

Water quality and nutrient measurements in the hyper-turbid Ems Estuary

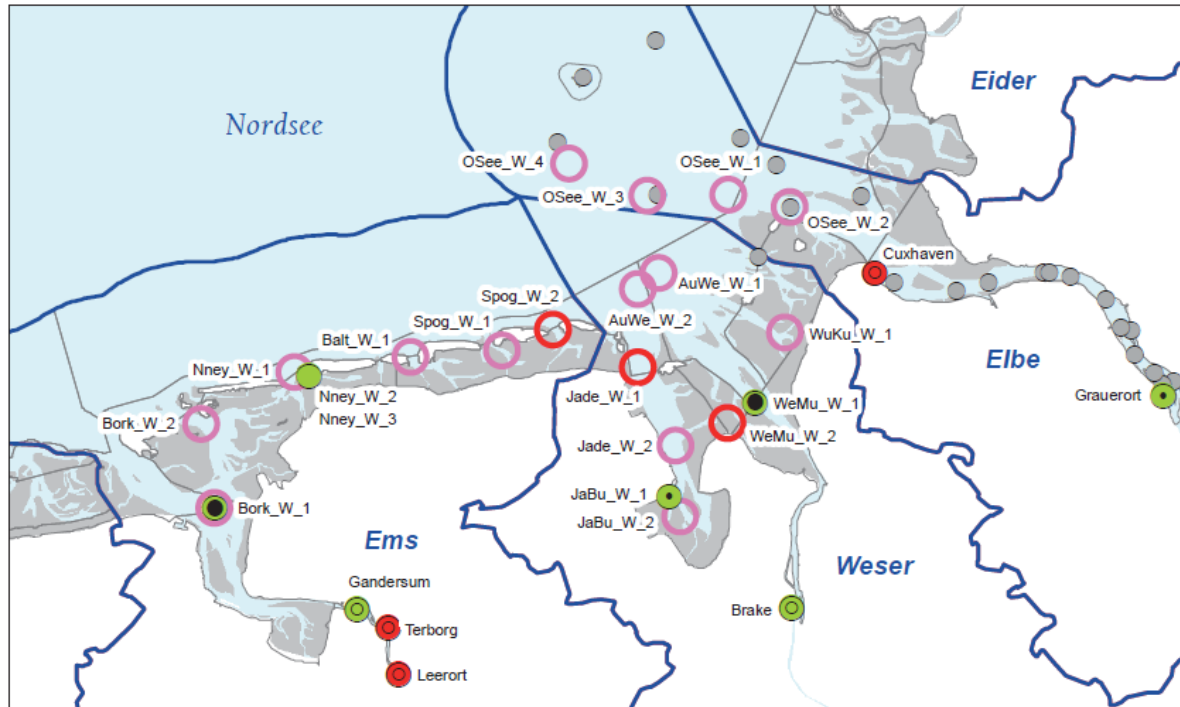
Anne Ritzmann

Coastal Research Station – NLWKN

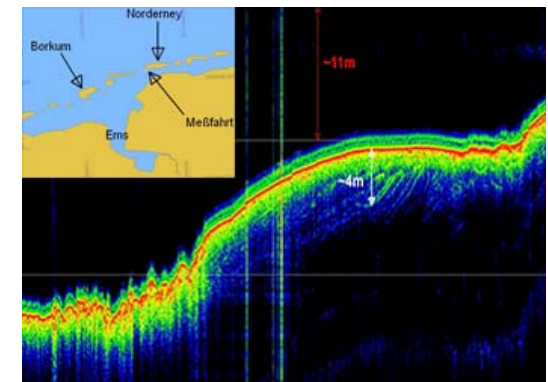
Norderney, Germany



Area & purpose



- North Sea up to 12 sm-zone, Wadden Sea and estuaries
- Biological monitoring, habitat mapping, sea state measuring network
- NEW: continuous, high resolution FerryBox measurements



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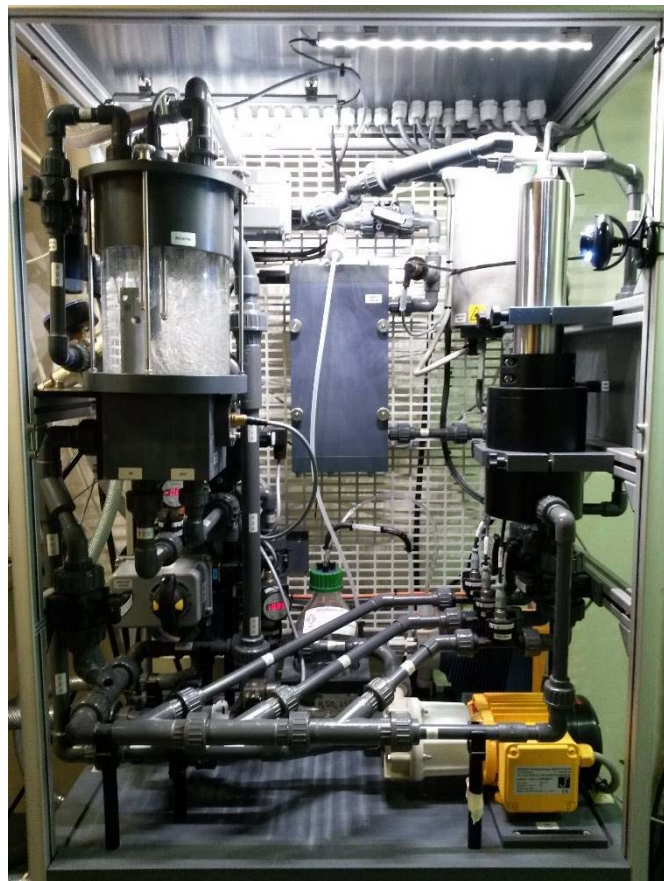
Main aims

