

DYNAMICS OF DOM IN THE LENA DELTA REGION (SIBERIA) REVEALED BY PARALLEL FACTOR ANALYSIS

INTRODUCTION

- Lena River – one of the largest rivers in the world → high riverine input into Arctic Ocean
 - Fresh water: ~20% total fresh water in the Arctic (Cauwet & Sidorov, 1996)
 - High amounts of sediments and organic matter
- Greatest discharge of organic matter in the Arctic Ocean (Stedmon et al., 2011)
- Large, shallow, dynamic and high diverse ecosystem (Kraberg et al., 2013)
- Under climate changing pressure (Yang et al., 2002)
 - Increasing temperatures → permafrost thaw
 - Increase in river discharge and riverine material export to the Arctic Ocean

MATERIAL AND METHODS

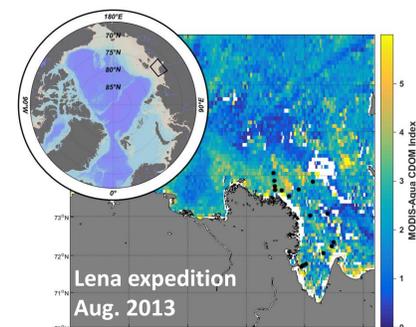
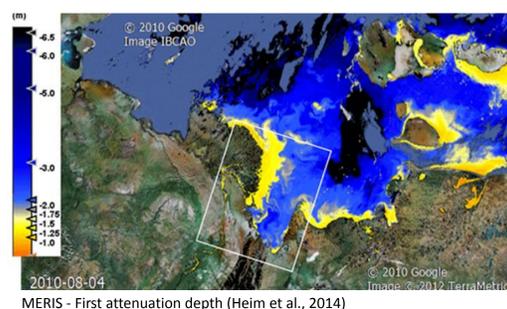
- **Lena expedition:** 1-7 September 2013 – R/V “Dalniye Zelentsy”
 - 4 transects – 18 oceanographic stations – 60 samples
- **Sensors:** CTD casts → Temperature, salinity, UMLD and stratification
- **Water samples:** CDOM (colored DOM), FDOM (fluorescent DOM) and DOC
- **Analyses:** - EEM/PARAFAC modeling for DOM (Stedmon & Bro, 2008; Murphy et al., 2013)
 - DOM modification indices: CDOM slope (S_{CDOM}), specific UV abs (SUVA), humification index (HIX), biological index (BIX)
- **Theoretical conservative mixing:** Salinity 0 (Stedmon et al., 2011) Salinity 34.5 (Granskog et al., 2012)

DOM DYNAMICS IN THE LENA DELTA

- Previous works: conservative mixing of DOM
 - Cauwet & Sidorov (1996)
 - Kattner, et al. (1999)
- Non-conservative mixing (Alling et al., 2010)
 - Removal up to 50%
- Changes in molecular composition
 - Dubinenkov et al. (2014)

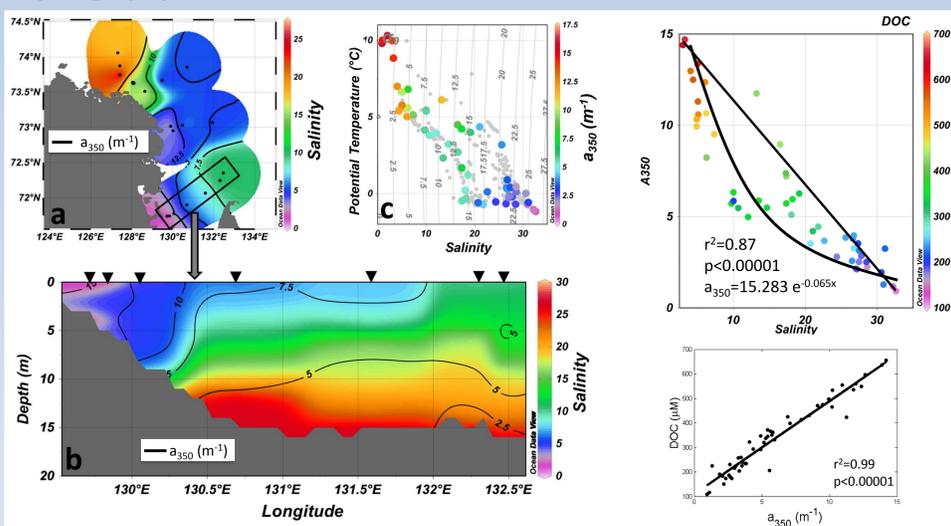
OBJECTIVES

- to characterize FDOM components
- to assess the DOM mixing behavior
- to evaluate the reactivity of DOM
- to investigate the processes modulating DOM transformation and mixing

