CHARACTERIZATION AND FATE OF DISSOLVED ORGANIC MATTER IN THE LENA DELTA REGION, SIBERIA

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 & Sidrov, 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

DOM DYNAMICS IN THE LENA DELTA

- Previous works: conservative mixing of DOM
  - Cauwet & Sidrov (1996)
  - Kattner et al. (1999)
- Non-conservative mixing (Alting 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 and reactivity
- to investigate the processes modulating DOM transformation and mixing

RESULTS AND DISCUSSION

- Hydrography, DOC and CDOM distribution

  - DOM decreases with salinity increase
  - Hydrography influence: Surface sal <10 & >10
  - Two mixing regimes: below/above pycnocline
  - Non-conservative mixing at surface → removal
  - Conservative removal below pycnocline

- Optical indices of DOM modification

  - Strongly humified region (mostly humic-like compounds)
  - Molecular weight/reactivity decreases with salinity
  - Indication of photodegradation → surface waters plume stations (high S, low DOM)

- Conclusions

  - Strongly humified region
  - DOM, humic-like content and reactivity decrease with salinity
  - Sharper decrease in DOM at surface, low salinity layer removal
  - Photodegradation & flocculation

METHODS

  - 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}), Slope ratio, specific UV abs (SUVA), humification index (HIX), biological index (BIX)
- Theoretical conservative mixing (gray dashed lines): average of each parameter at high and low salinity end-members

CONCLUSIONS

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