- increase the database of traditional point measurements by means of continuous data
- satisfy reporting duties required by the European strategies
- improve knowledge on seasonal water quality and nutrient dynamics
- Masterplan Ems 2050: demanded by European Commission - restauration and management



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FerryBox configuration

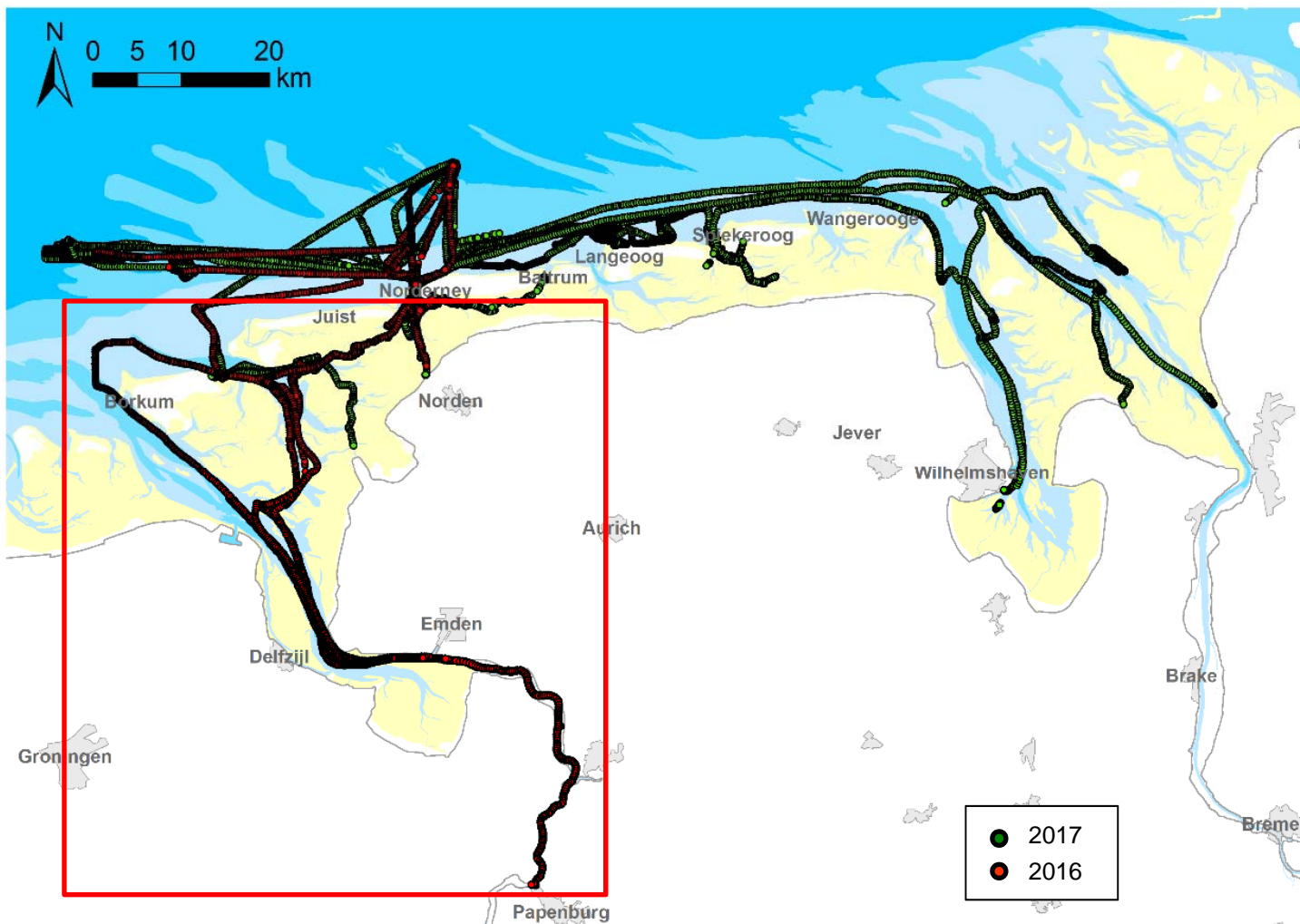


temperature, salinity, pH,
oxygen, Chl *a*, algae groups,
turbidity

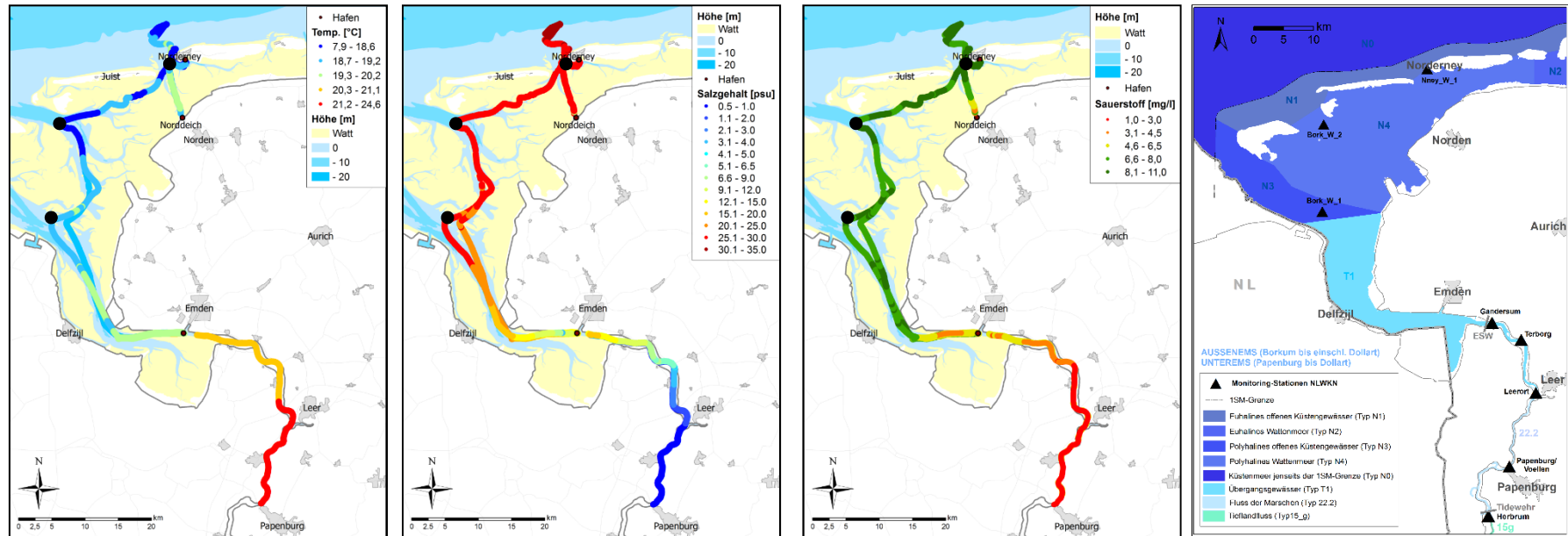


nutrient analysis (NH_4 , PO_4 / NO_2 , NO_3 , SiO_2)

Campaign data



First FerryBox campaign in July 2016



Temperature

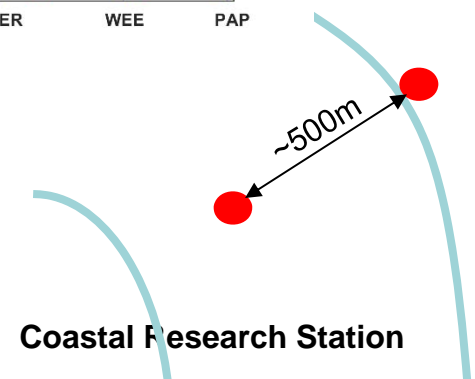
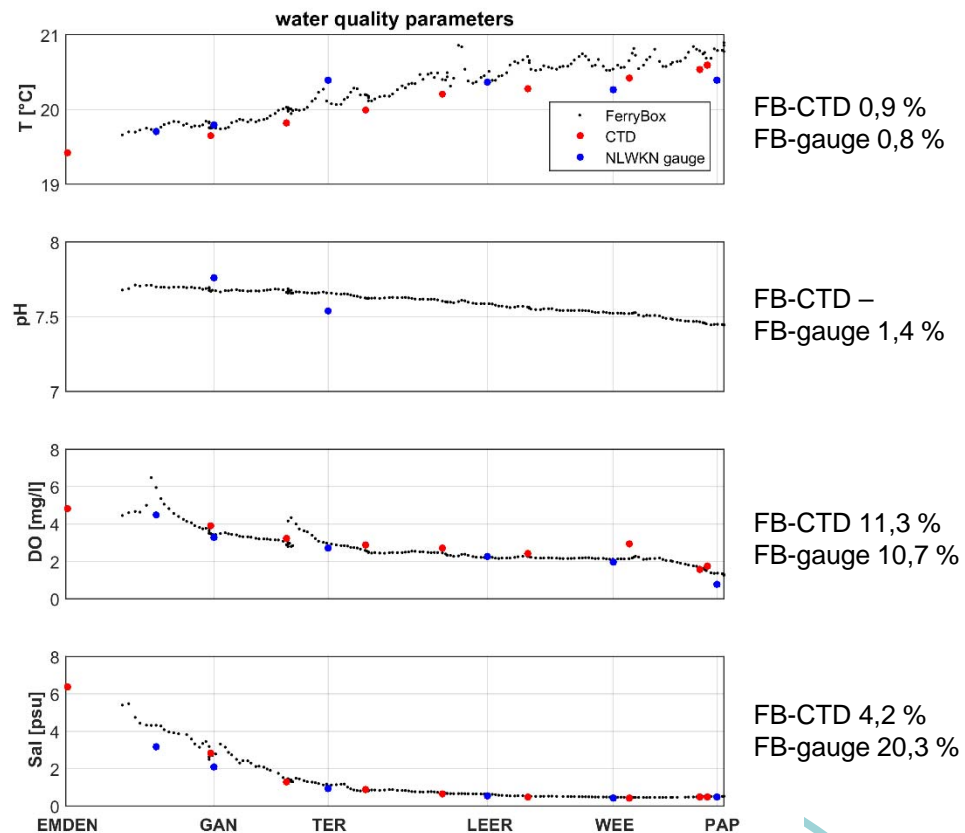
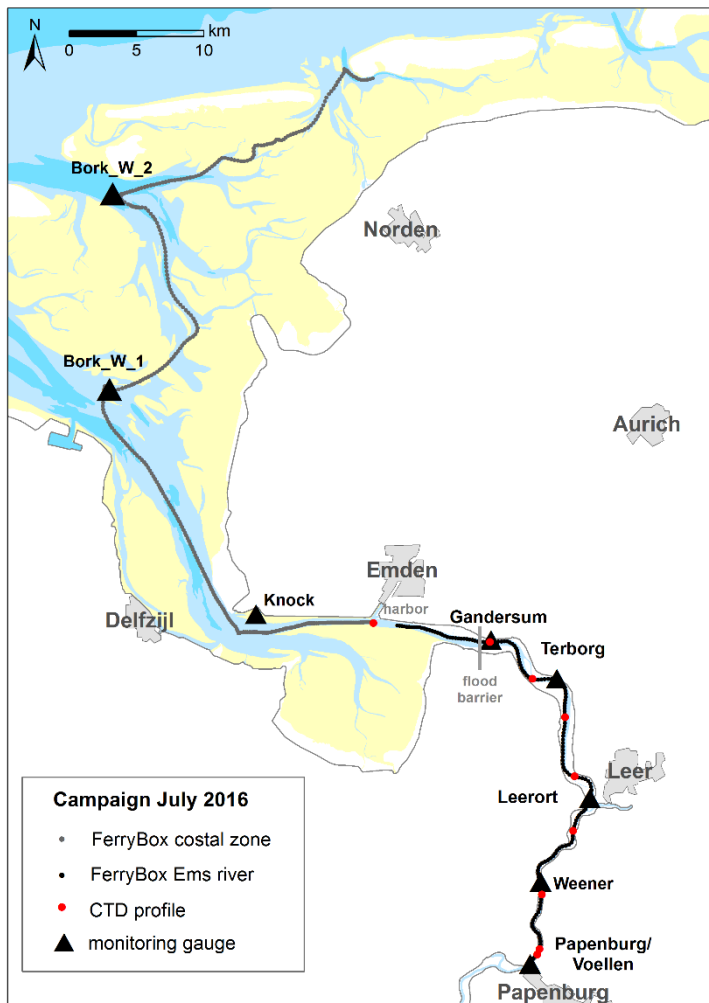
Salinity