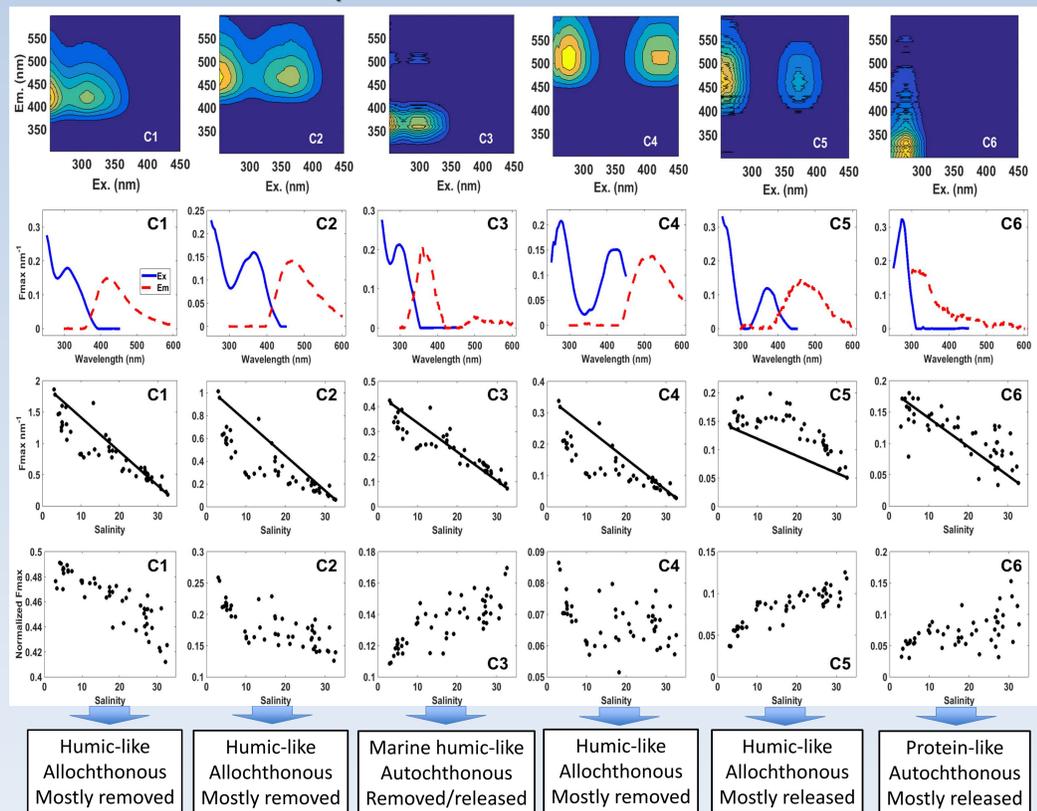


RESULTS AND DISCUSSION

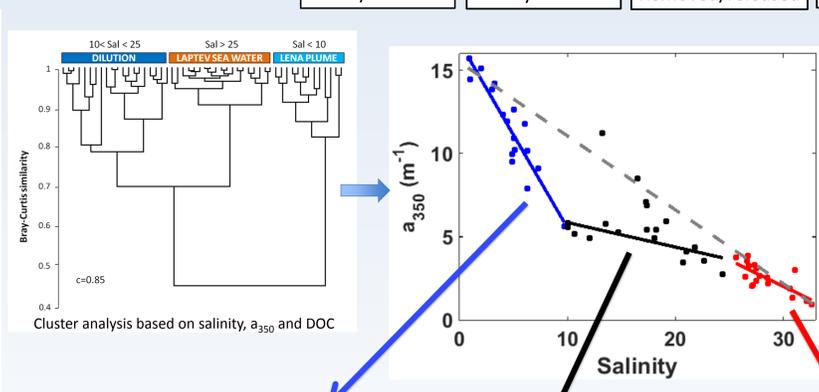
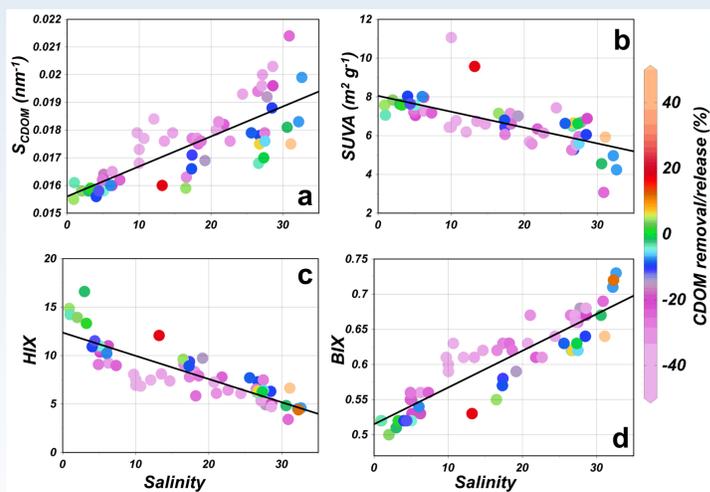
Hydrography, DOC and CDOM distribution



EEM-PARAFAC components



Optical indices of DOM modification



CONCLUSIONS

- Strongly humified region
- Non-conservative mixing
- Strong DOM removal (3 different regimes)
- Changes composition/reactivity
- Different processes over DOM

LENA PLUME

- high DOM – Allochthonous
- higher reactivity - Labile
- strong DOM removal
- PHOTODEGRADATION
- SORPTION/FLOCCULATION

DILUTION

- mod. DOM – Allochthonous
- decrease in reactivity
- moderate DOM removal
- PHOTODEGRADATION
- SORPTION/FLOCCULATION
- LOW RELEASE (C3, C5 & C6)

MARINE SHELF WATERS

- low DOM
- low reactivity – Refractory
- low input/removal
- PSEUDO-CONSERVATIVE
- LOW TRANSFORMATION

- Strongly **HUMIFIED** region (mostly humic-like compounds)
- **NO BIOLOGICAL DEGRADATION** (Mopper & Kieber, 2002)
- Molecular weight/reactivity decreases with salinity