



**DFG-Research Group
"BioGeoChemistry of Tidal Flats":
Some thoughts about the coastal
"bioreactor"**

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DFG- Research Group „BioGeoChemistry of Tidal Flats“

<http://www.icbm.de/watt/>



Institute for Chemistry
and Biology of the
Marine Environment



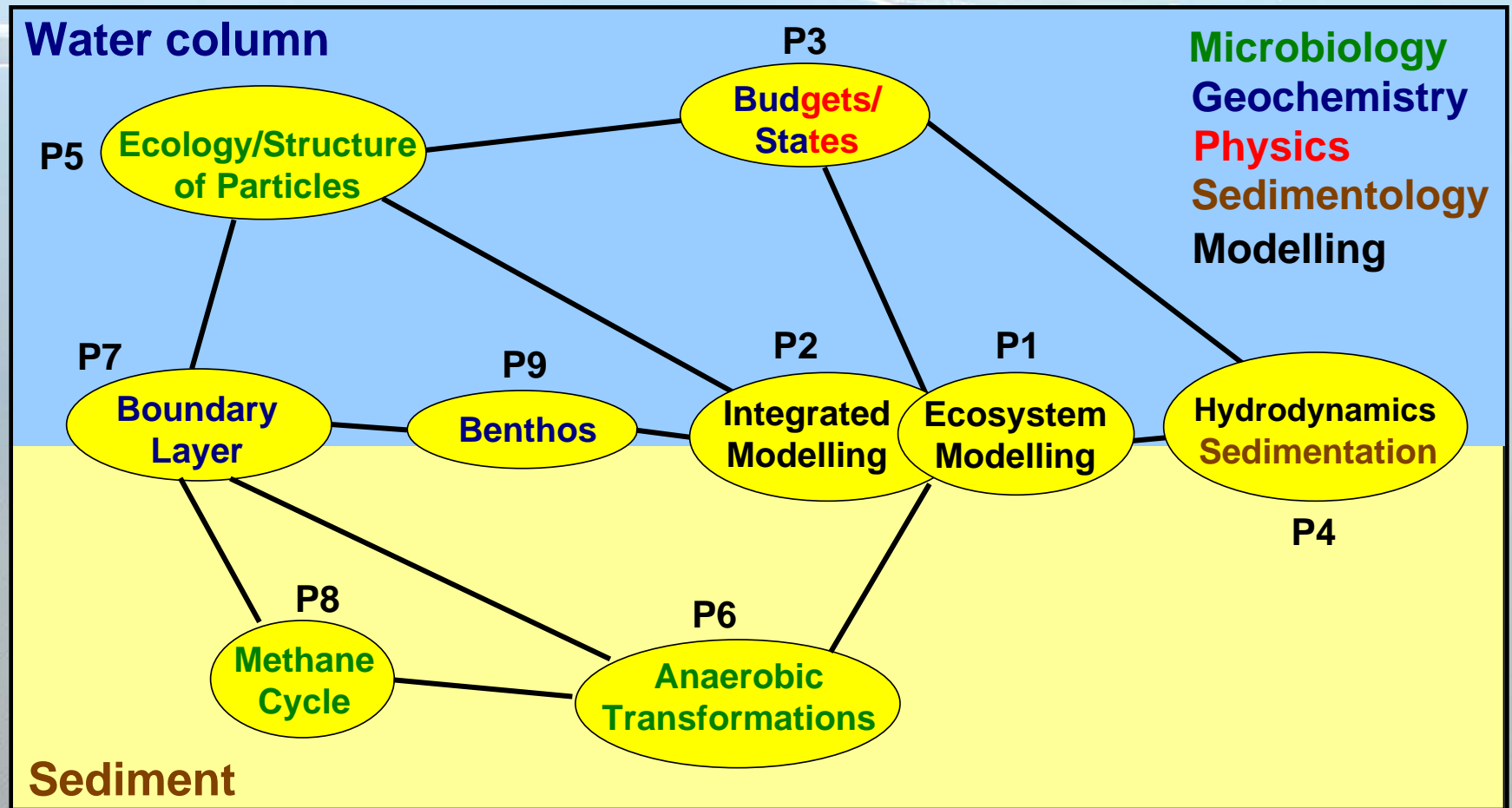
Max Planck Institute
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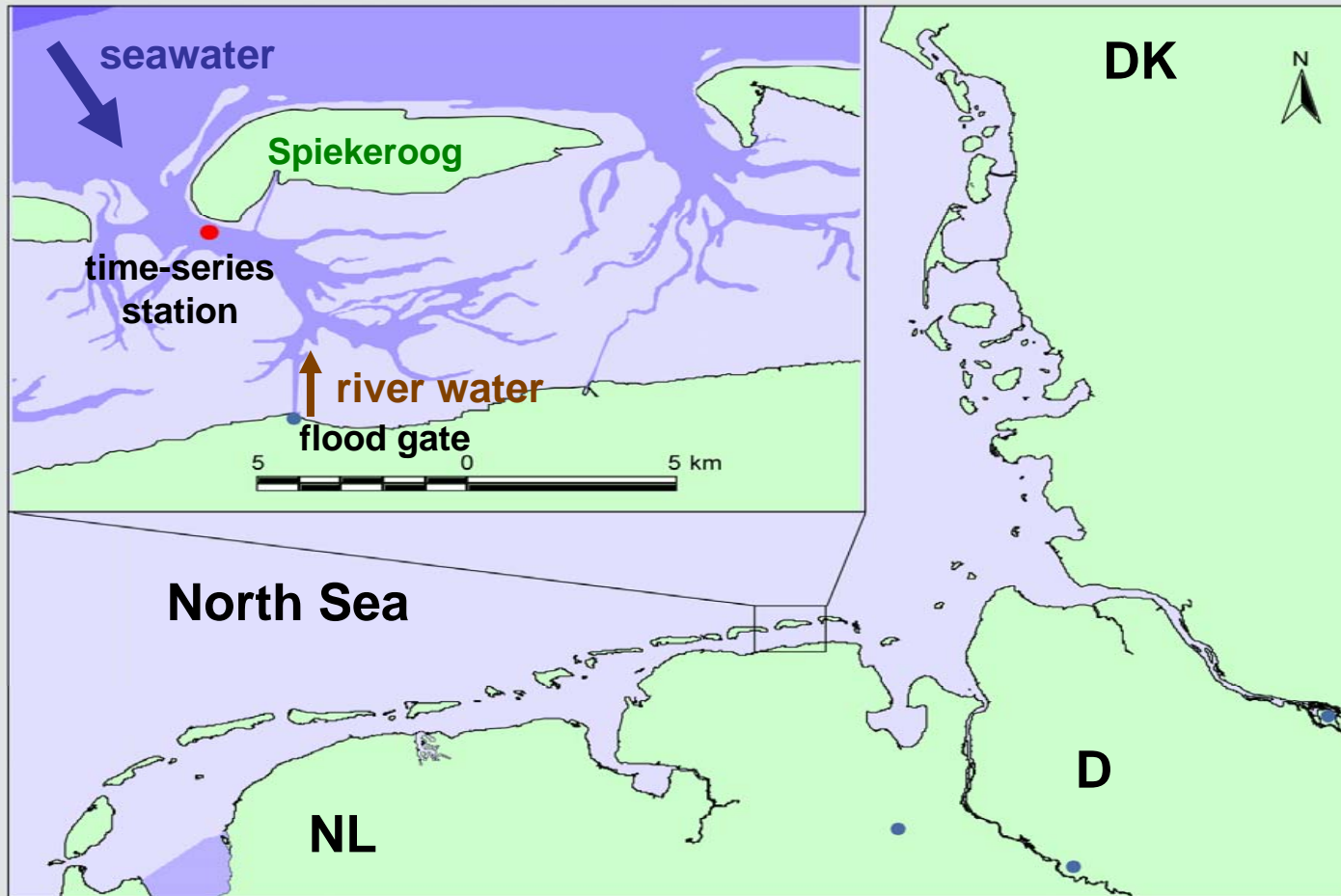
funded by the German Research Foundation (DFG)