Oxygen

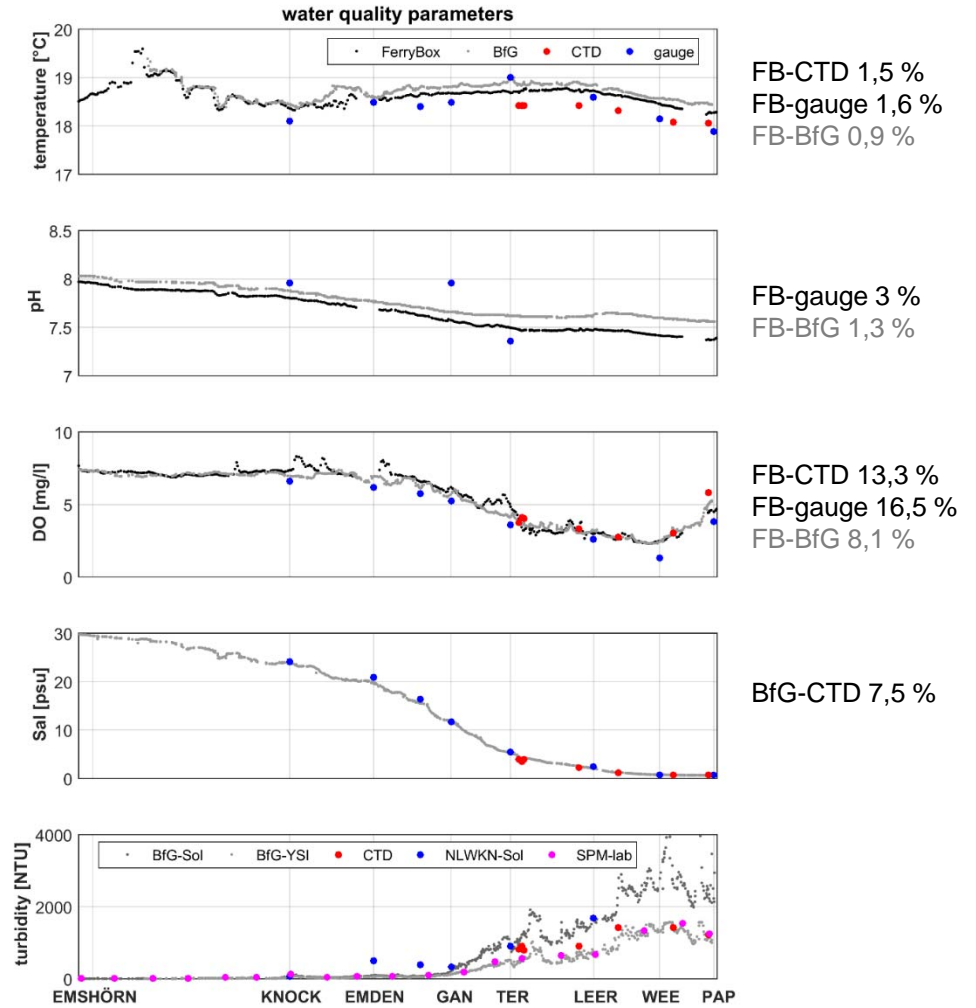
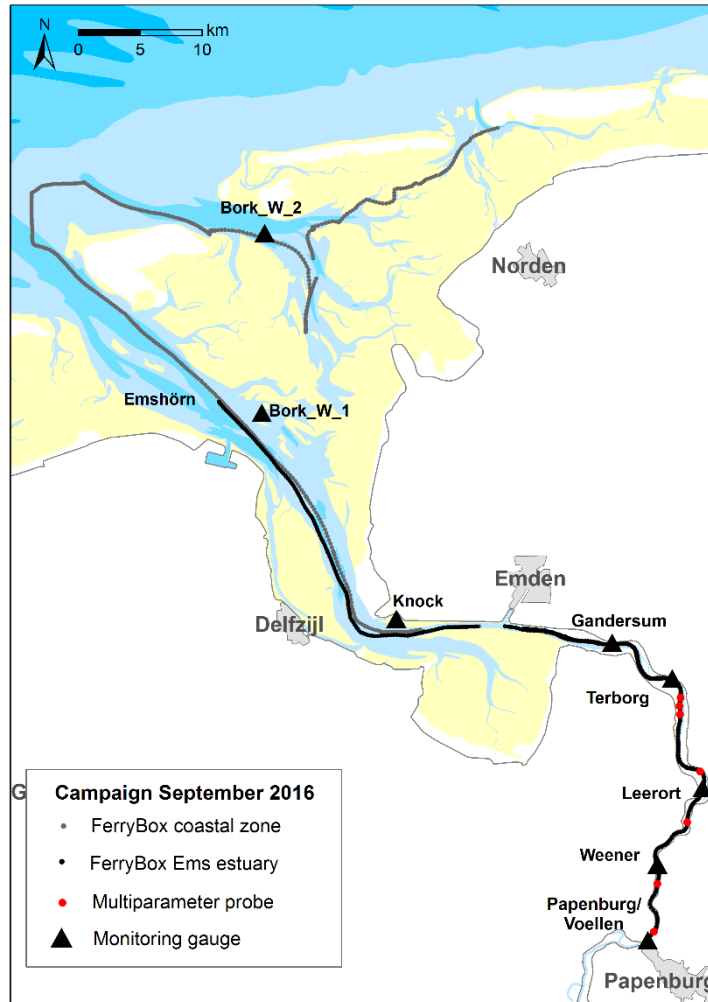
- Spatial distribution of standard parameters along gradient from offshore conditions to freshwater influenced river

