Seasonality in Lena River biogeochemistry and dissolved organic matter

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Also see **manuscript accepted for publication** in Frontiers In Environmental Science:

Link: https://www.frontiersin.org/articles/10.3389/fenvs.2020.00053/abstract
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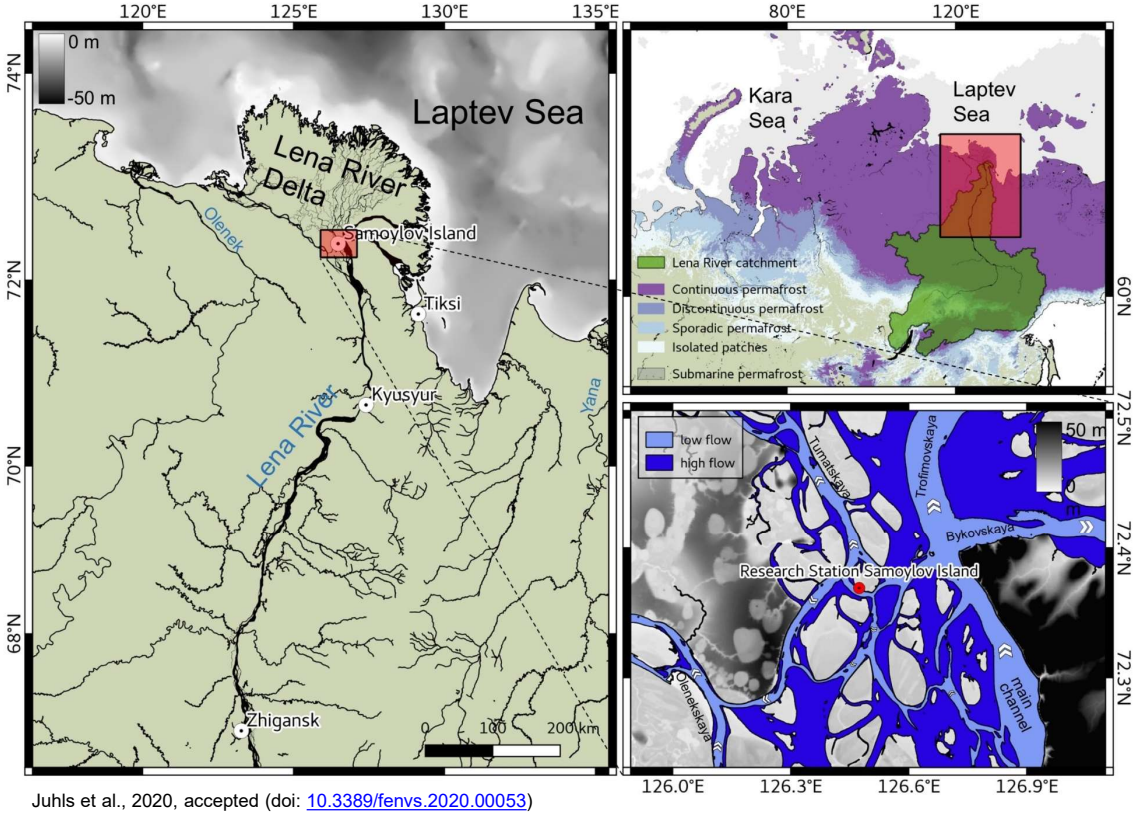
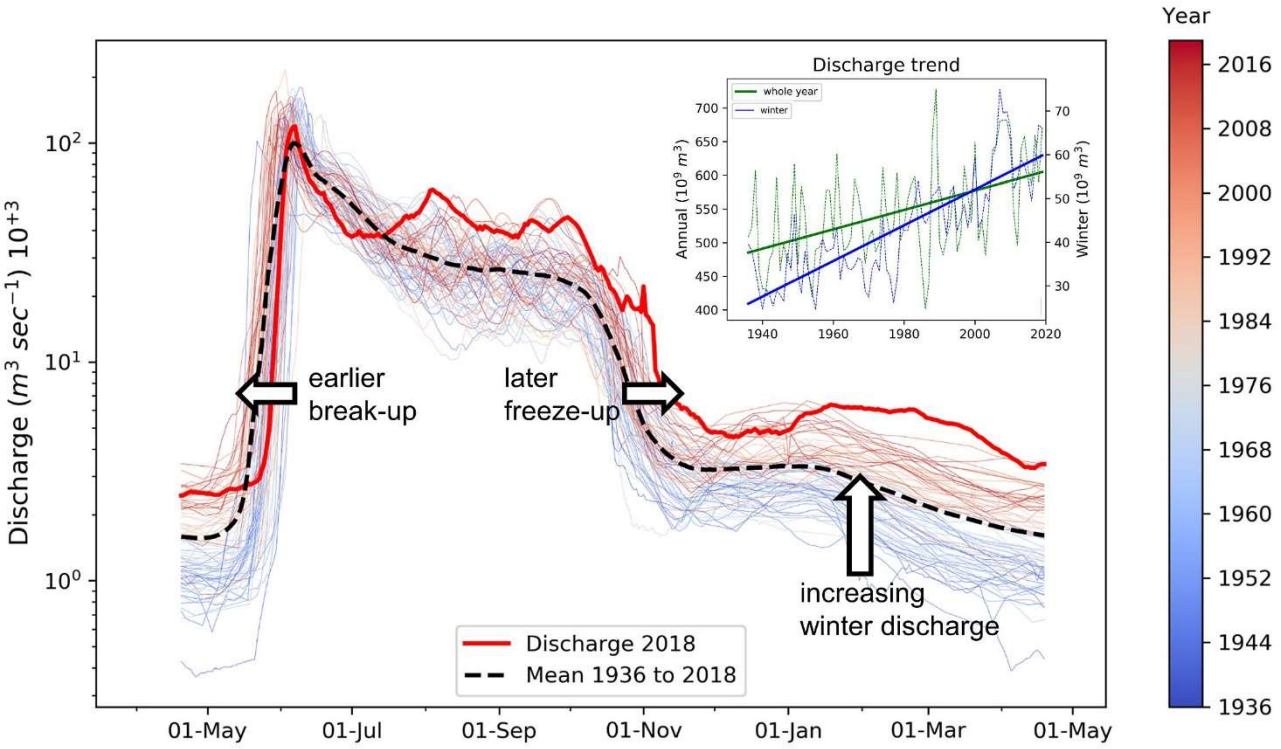
Introduction - The Lena River



Juhls et al., 2020, accepted (doi: 10.3389/fenvs.2020.00053)

- Lena River catchment ~ 90 % permafrost
- Lena River exports ~ 20 % of freshwater to Arctic Ocean
- Largest watershed of Arctic Rivers

Introduction – Lena River Discharge



- Changing seasonality:
  - Earlier break-up
  - Later freeze-up
- Increase in long-term discharge flux
- 2018 shows high summer discharge compared to the long-term mean

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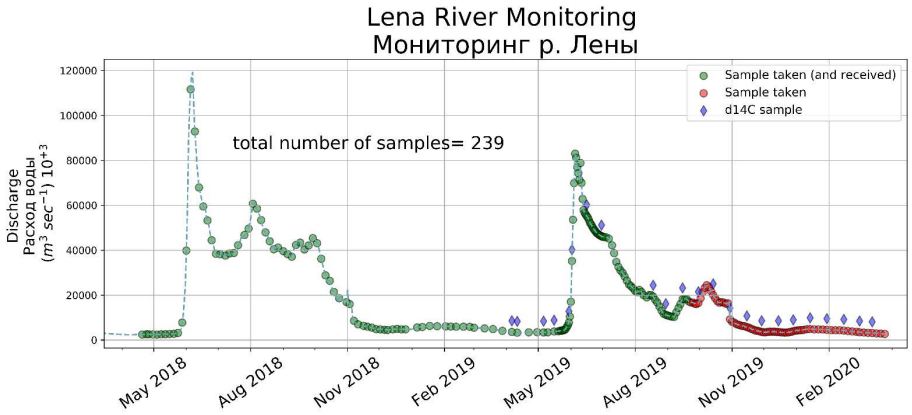
Introduction – New Sampling Program

Samoylov Island Research Station, photo: Thomas Opel, Alfred Wegener Institute Potsdam

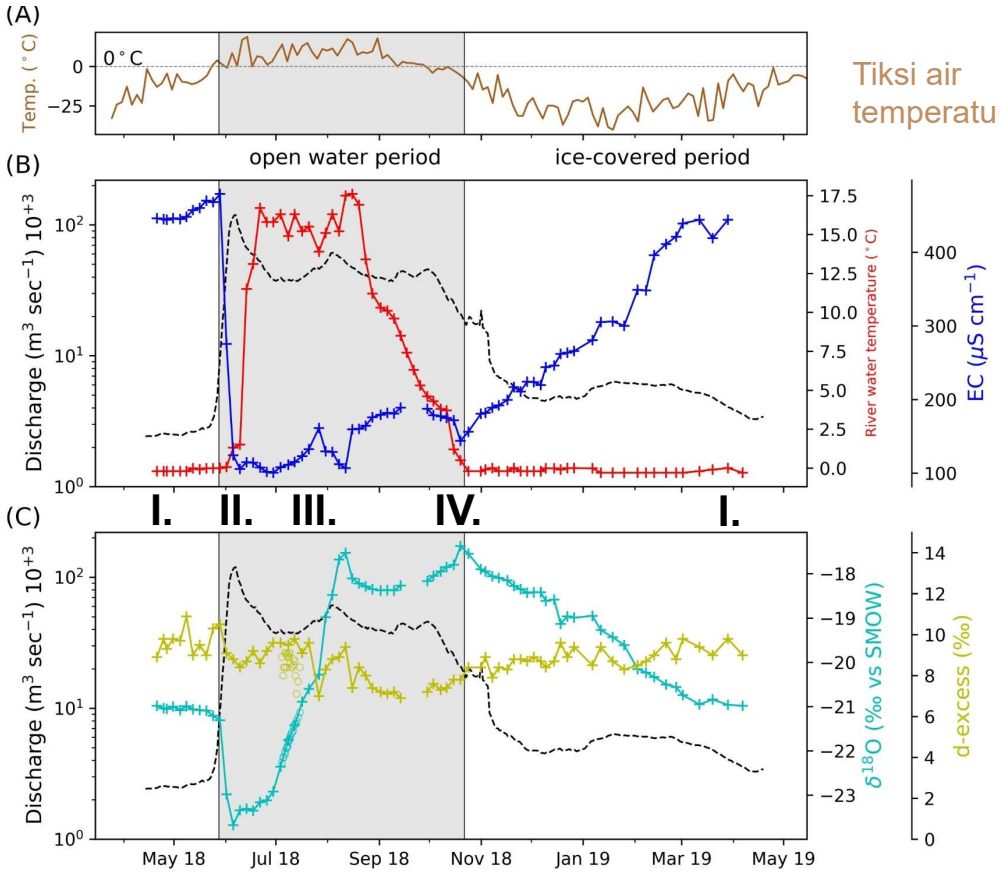


- Sampling close to the river mouth at the Samoylov Island Research Station
- High sampling frequency (~ 4 days or more)
- Sampling throughout the whole season

→ **78 samples** in first **year** (April 2018 to April 2019)