DFG- Research Group „BioGeoChemistry of Tidal Flats“





Area of investigation: Spiekeroog Island backbarrier tidal flats





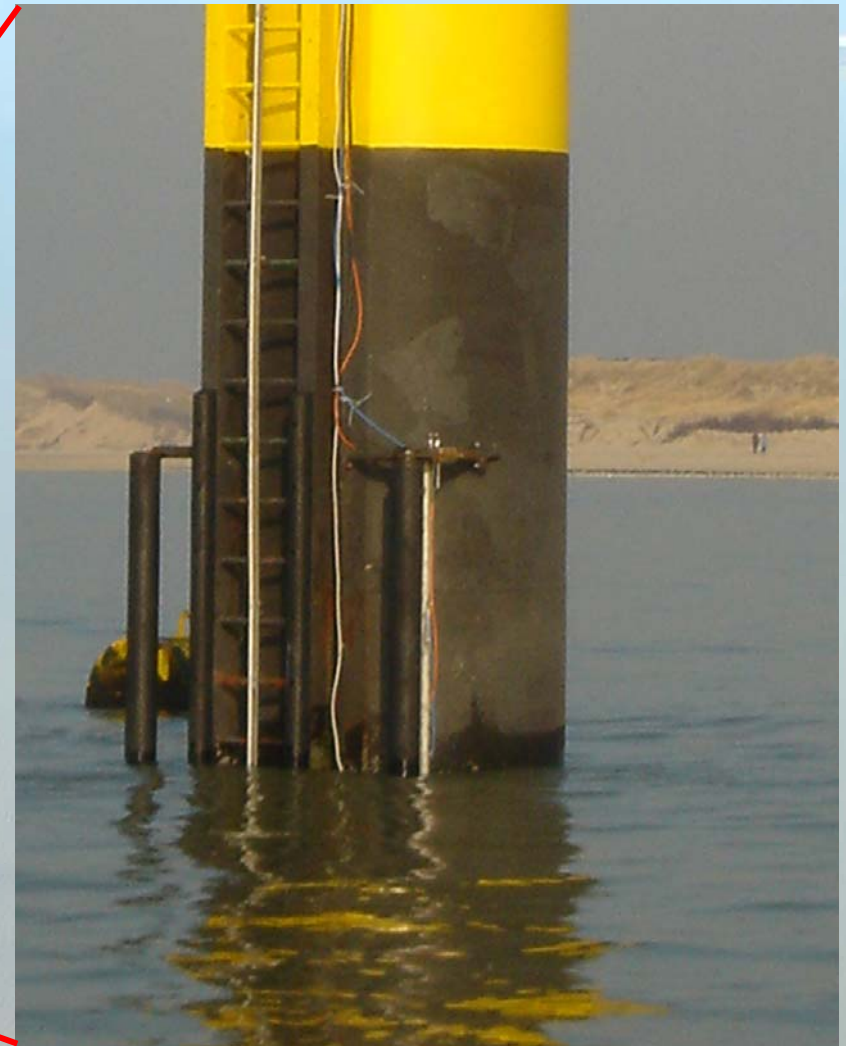
Time-series station

✉ for the continuous acquisition of physical and chemical parameters





Time-series station



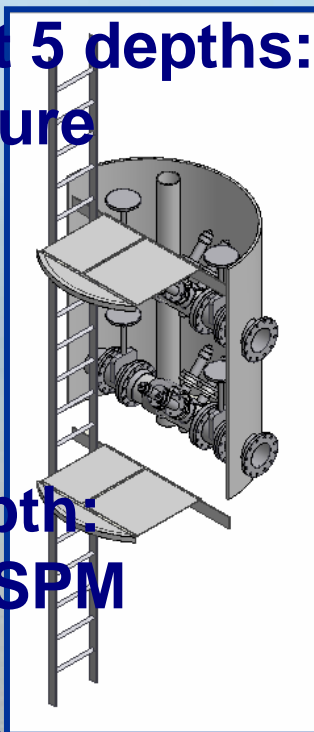
Time-series station

Sensors at 5 depths:

- temperature
- salinity
- oxygen
- pressure

At 1 m depth:

- MST for SPM
- methane
- nutrients
- manganese

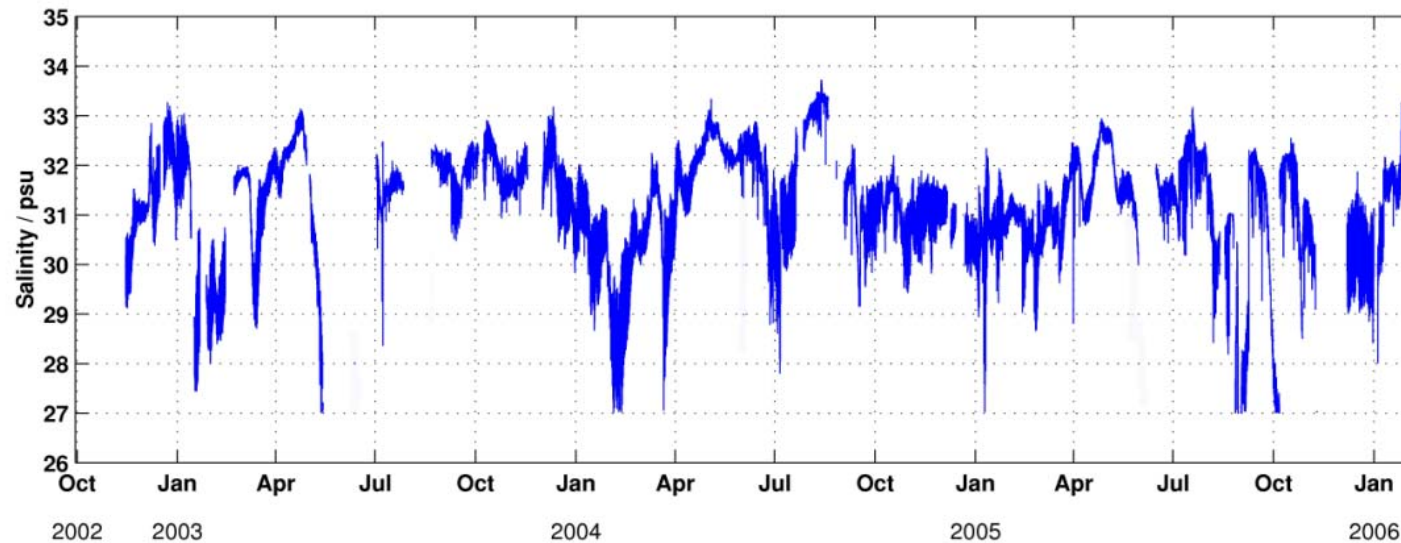
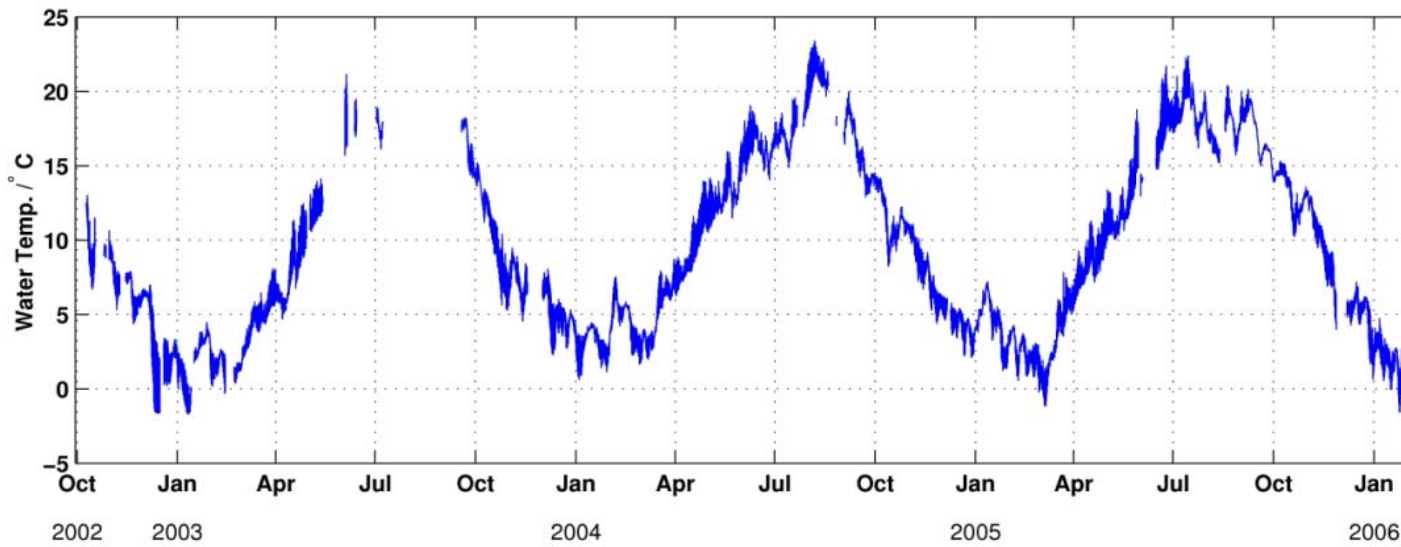


Additionally:

- meteorology
- radiometry for SPM
- ADCP for currents

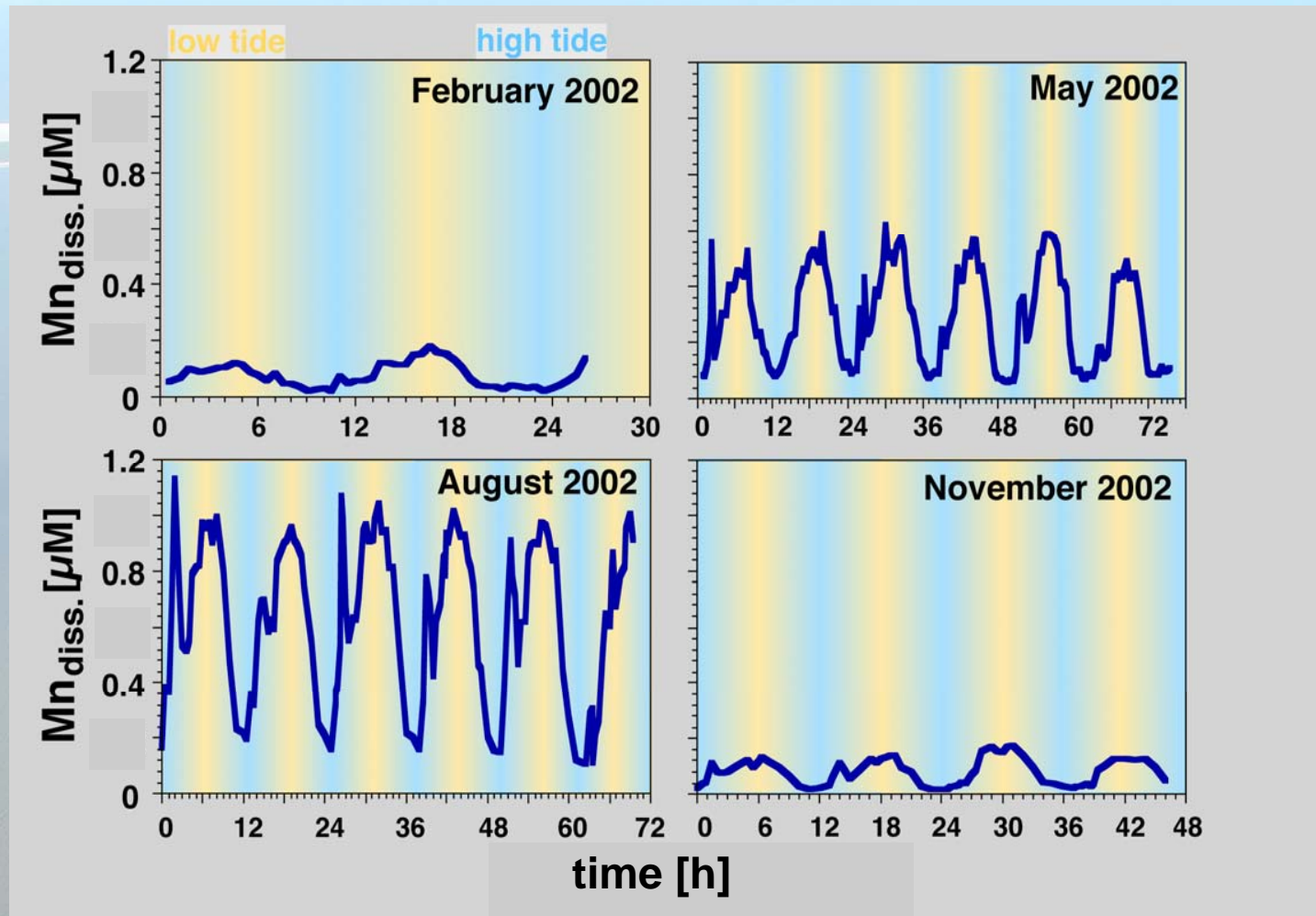


Time-series station



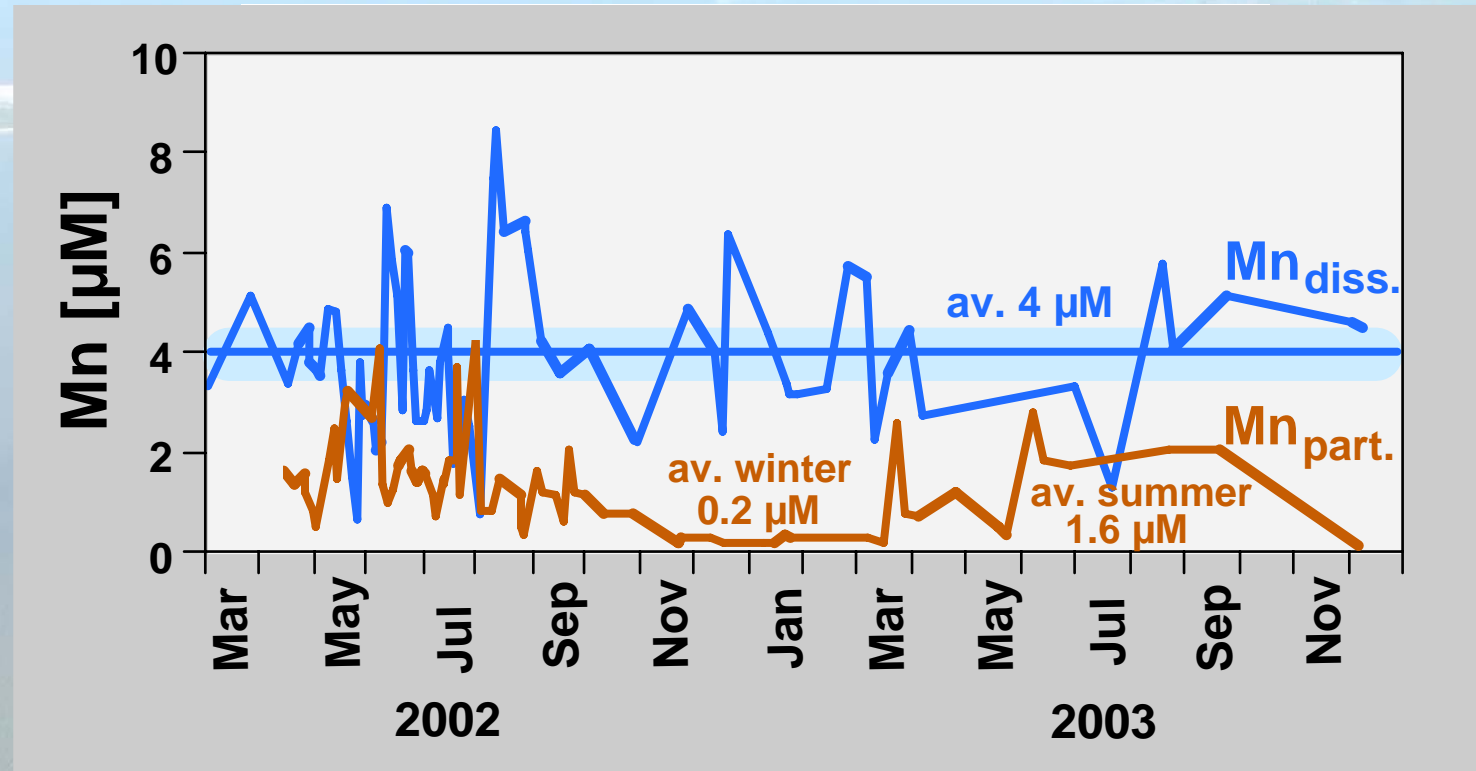
dissolved manganese

North Atlantic: 0.004 μM North Sea: 0.020 μM



✉ backbarrier flats are exporting dissolved Mn

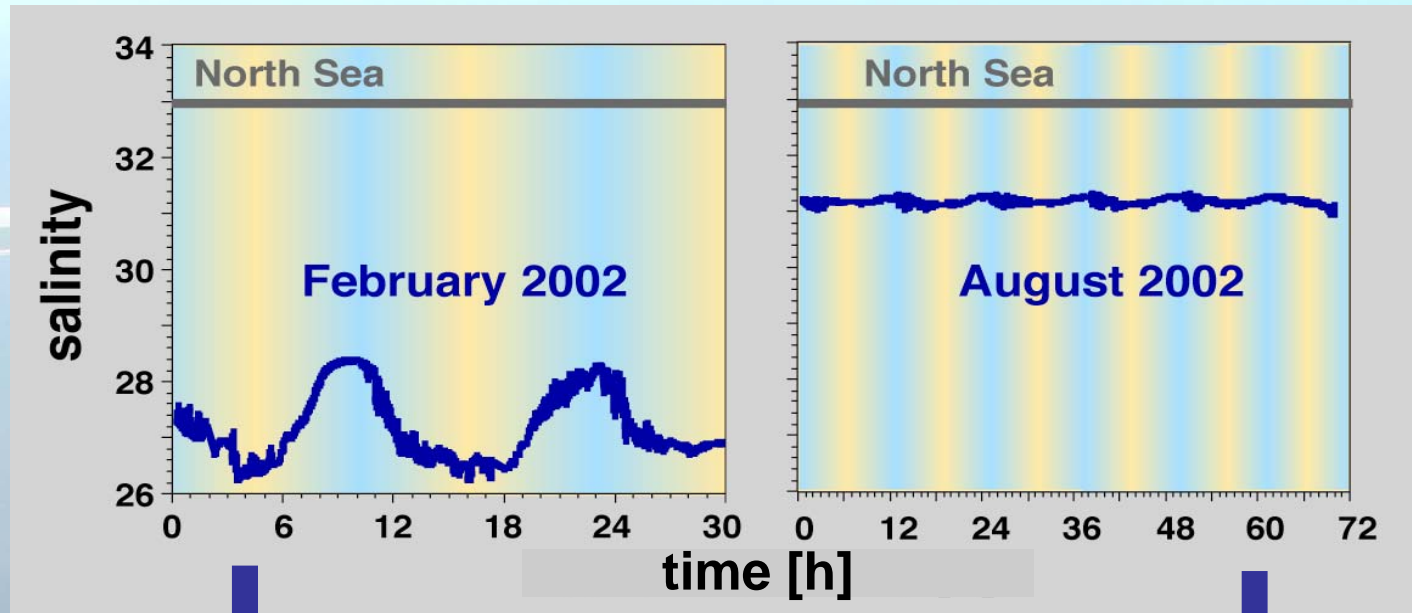
Manganese in fluvial input



backbarrier water column average:
 winter $0.07\mu\text{M}$; summer $0.70\mu\text{M}$

✉ Fluvial input forms an important Mn-source

What are the dominating Mn-sources?



fluviate

pore water

winter

0.30

Mn_T-input flood-gate [μM]

0.10

0.35

Mn_T backbarrier area [μM]

0.80

15

pore water Mn-input [%]

87

summer

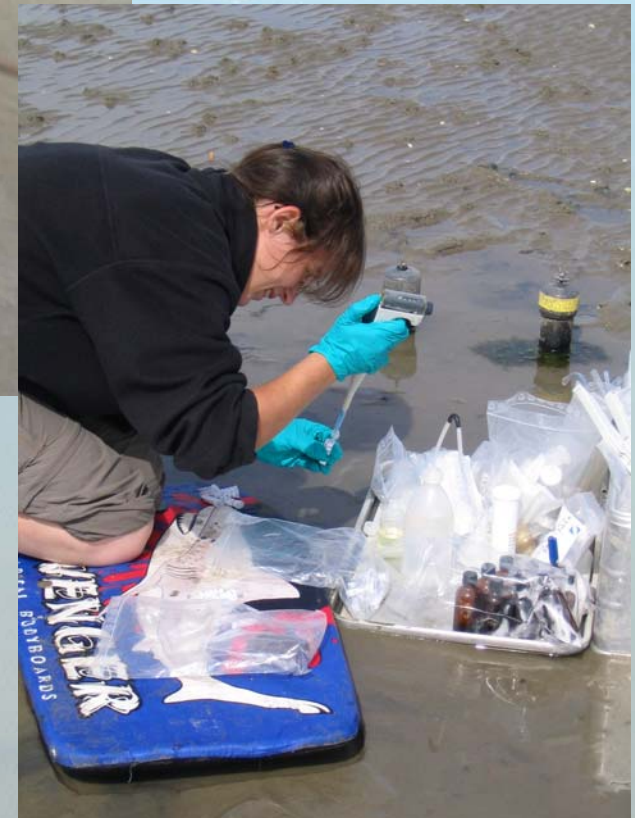
Pore water sampling: *continuous monitoring*