→ 559 measurements vs. 3 at monitoring stations

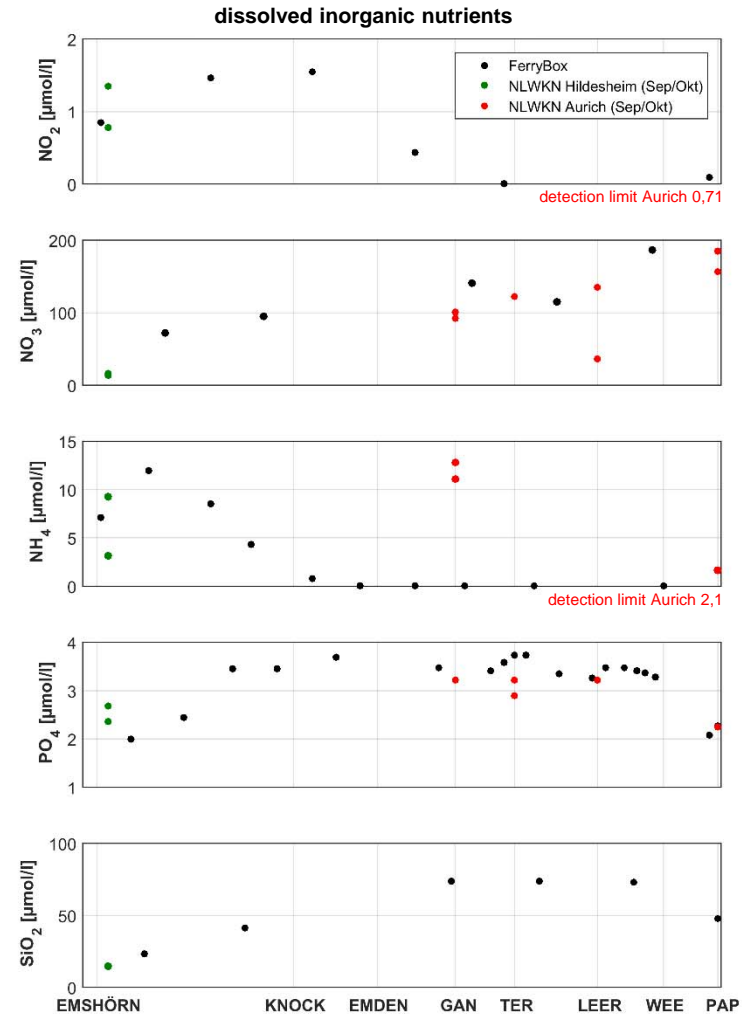
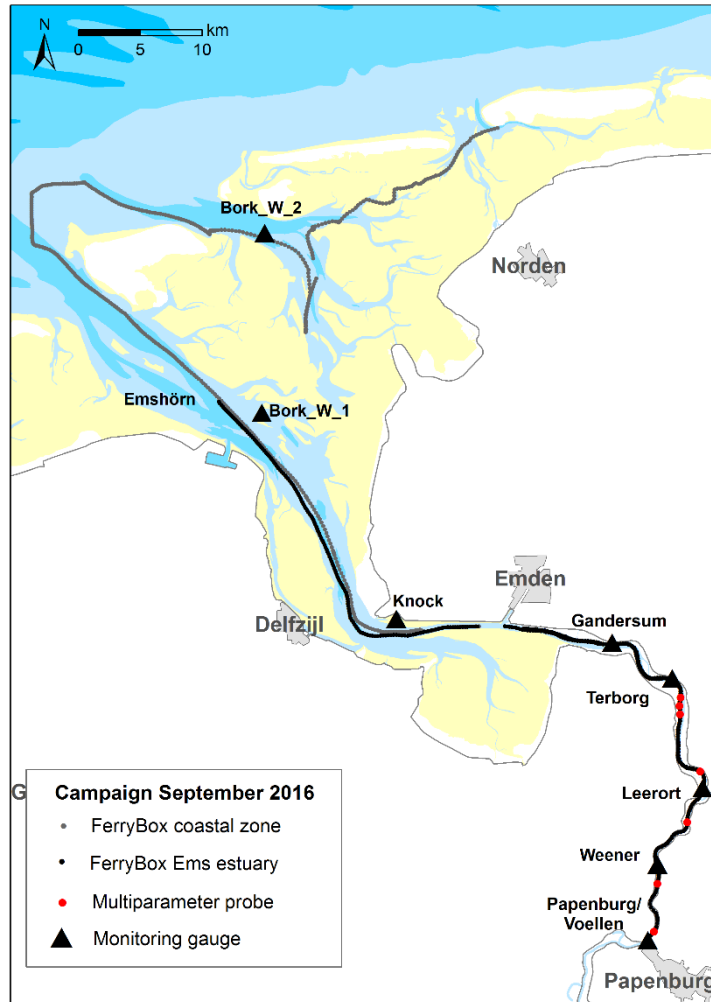
Validation July 2016



