Project: **1244**

Project title: **APOC - Anthropogenic impacts on particulate organic carbon cycling in the North Sea**

Principal investigator: **Wenyan Zhang**

Report period: **2025-11-01 to 2026-10-31**

All simulations have been performed as planned during the allocation period.

1. North Sea simulations

We conducted hindcast simulations with the SCHISM model for the period 2012–2014 to assess sediment budgets and changes in sediment transport pathways in the north Sea and German Bight. The model setup was extended by coupling a wave model, and a total of 10 numerical experiments were performed under both the present-day and future OWF configurations and sensitivity tests with different sediment characteristics. The North Sea results have been partially published in Chen et al. (2026; Fig. 1) and a further paper with German Bight and Wadden Sea results is to be submitted within this year (Fig. 2).

2. Baltic Sea simulations

We further conducted simulations of resuspended carbon fluxes in the Baltic Sea. The results have been published as a pre-print (Porz et al., 2026; Fig. 3) and final publication is anticipated within this year.

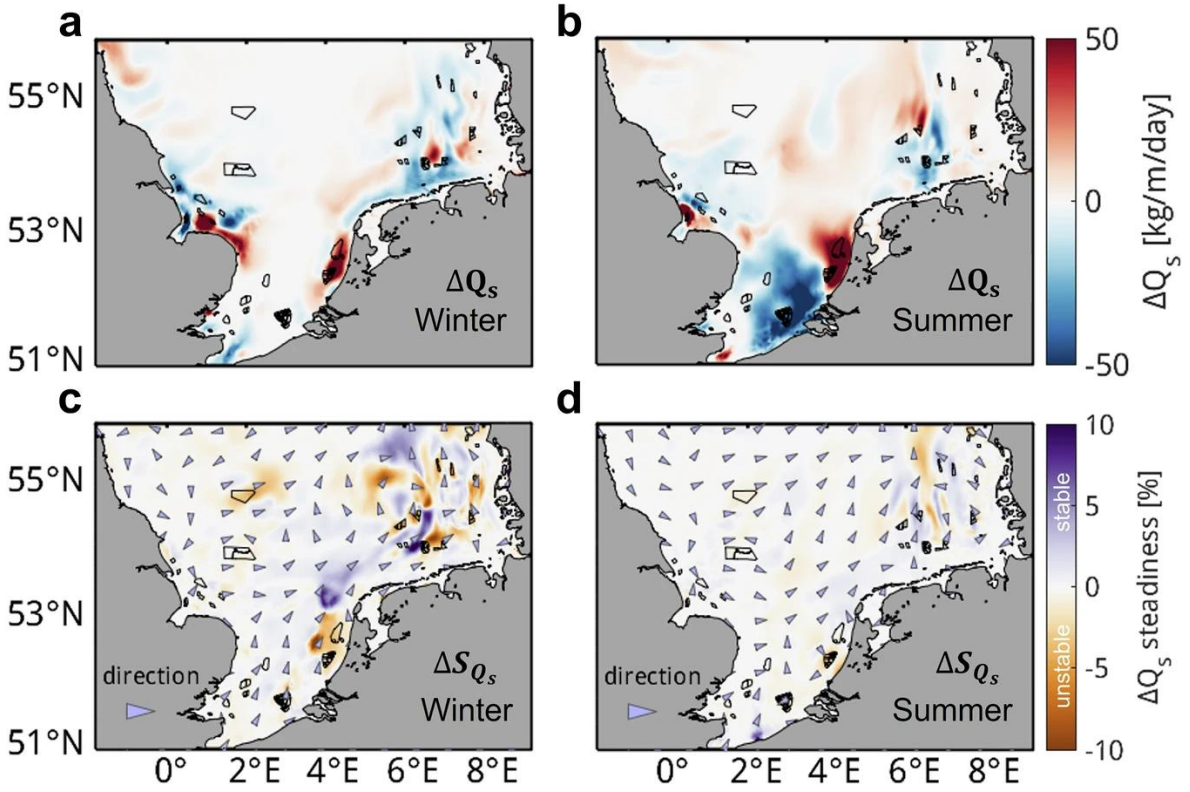


Figure 1. **a** Mean change of sediment flux in winter (December–February). Positive and negative values indicate increase and decrease caused by OWFs, respectively. **b** Similar to a but for summer (June–August) months. **c** Mean change of the steadiness of transport direction in winter (December–February). Positive and negative values indicate increase and decrease of steadiness caused by OWFs, respectively. **d** Similar to (**c**) but for summer (June–August) months. The arrows in (**c**) and (**d**) indicate the seasonal averaged direction of Q_s derived from the reference simulation.

