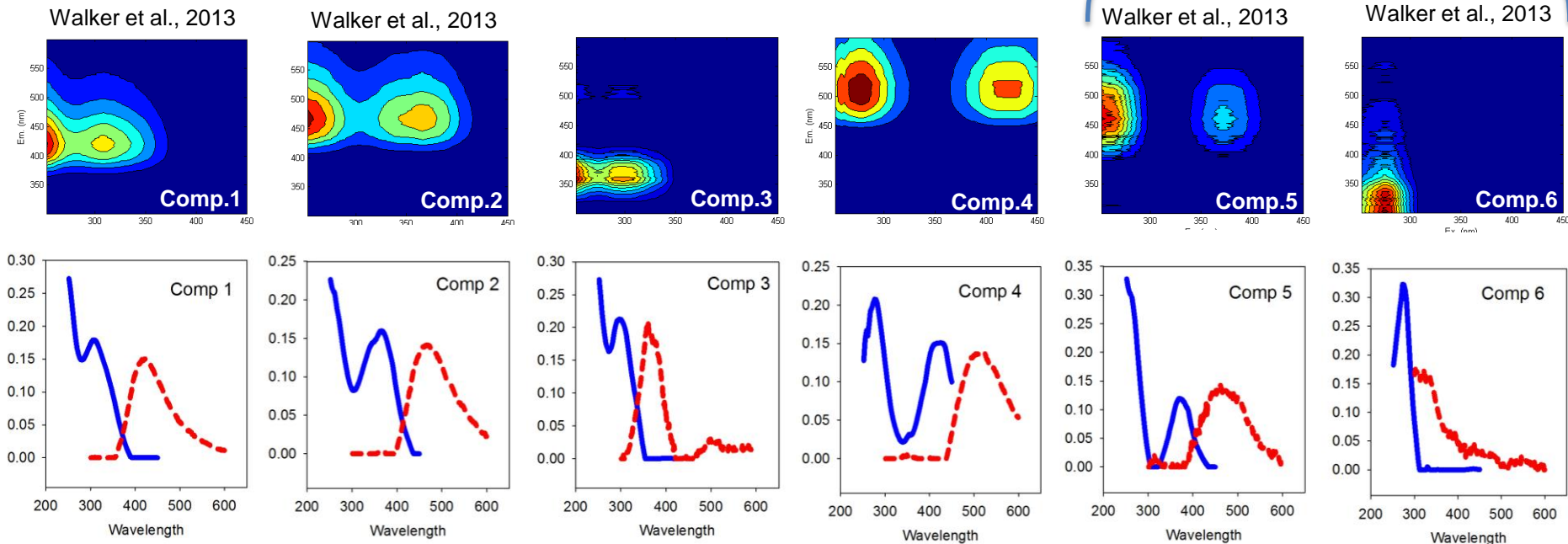
In agreement with DOC results
(I. Dubinenkov, *pers. comm.*)

RESULTS AND DISCUSSION



- PARAFAC model: 6 components validated
 - 4 humic-like (C1, C2, C4, C5)
 - 1 marine-humic-like (C3)
 - 1 protein-like (C6)

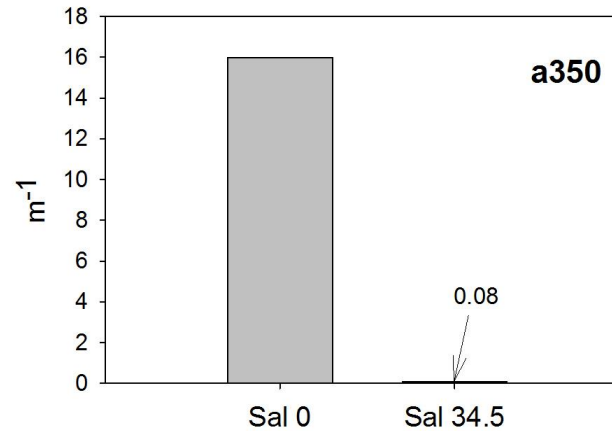
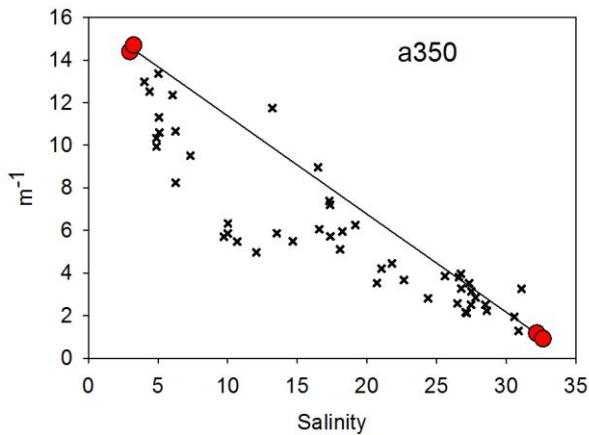
Released by phytoplankton
metabolism
Chari et al., 2013