**installation of permanent
in-situ pore water sampler**



sampling ports

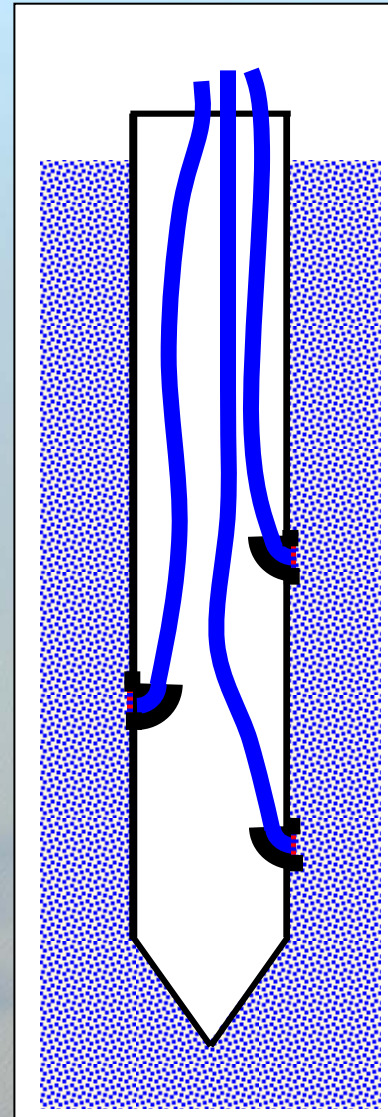


**pore water sampling and
data logger reading**

Pore water sampling: *continuous monitoring*

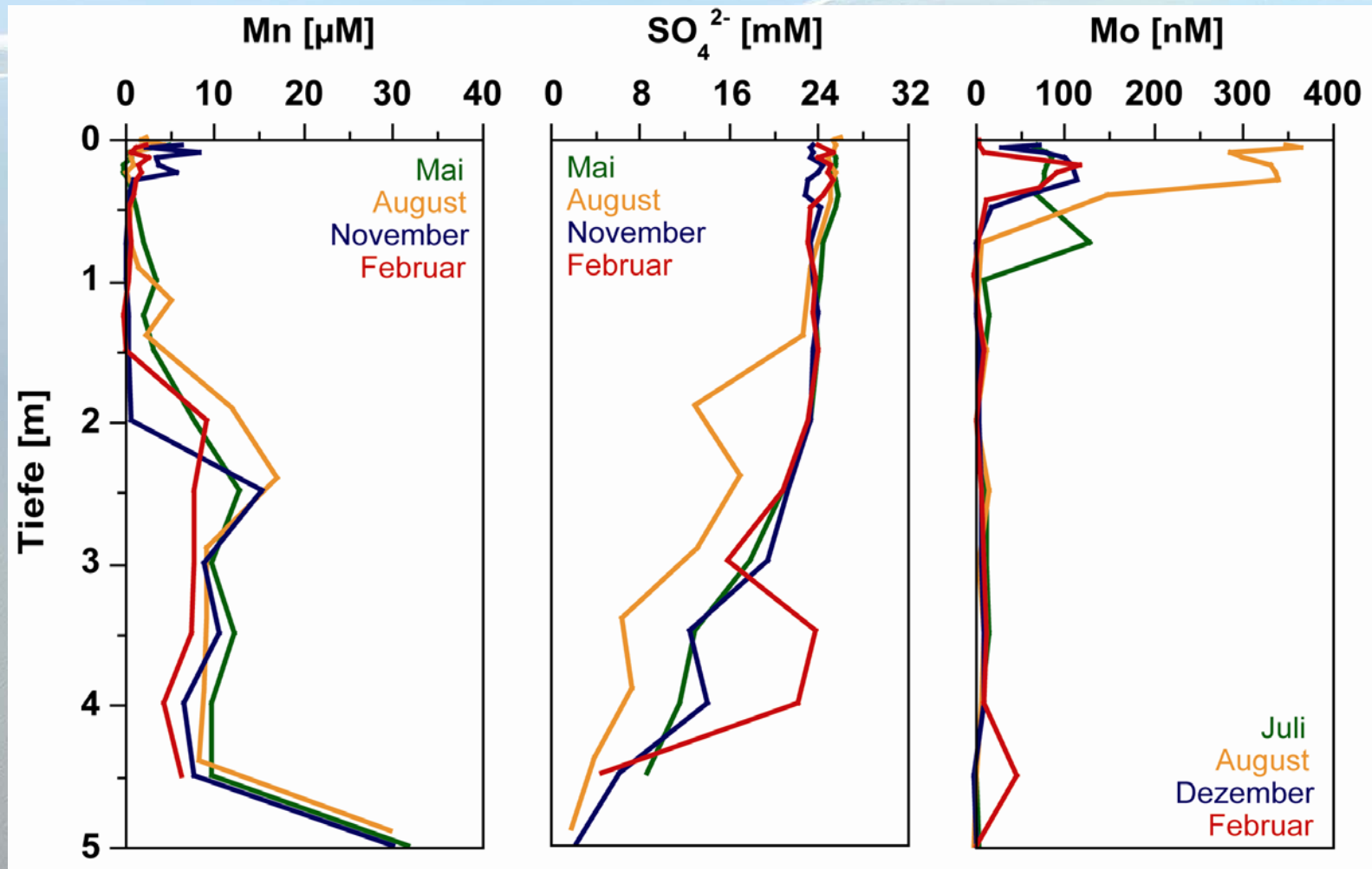


pore-water inlet



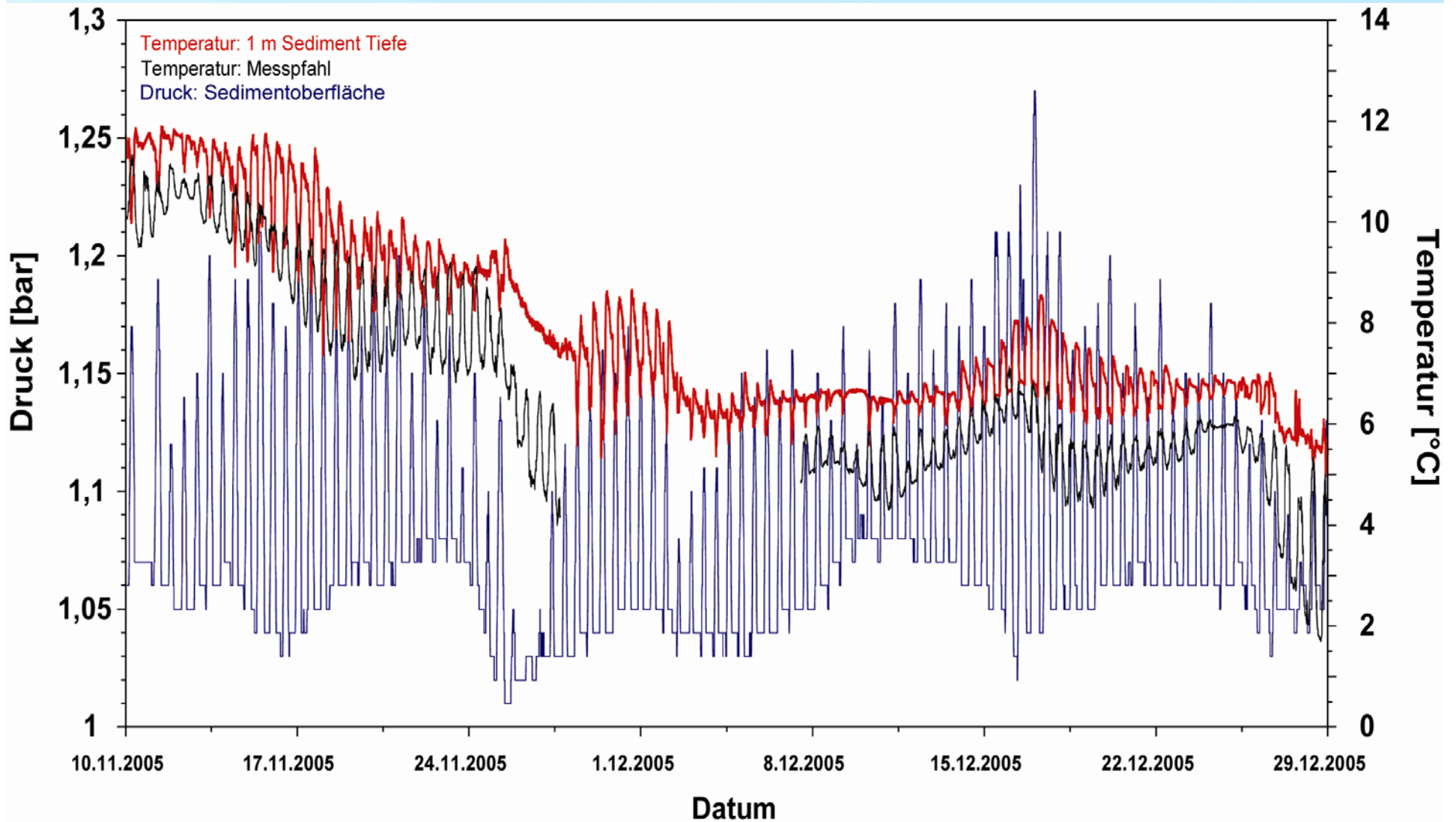
**PW in-situ sampler in
a salt marsh**

Pore water sampling: *continuous monitoring*

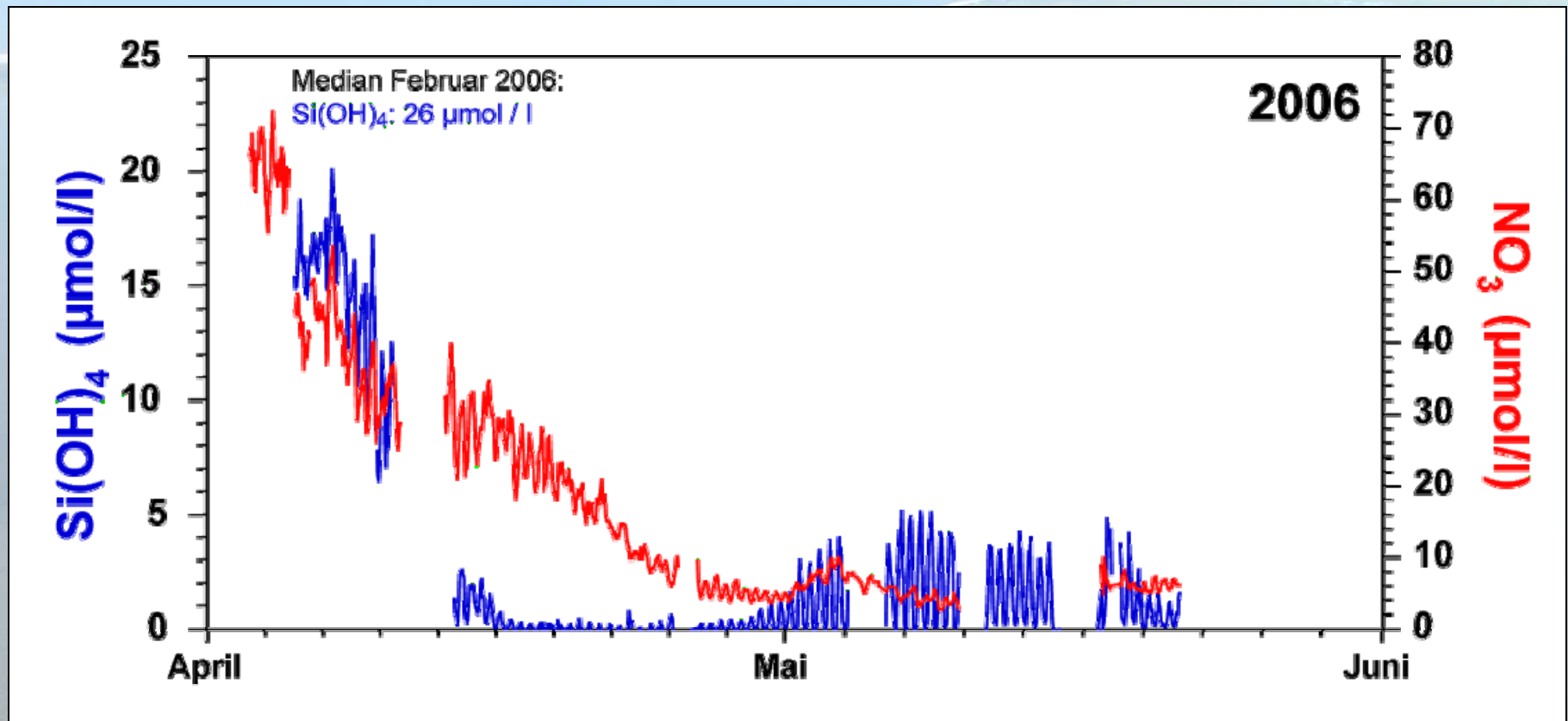