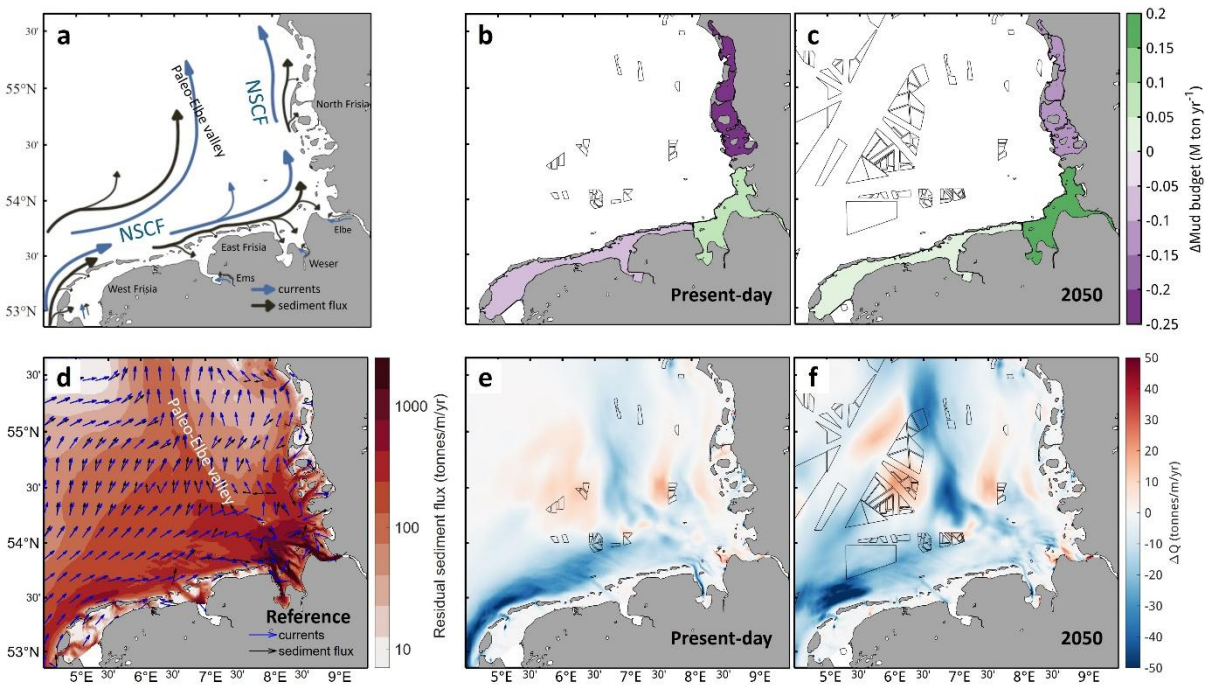


Figure 2. Annual response in mud budget and residual sediment flux due to offshore wind farm effects. (a) Sketch of regional circulations in the North Sea. (b, c) Estimated changes in the annual mean mud budget of three Wadden Sea zones compared to the reference simulation. (d) Reference and (e, f) estimated changes in the annual mean.

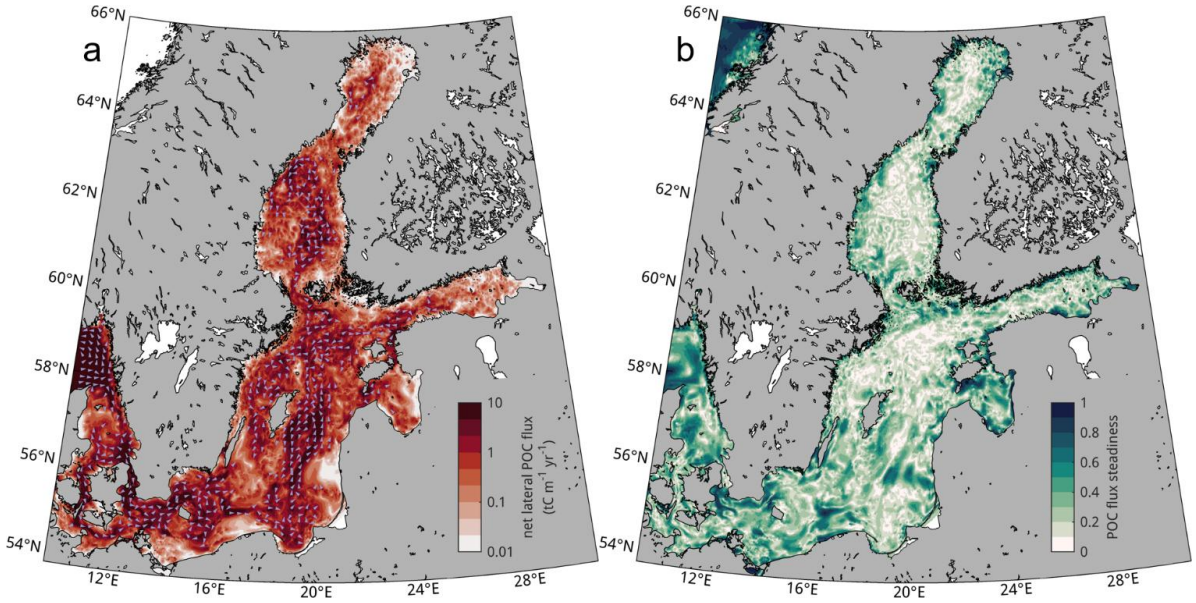


Figure 3. Lateral fluxes of resuspended particulate organic carbon in the Baltic Sea during the simulation period 2010–2015. (a) Magnitudes (colours) and directions (arrows) of the residual, depth-integrated fluxes. (b) Steadiness of lateral particulate organic carbon fluxes. Values are interpolated to regular grids for presentation.

References

Chen, J., Christiansen, N., Porz, L., Miao, B., Ma, M., Schrum, C., and Zhang, W.: Sediment transport pathways and organic carbon burial impacted by offshore wind farms in shelf seas, Comm. Earth Environ., 7, 262, doi:10.1038/s43247-026-03390-6, 2026.

Porz, L., Kossack, J., Pogorzelski, D., and Zhang, W.: Lateral Transport Controls Particulate Organic Carbon Stocks and Fluxes in the Baltic Sea, EGUsphere, 2026, 1–34, doi:10.5194/egusphere-2026-3315, 2026.