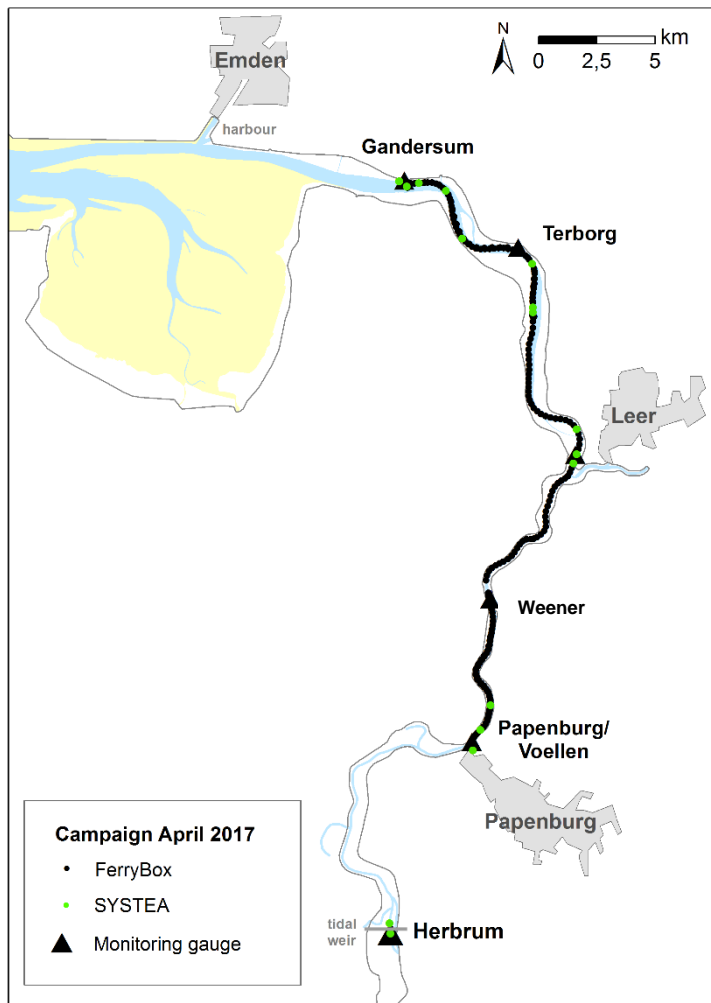
Campaign September 2016



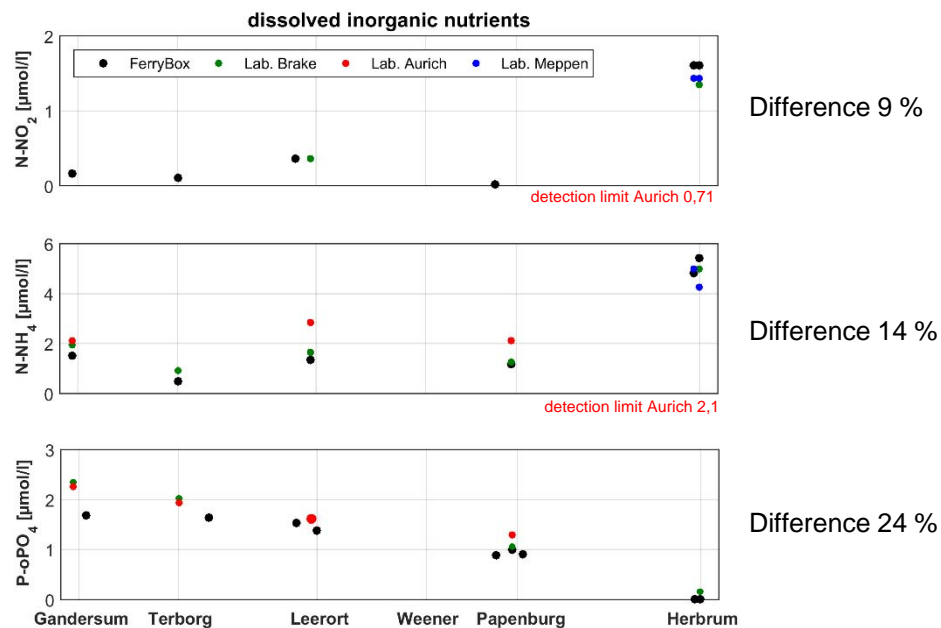
Campaign September 2016



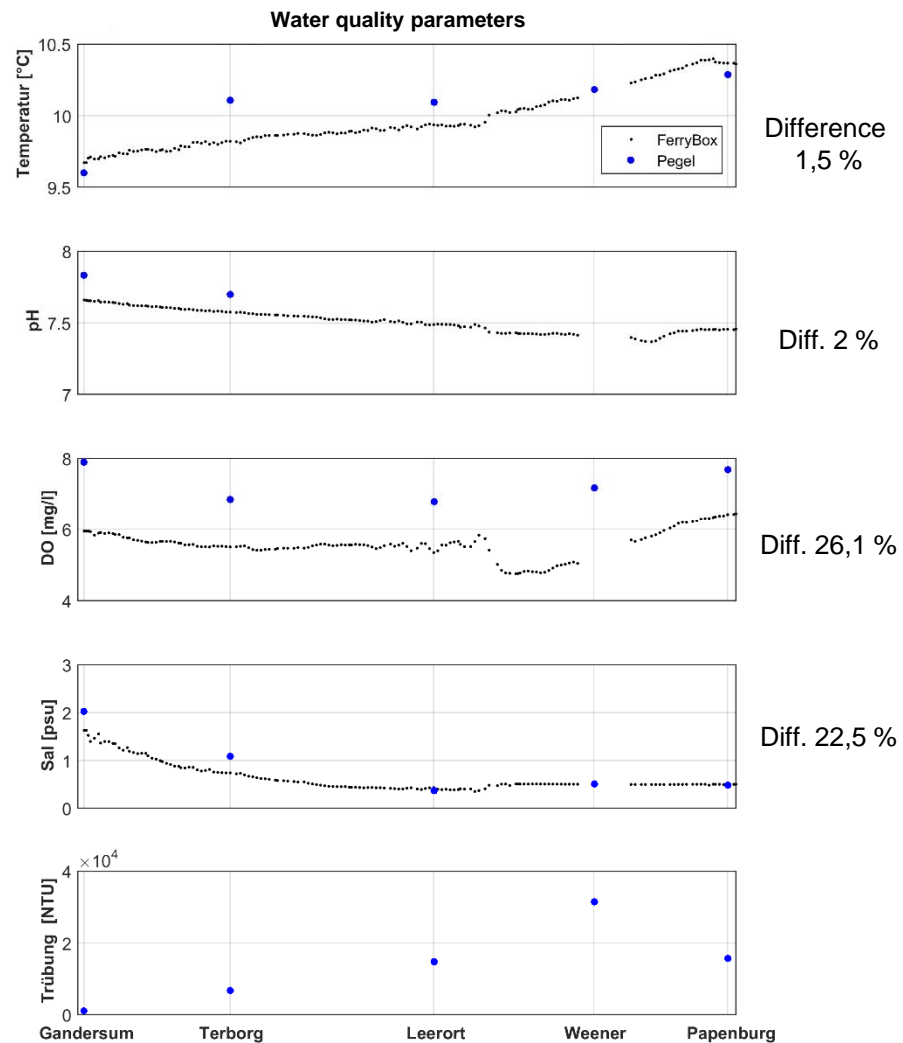
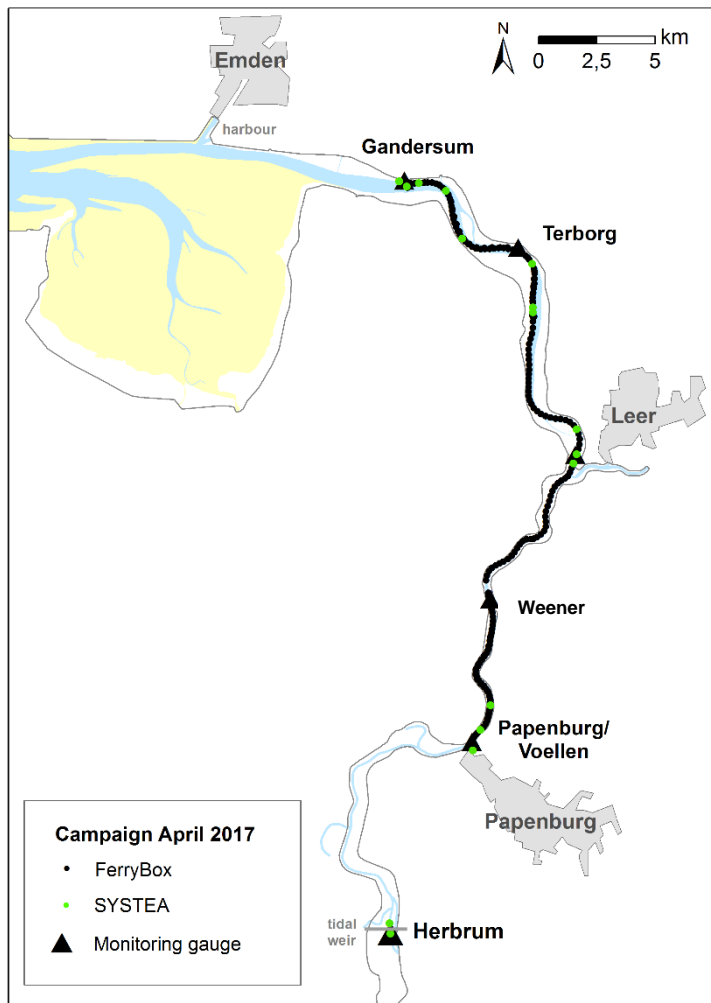