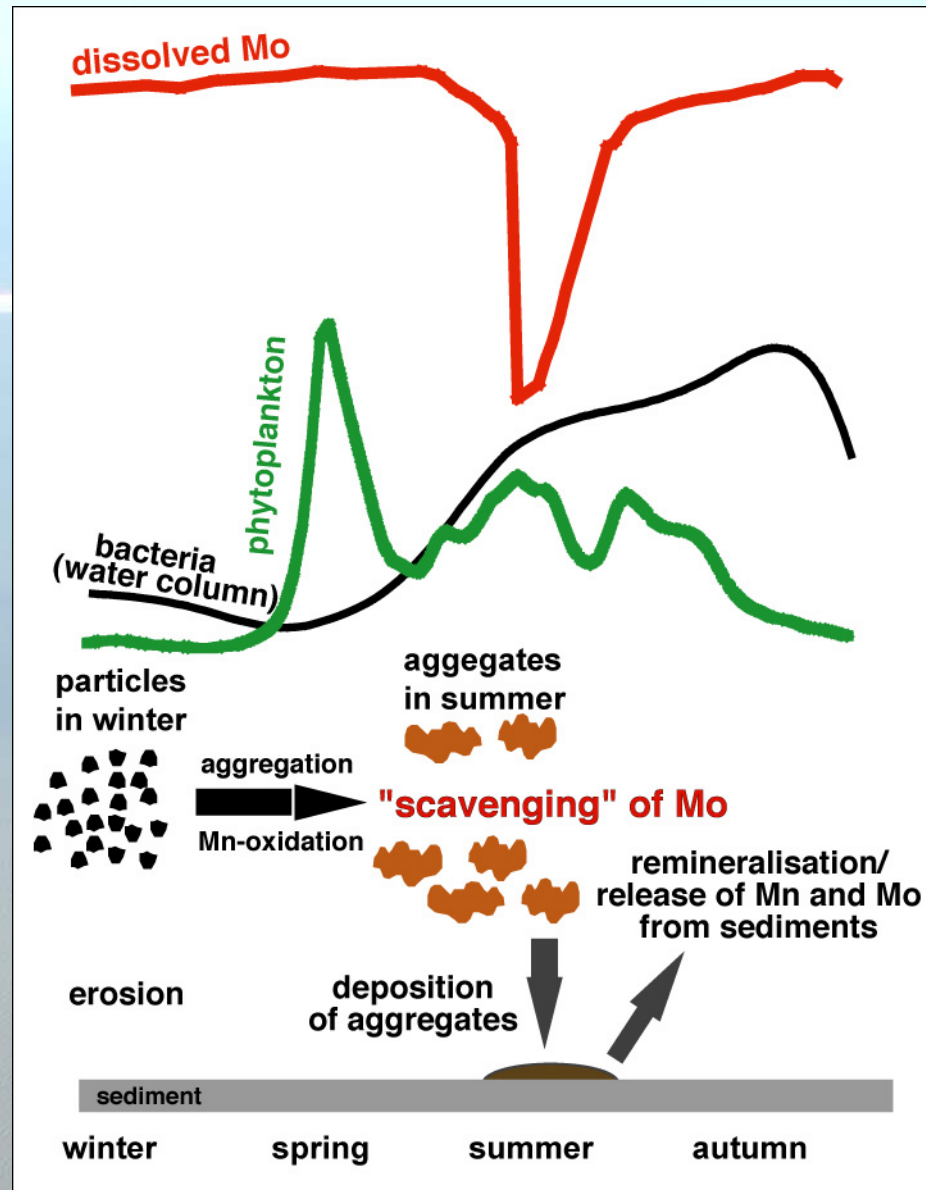


Pore water sampling: *continuous monitoring*



Nutrient drawdown during plankton bloom







Conclusions

- Coastal systems are extremely complex owing to the close interplay between physical forcing, varying chemical parameters and biological activity
- We may learn how such systems are operating by using an integrated multidisciplinary approach
- One of the major requirements is the availability of time-series of physical, chemical, and biological parameters at key locations
- Besides fluvial input during the winter, the pore water reservoir in sand flats forms an important source for chemical water column signatures
- The importance of this „bioreactor“ for coastal systems is not yet fully understood
- It seems like pulses of metabolizable organic matter after the termination of plankton blooms keep the system going



Thanks for your attention