RESULTS AND DISCUSSION

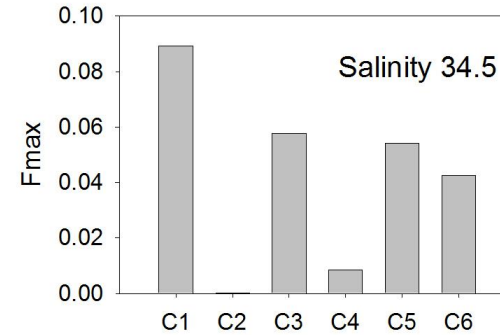
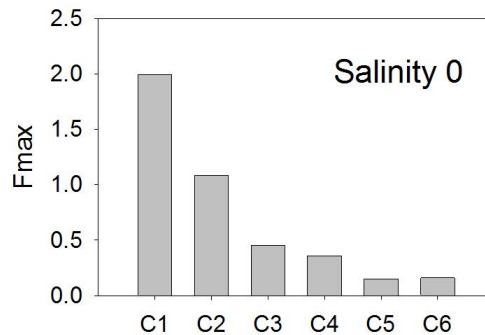


- Extrapolations to fresh and pelagic waters



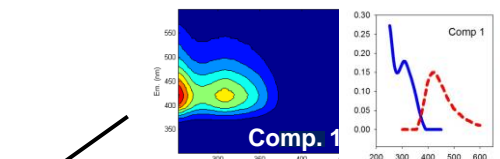
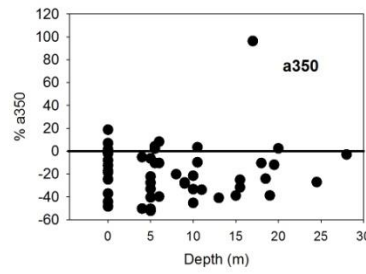
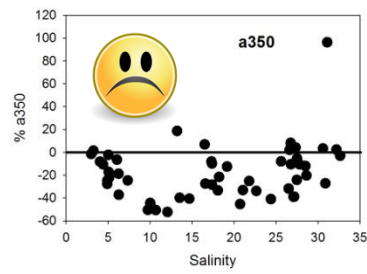
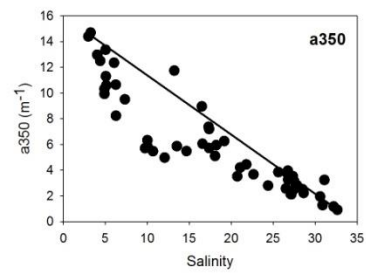
Stedmon et al. (2011)
15.5 m⁻¹ @ Sal=0

Granskog et al. (2012)
0.2 m⁻¹ @ Sal=34.5

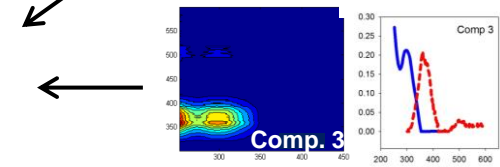
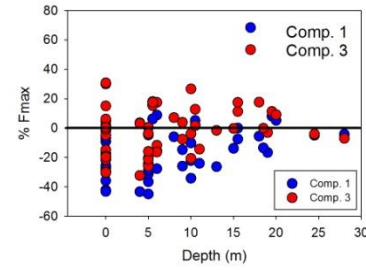
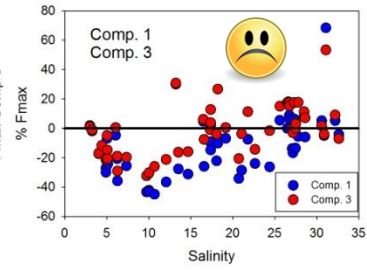
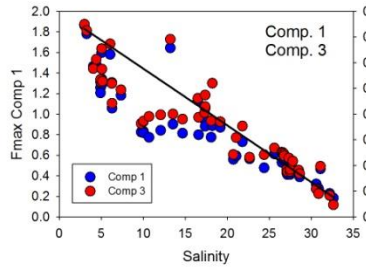