Campaign April 2017



- ☹️ SiO_2 , NO_3
- 😊 NO_2 , NH_4 and PO_4



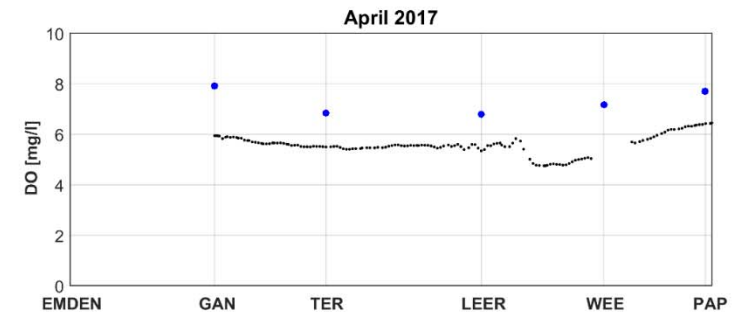
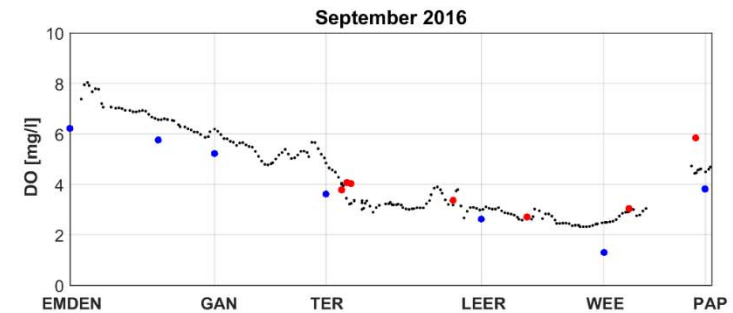
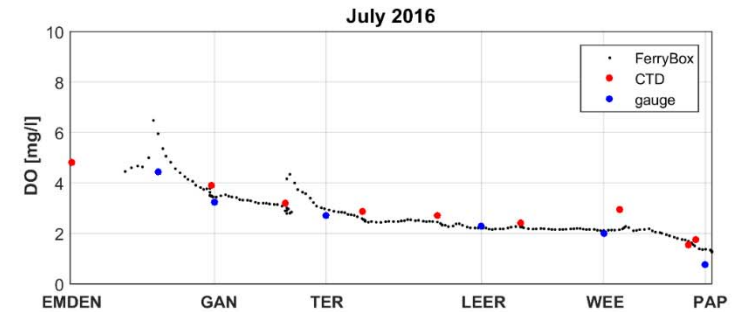
Campaign April 2017



