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**HELMHOLTZ**  
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**ALFRED-WEGENER-INSTITUT**  
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UND MEERESFORSCHUNG

# Elbe 2020 – Investigating a River-Sea System from Upstream into the North Sea

H. Brix, N. Kamjunke, I. Bussmann, E. Achterberg, P. Dietrich,  
P. Fischer, G. Flöser, M. Friedrich, F. Geißler, U. Koedel,  
M. Koschorrek, L. Rewrie, C. Schütze



Modular Observation Solutions for Earth Systems

- Understanding river-sea-systems requires a thorough understanding of processes that span different Earth system compartments
- Issues when scientific disciplines interact. Differences in:
  - Measurement and calibration standards
  - Quality Control Approaches
  - Data Formats and Handling
- MOSES (Modular Observation Solutions for Earth Systems) addresses this type of problem through:
  - Sensor comparison and intercalibration campaigns
  - Joint field campaigns involving partners from different Earth compartment and disciplines

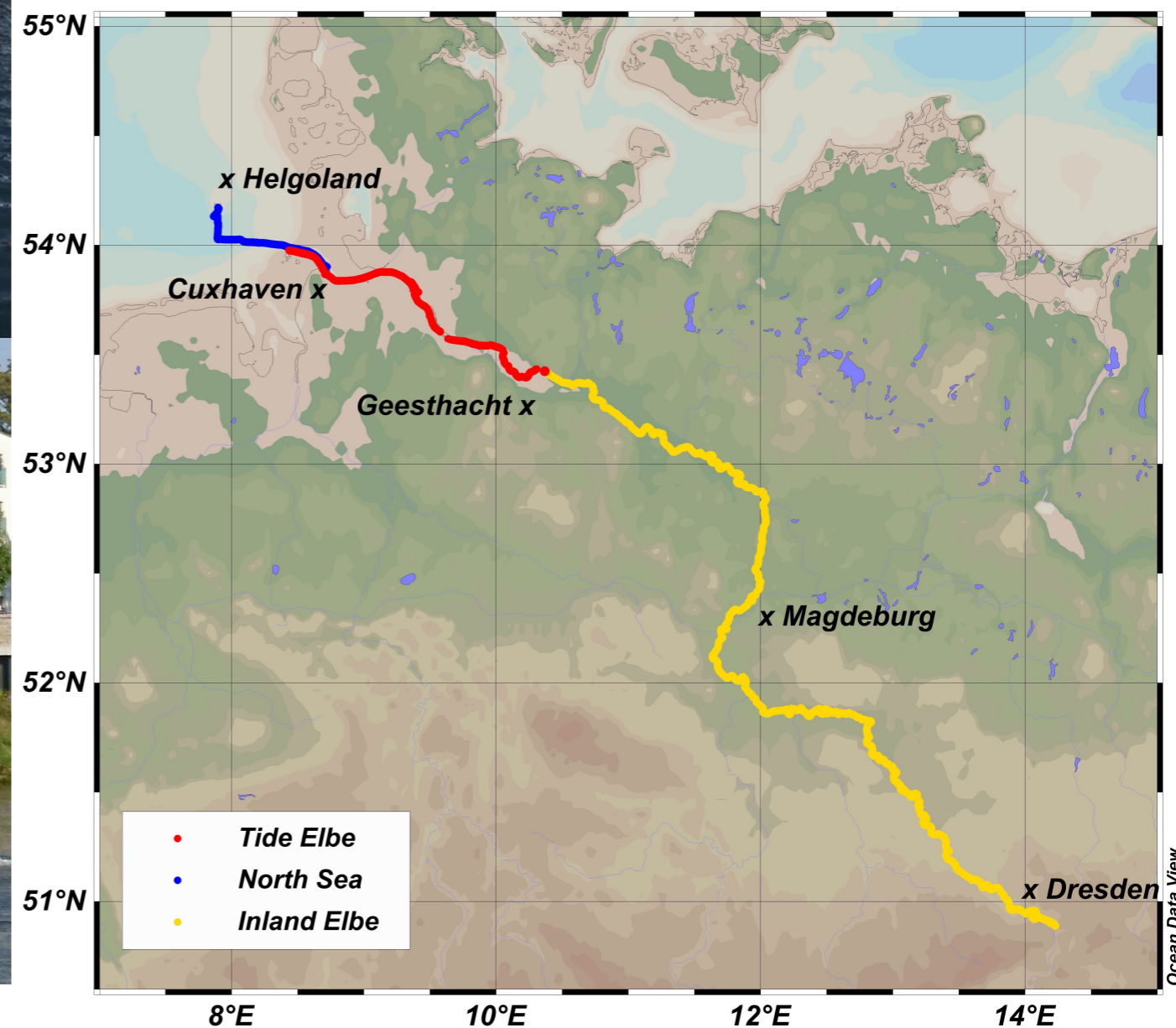
# The Elbe2020 Campaign



Modular Observation Solutions for Earth Systems



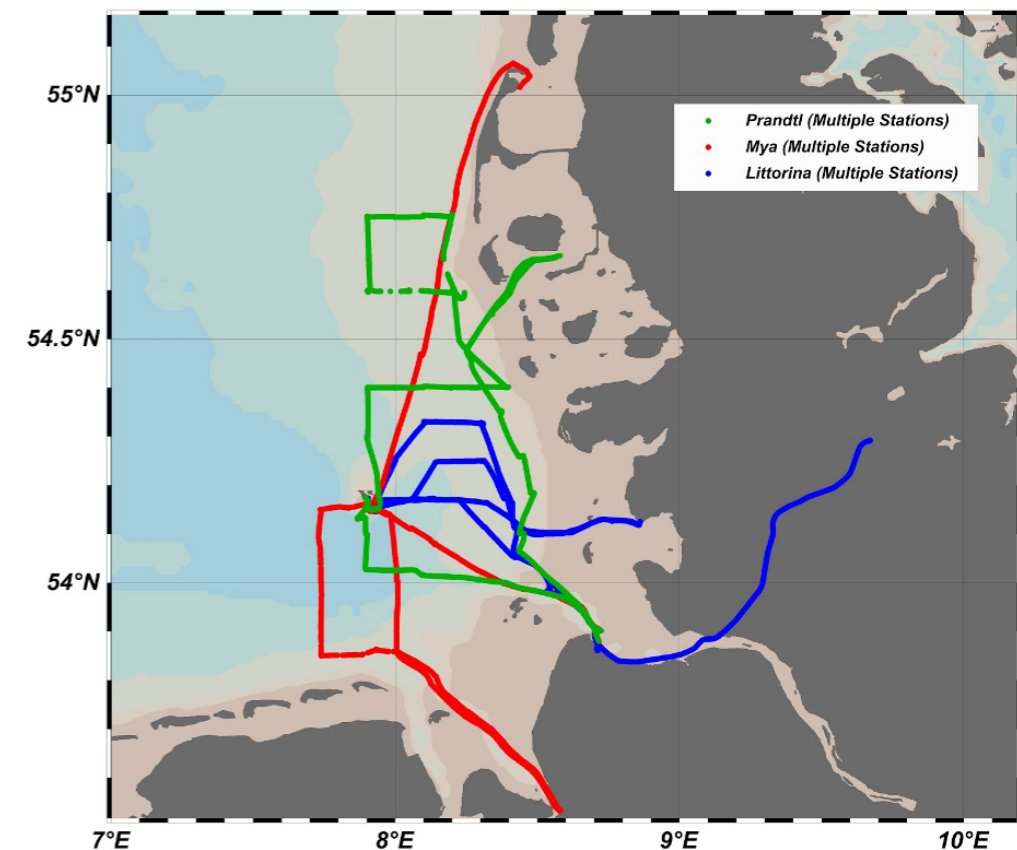
**Inland Elbe cruise, 4. – 12. Aug 2020**  
**Tide Elbe cruise, 25. -26. Aug 2020**  
**Part of Sternfahrt 5, 31.8 – 3.9 2020**



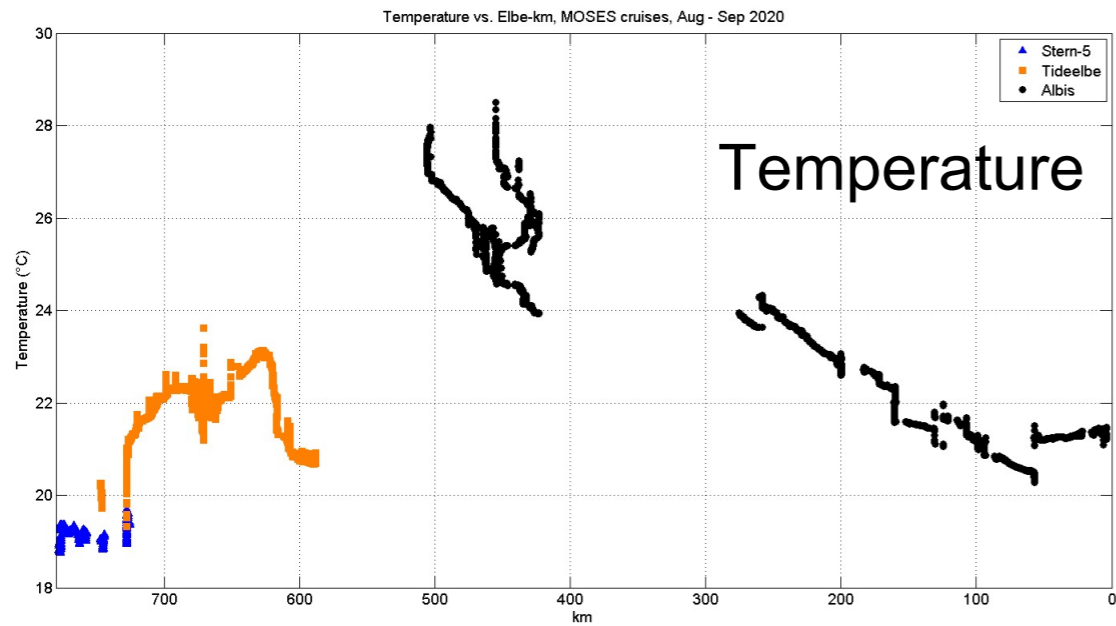
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- Establish scientifically sound and resilient sampling procedures for multiple ships (inland waters and ocean going, fresh and sea water, ...)
  - Create reference data for main environmental parameters for future investigations of extreme events
  - Test communication logistics
  - Establish common data flows and protocols

# Logistics and Realization

- Four research vessels from four research institutions
- Duration: two months
- Measurements:
  - Standard hydrological and oceanographic parameters
  - Nutrient and carbonate systems
- Two cruises in the river (fresh water and tidal sections)
- Three ships in the German Bight

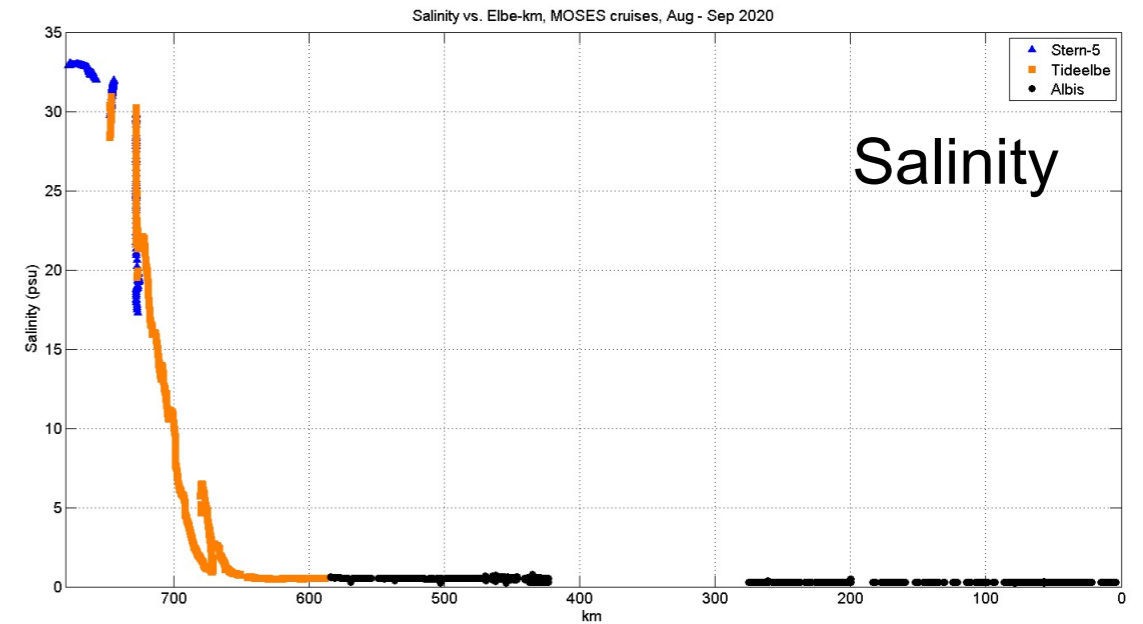


# Results along the river: Helgoland – Czech Republic



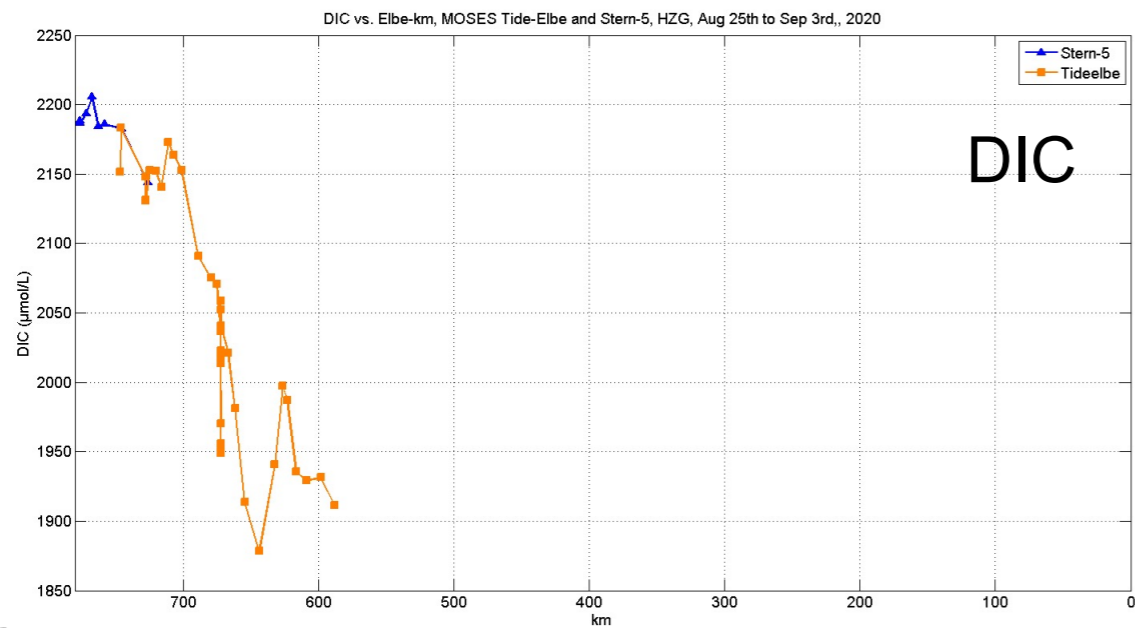
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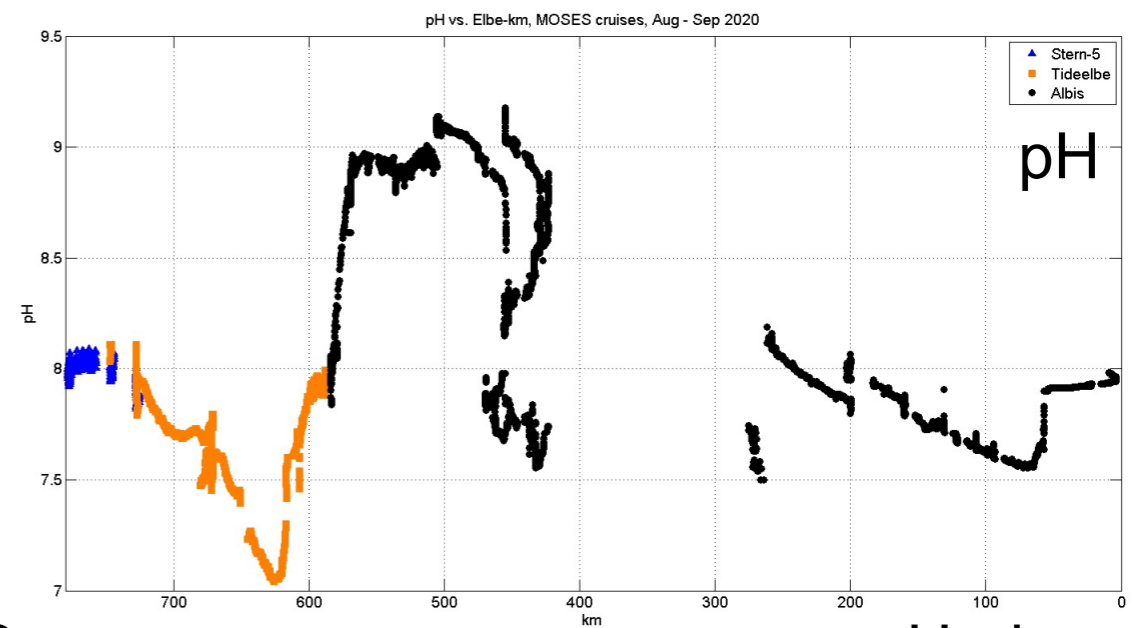
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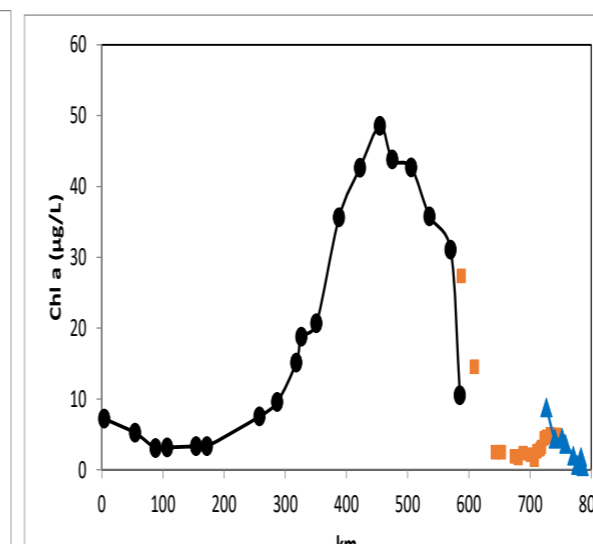