Walker et al., 2013

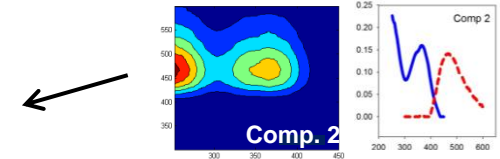
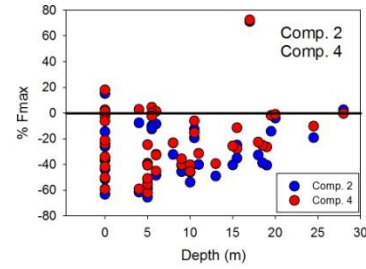
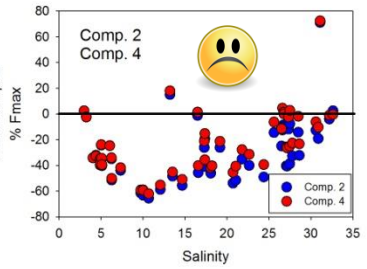
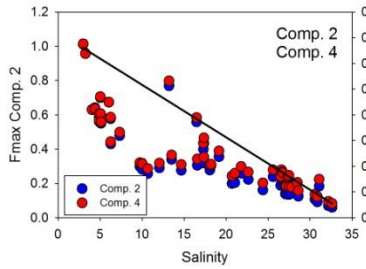
😊 Release 😞 Removal



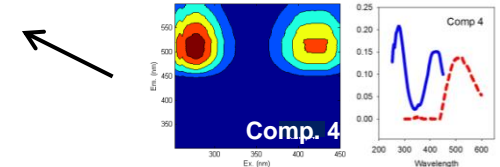
Humic-like



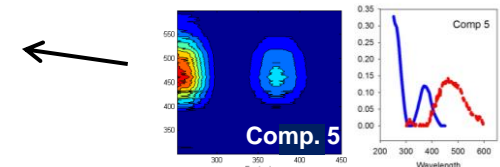
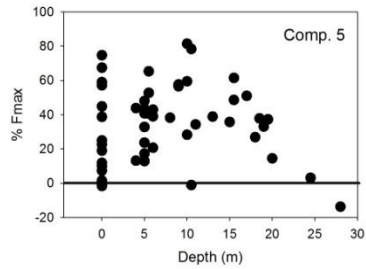
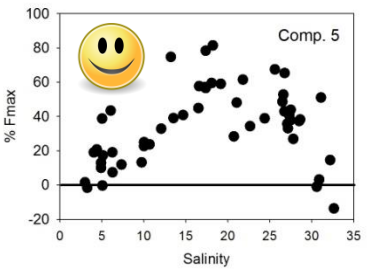
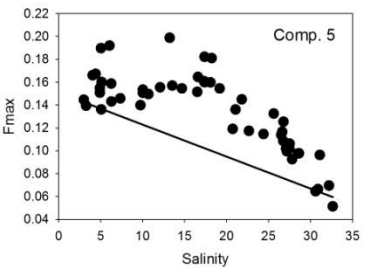
Marine humic-like



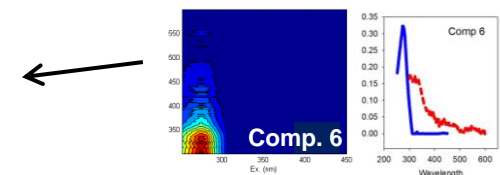
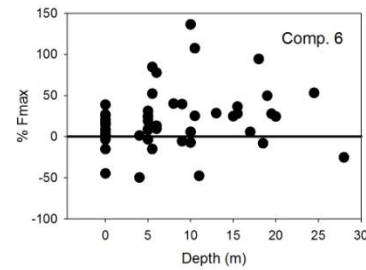
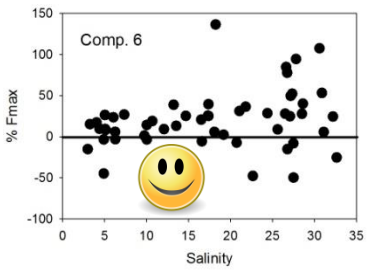
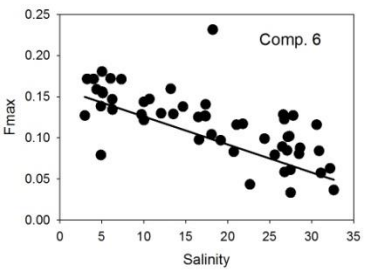
Humic-like (Allochthonous)



Humic-like (Allochthonous)



Humic-like



Protein-like

FURTHER ANALYSIS



- Removal processes
 - Photodegradation
 - Flocculation
- Release processes
 - Microbial production
 - Coastal erosion
- DOM discharge and residence time

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Thank you!

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Funding: