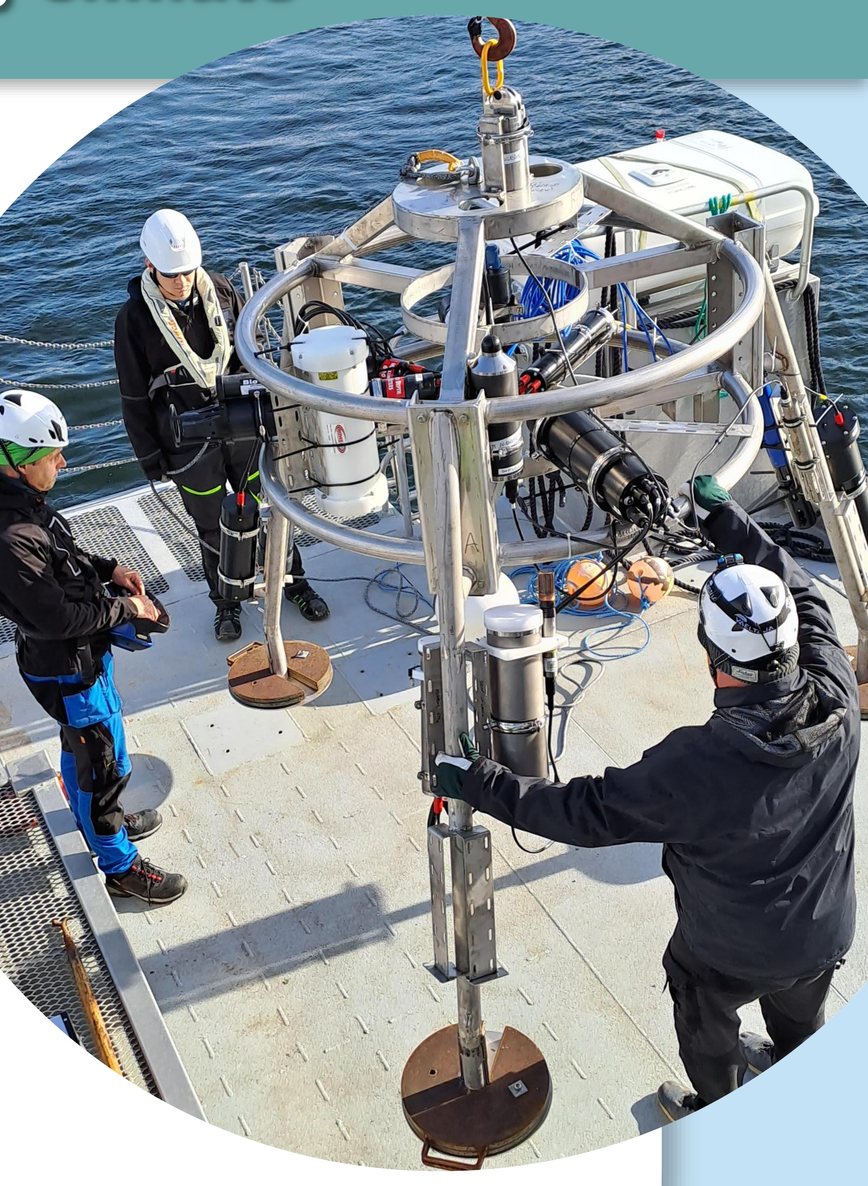
Kristian Spilling kristian.spilling@syke.fi

Eero Asmala, Joonas Virtasalo, Noora Haavisto, Pasi Ylöstalo, Sami Kielosto, Sebastian Ehrhart, Josephin Lemke, Karoliina Koho

The impacts of phytoplankton community composition and particle transport pathways on the biological carbon pump in coastal seas under the changing climate