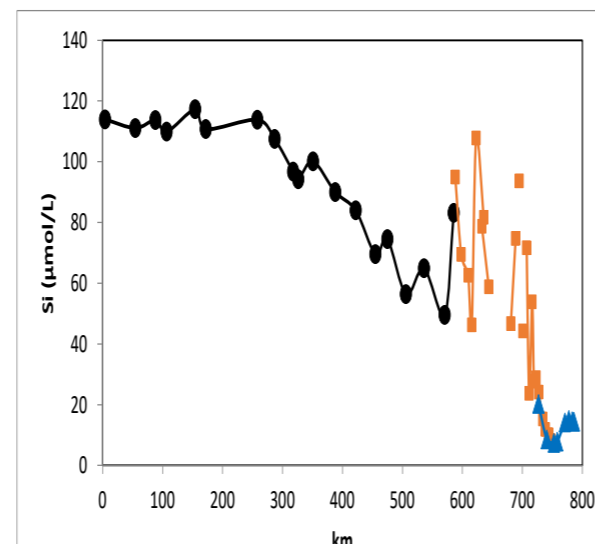
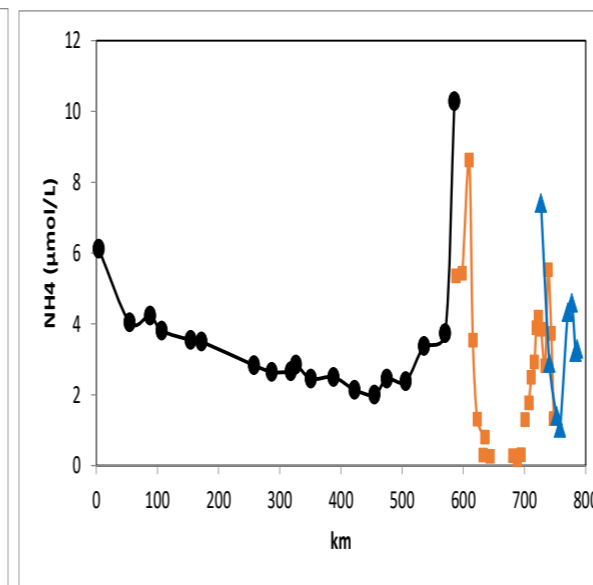
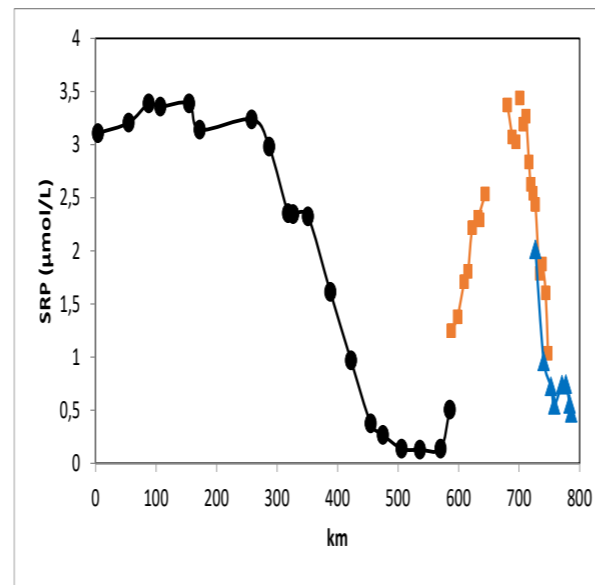
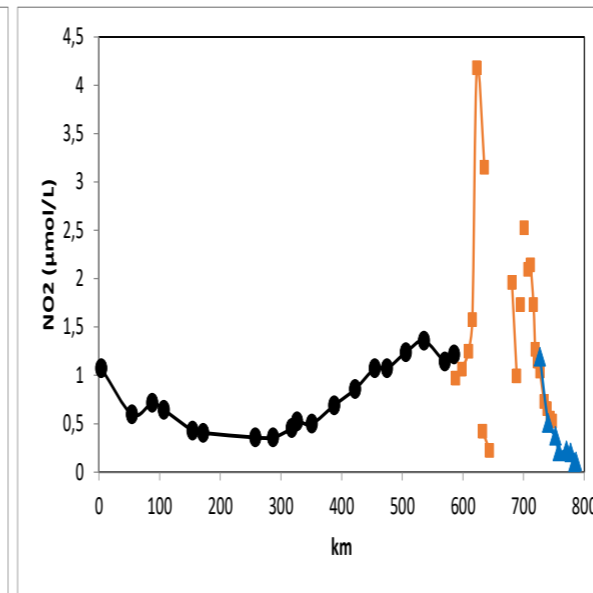
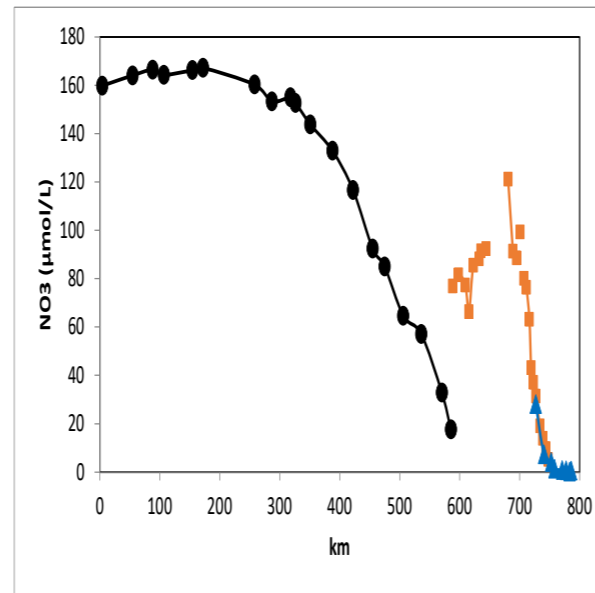
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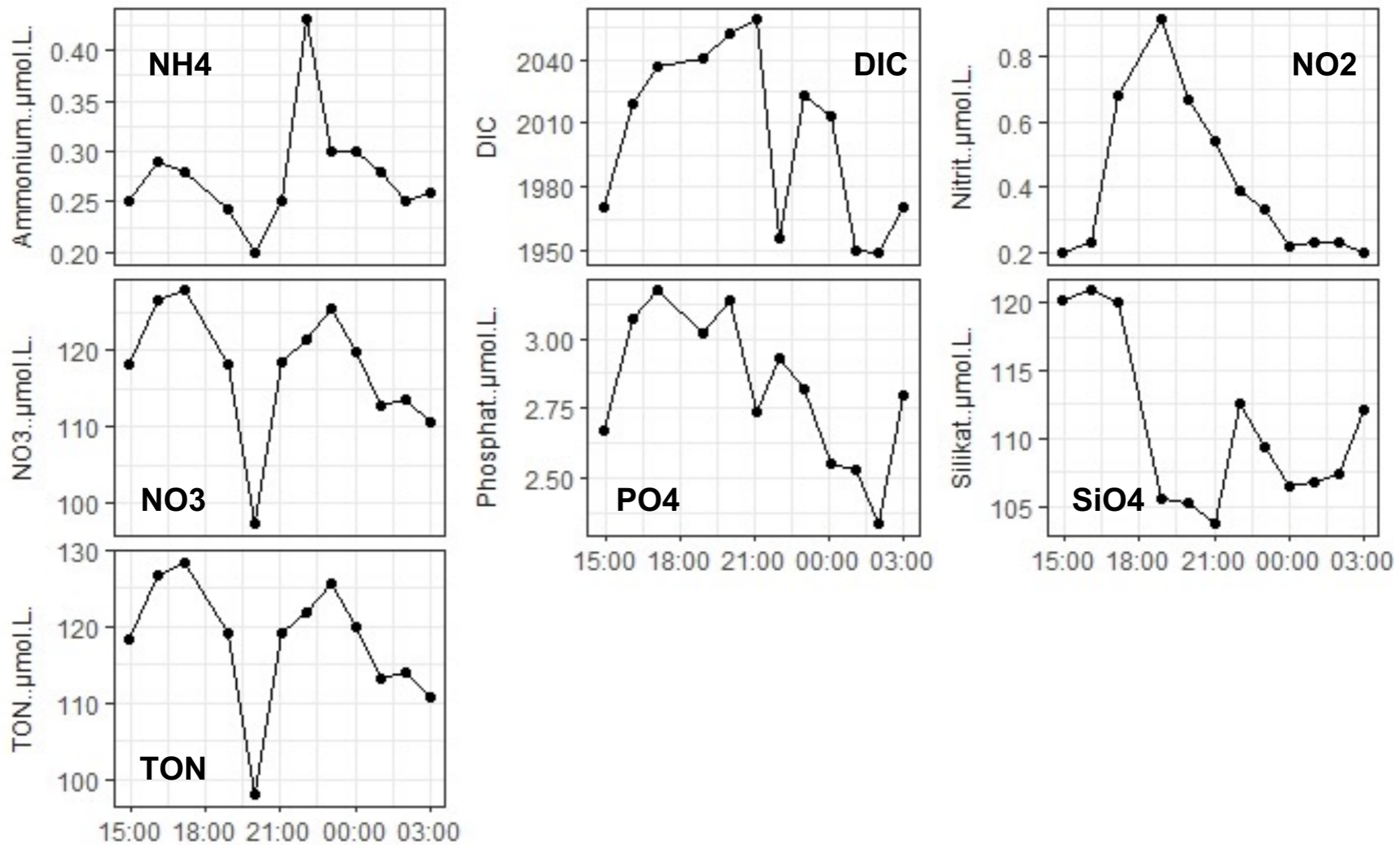