→ **239 samples for 2 years**

Results - Biogeochemistry



Tiksi air temperature

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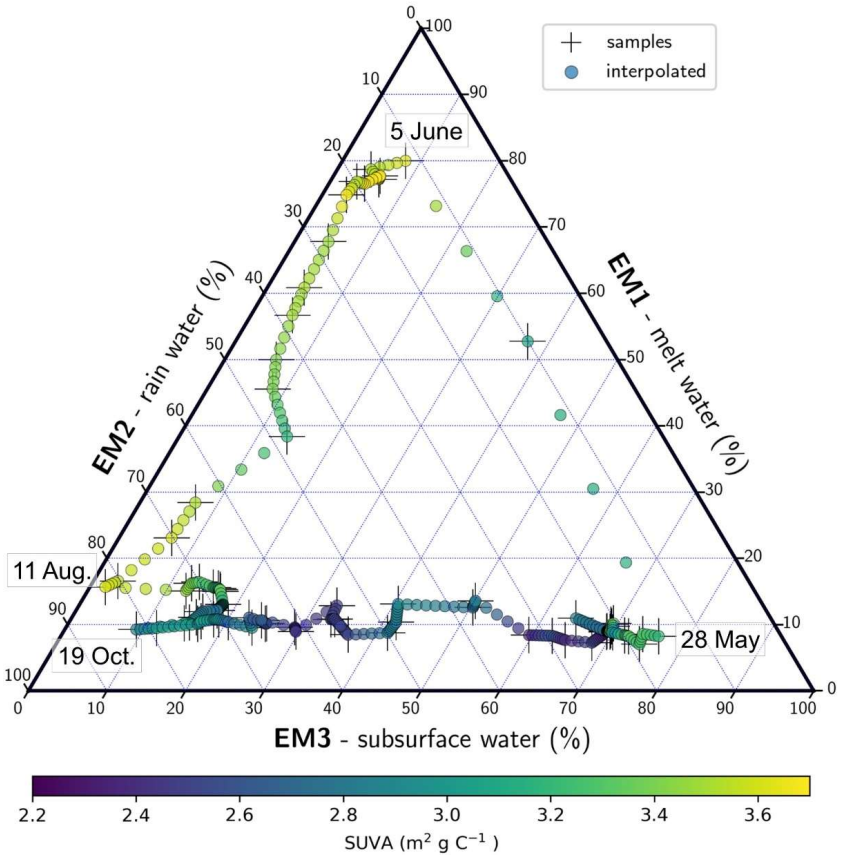
Lena River is ~5 months ice free

- Water chemistry generally change along the seasonal patterns of hydrograph:
  - I. Winter baseflow
  - II. Spring freshet
  - III. Summer
  - IV. Freeze-up

Research Question:

What are the drivers / water sources of seasonality?

Results – Drivers of Seasonality



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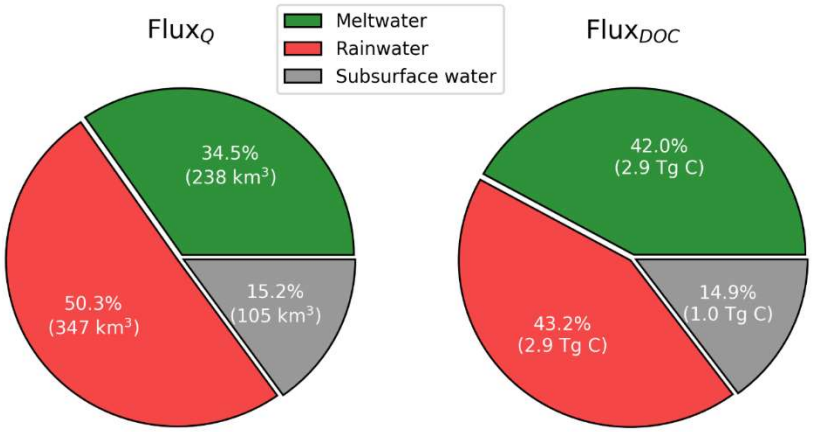
- Endmember analysis using water chemistry reveals dynamics of water sources
- Enables quantification of water and DOC fluxes for each water type