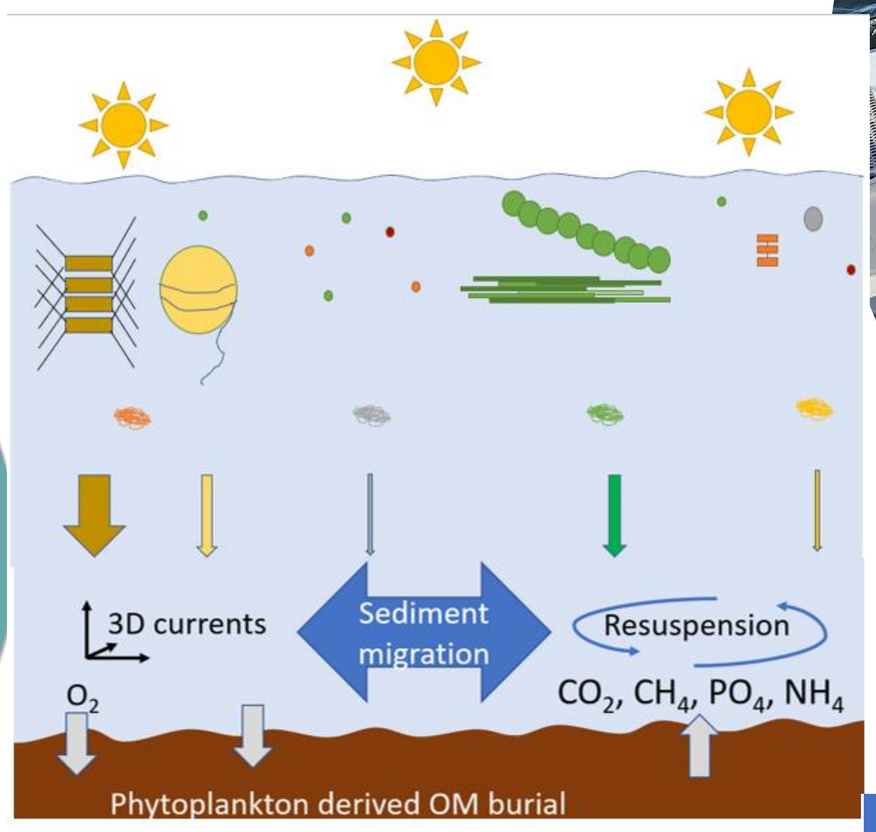
This is a newly started AKA funded project running 2023-2027 where we will unravel the interplay between the phytoplankton community composition vertical and lateral particle transport on the organic matter remineralization in coastal seas, to better understand the coastal carbon sink.

We will deploy a new benthic lander (depicted to the right) together with sediment traps and instrumentation for monitoring the phytoplankton community. Table 1 present the full set of sensors attached to the benthic lander.



First deployment at Utö April – June

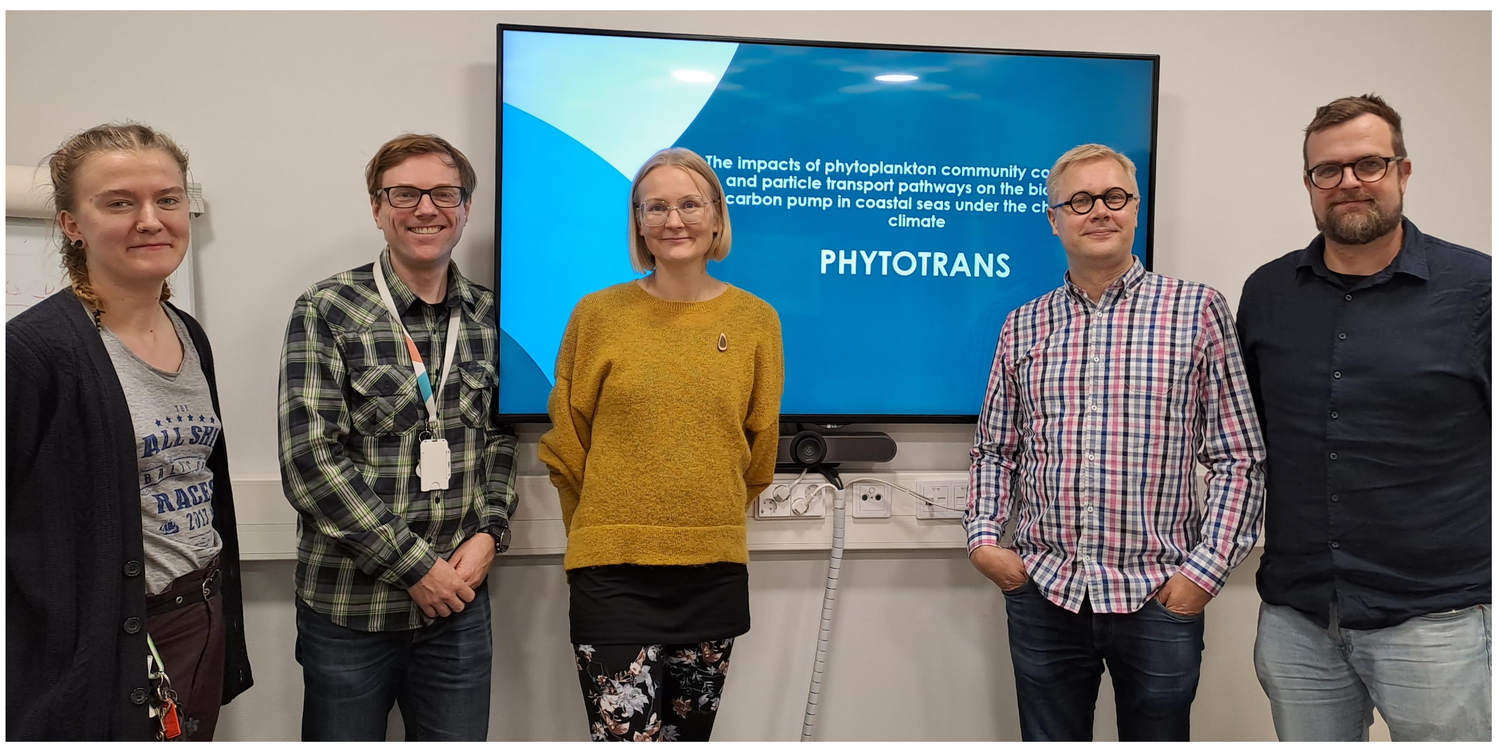
Second deployment at Tvärminne August - September