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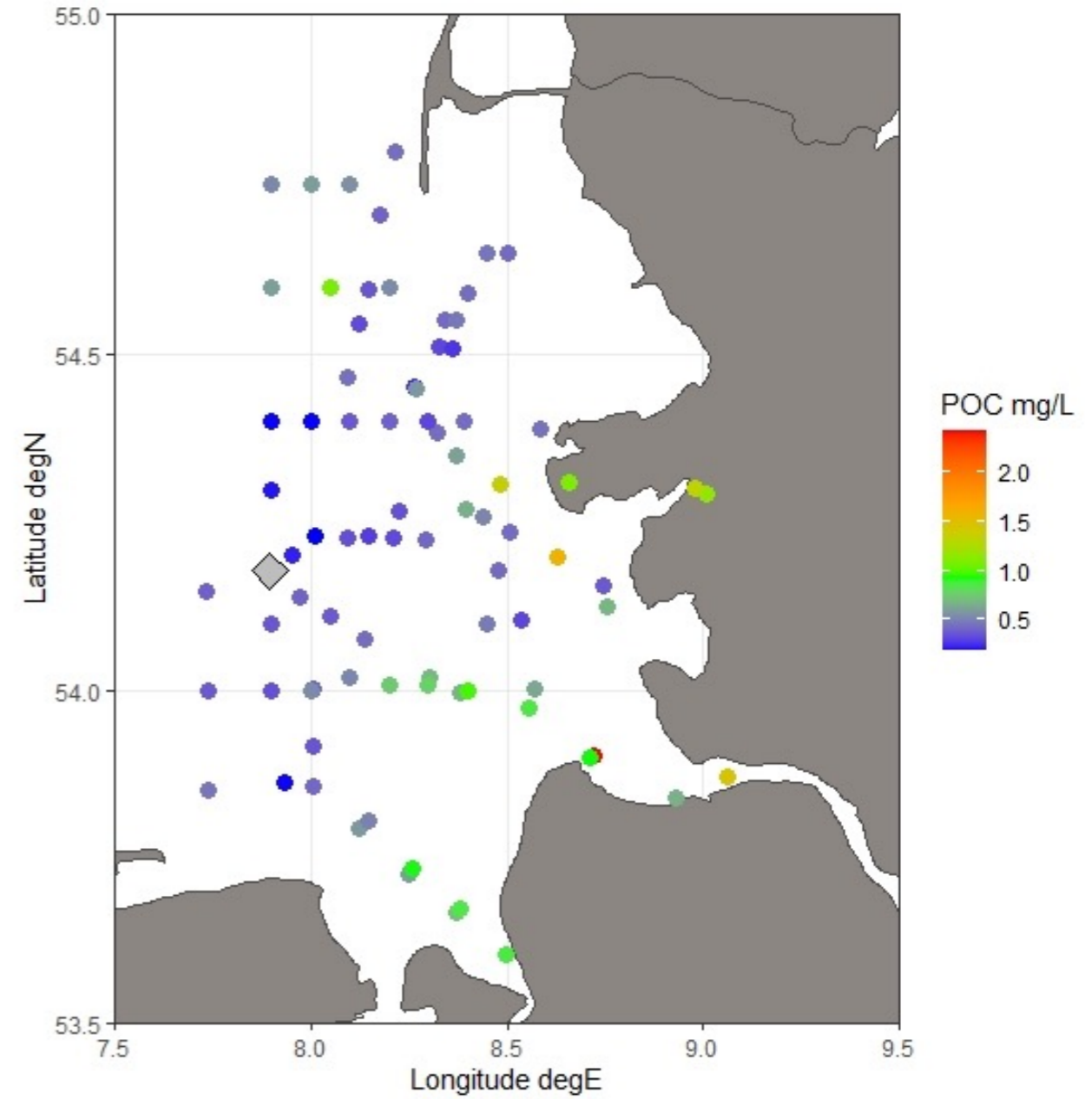
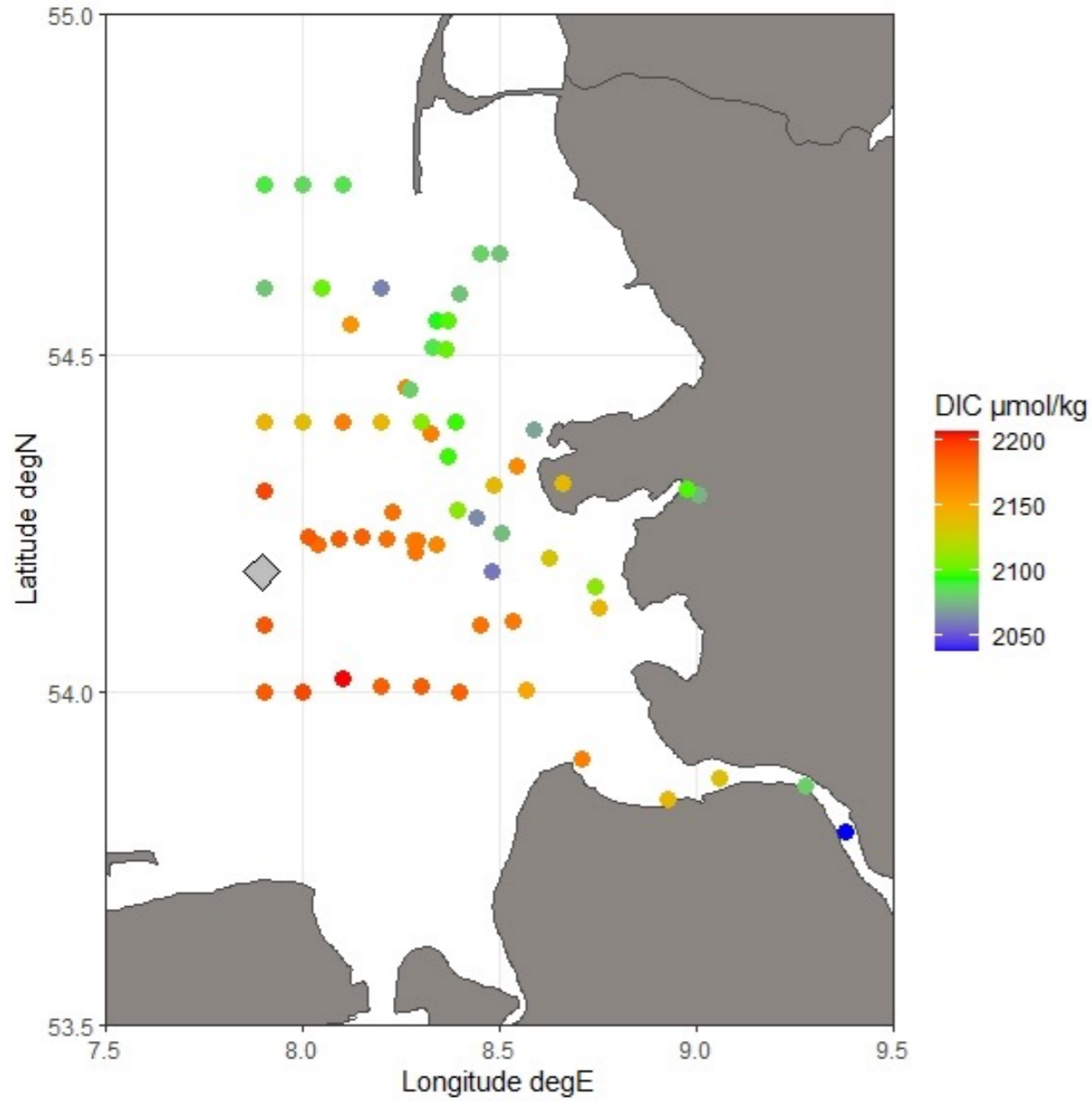


# Results for the Tidal Cycle





# Results in the estuary and beyond



# Conclusions

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- Measurements across compartments require logistical effort and challenge old habits
- Cross-calibration, shared data handling and logistics are required
- Results help answer local / regional research question as well as enhance systems understanding
- Challenges:
  - Communication in the field
  - Sustaining network for operations to monitor extreme events

# Acknowledgements

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- Crew and captian of RVs Albis, Littorina, Ludwig Prandtl and Mya II
- Numerous lab technicians at all participating institutes
- Numerous colleagues “behind the scenes” supporting with logistics, instruments, knowhow and advice

Thank you for your attention !