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Results and Discussion – DOM Concentration and Quality

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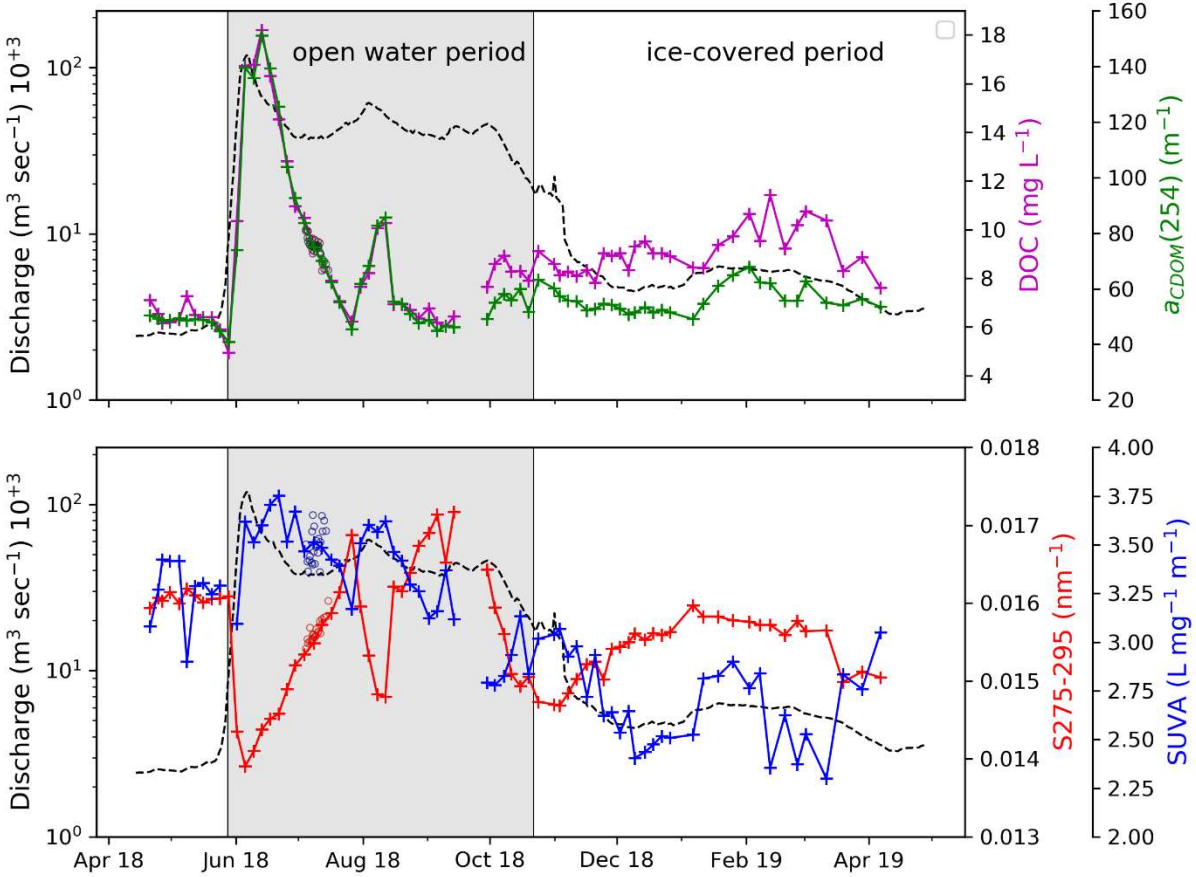

- DOM max in spring
- Seconds pronounced peak in summer
- Increased DOM in winter
- **SUVA** (blue) **decreasing** from spring to winter
- **S275-295** (red) **inversly** to concentration

➢ **Indicates fresh DOM in spring and older DOM in summer & winter**

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