How do phytoplankton community composition affect aggregate formation, carbon export and pelagic-benthic processes?

	Sensor method	Sensor model	Acquired information	Measurement principle
Gases	Tunable diode laser absorption spectroscopy	JENA, Contros HydroC NH4	Dissolved methane concentration	Absorption spectroscopy
	IR absorption spectrometry	JENA Contros HydroC CO2	Dissolved CO_2 concentration	Absorption spectroscopy
	Optical	ANDERAA	Dissolved oxygen concentration	Dynamic fluorescence quenching
	Multiparameter	Sea&Sun technology	Temperature, salinity, pH and H2S	Thermocouples, conductivity, electrical potential
Dissolved compounds	Wet chemical sensing	SeaBird Wetlabs HydroCyle-PO4	Phosphate concentration	Colorimetric after chemical reaction
	Chlorophyll a fluorescence	YSI, EXO Total algae	Phytoplankton concentration	Chla fluorescence ex470/em685 nm
	Humic-like fluorescence	YSI, EXO fDOM	Organic matter concentration	fDOM specific fluorescence ex365/em480 nm
Particle transport	Forward scattering laser diffraction	Sequoia, LISST-100x	Particle size and concentration (1-250 µm)	Light scattering at 670 nm
	Spectral backscattering	Sequoia, Hyper-bb	Hyperspectral properties of particles	Backscattering at 430-700 nm
	Turbidity	YSI, EXO Turbidity	Turbidity in NTU	Nephelometry at 860 nm
	Acoustic backscattering	Aquatech AQUAscat 1000R	Vertical profile of suspended particle concentration and mean size	Acoustic backscattering at 0.5, 1.5 and 3.0 MHz acoustic frequencies
	Acoustic Doppler current profiler (ADCP)	Rowe SeaWATCH 1200 kHz	Vertical flow velocity profile in the near-bottom water	Acoustic Doppler backscattering at 1.2 MHz acoustic frequency
	Acoustic backscattering	Marine Electronics 3D Seafloor Profiling Sonar (Model 2001)	Seafloor micromorphology at <1 mm vertical resolution over a 1.5 m circular area	Rotating acoustic line scans of seafloor topography at 1.0 MHz acoustic frequency

Table 1. The list of sensors that will be attached to the benthic lander



Noora Haavisto, Kristian Spilling, Karoliina Koho, Joonas Virtasalo and Eero Asmala