Overall Data Quality

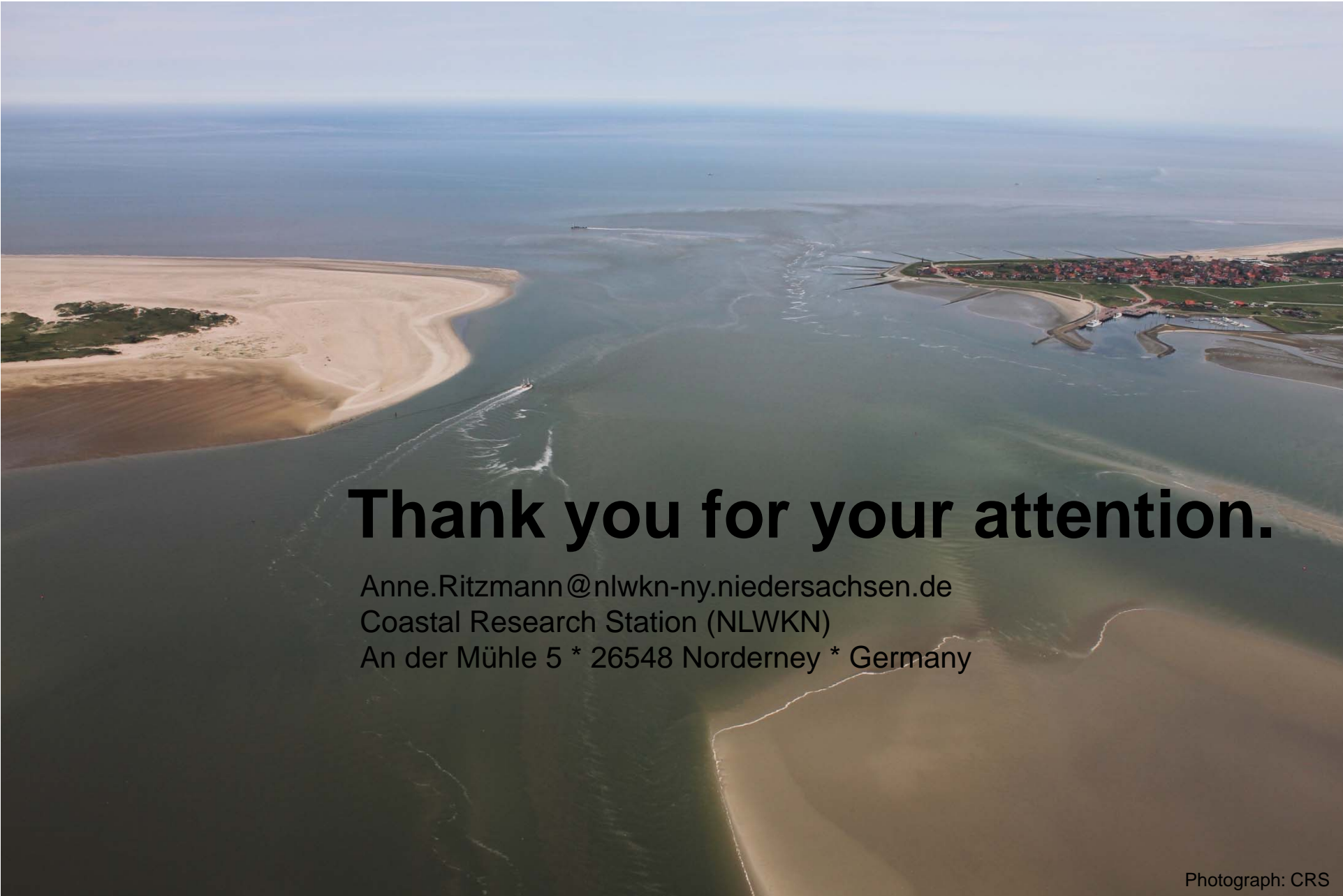
	Difference (%)	pH	Temp	Sal	DO
July 2016	FB-gauge	1,4	0,8	20,3	10,7
	FB-CTD	-	0,9	4,2	11,3
September 2016	FB-gauge	3,0	1,5	-	16,5
	FB-CTD	-	1,6	-	13,3
April 2017	FB-gauge	1,9	1,5	22,8	26,2
	FB-CTD	-	-	-	-

- A difference does not automatically mean bad data
-but it might!



Conclusions

- FerryBox works in turbid waters
- good results for standard water quality parameters
 - QM necessary (drift of sensor)
 - check validation results (do they fit the data)
- Nutrient analysers
 - good results for NO_2 , NH_4 and PO_4
 - improvement necessary for NO_3 and SiO_2
 - high maintenance effort for nutrient analysers



Thank you for your attention.

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