Common topic: Interfaces in urban freshwater ecosystems

„ Transformation of environmentally relevant compounds in urban lakes by aquatic invasive ecosystem engineers “ (**F1: TrOCs)**

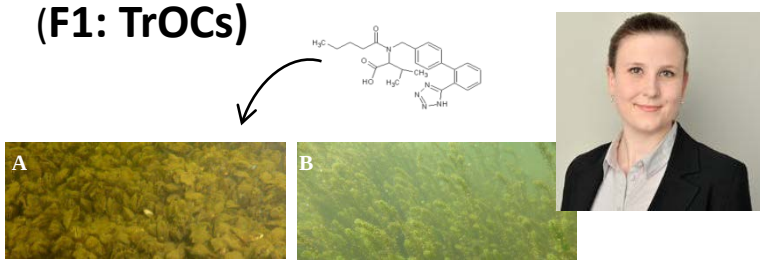
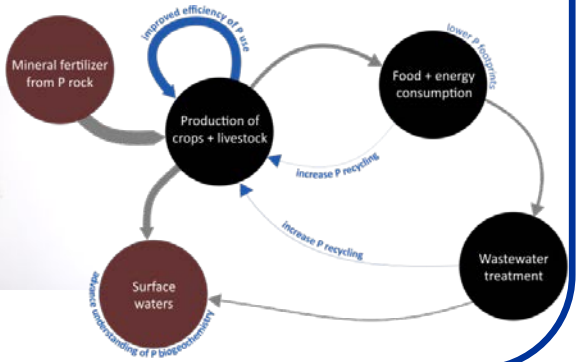


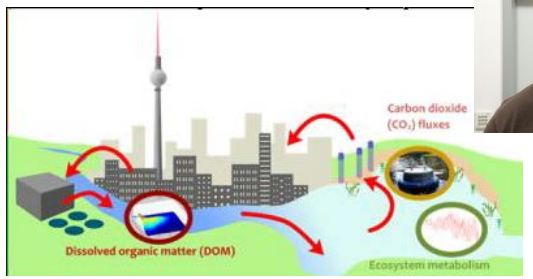
Fig. 1: *Dreissena rostriformis bugensis* (A) and *Elodea nuttallii* (B) in Lake Müggelsee, Berlin

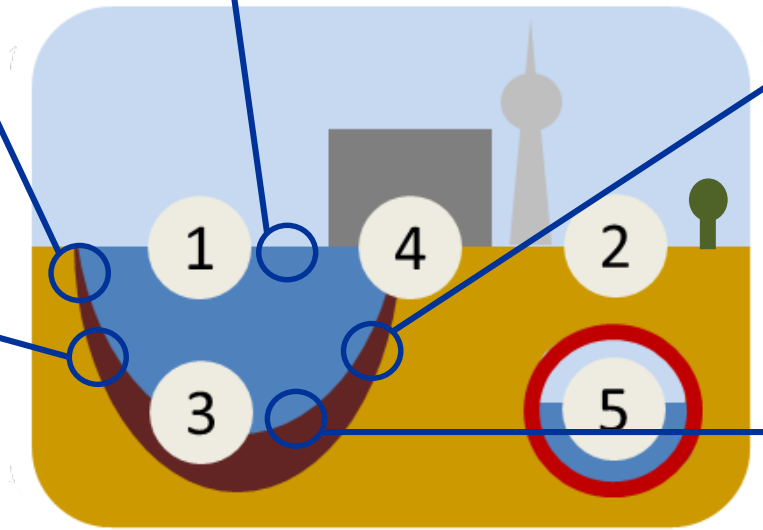
„ Modeling cyanobacteria at lake Müggelsee“ **(F2: Cyano)**

„Controlling of phosphorus fluxes in urban systems – analogous processes in limnic sediments and sewage sludges“ **(F3:Phos)**



„ The GHG footprint of a metropolitan area“ (**F4: GHG)**





Kollegiates

Giulia Friedland
Elena Matta

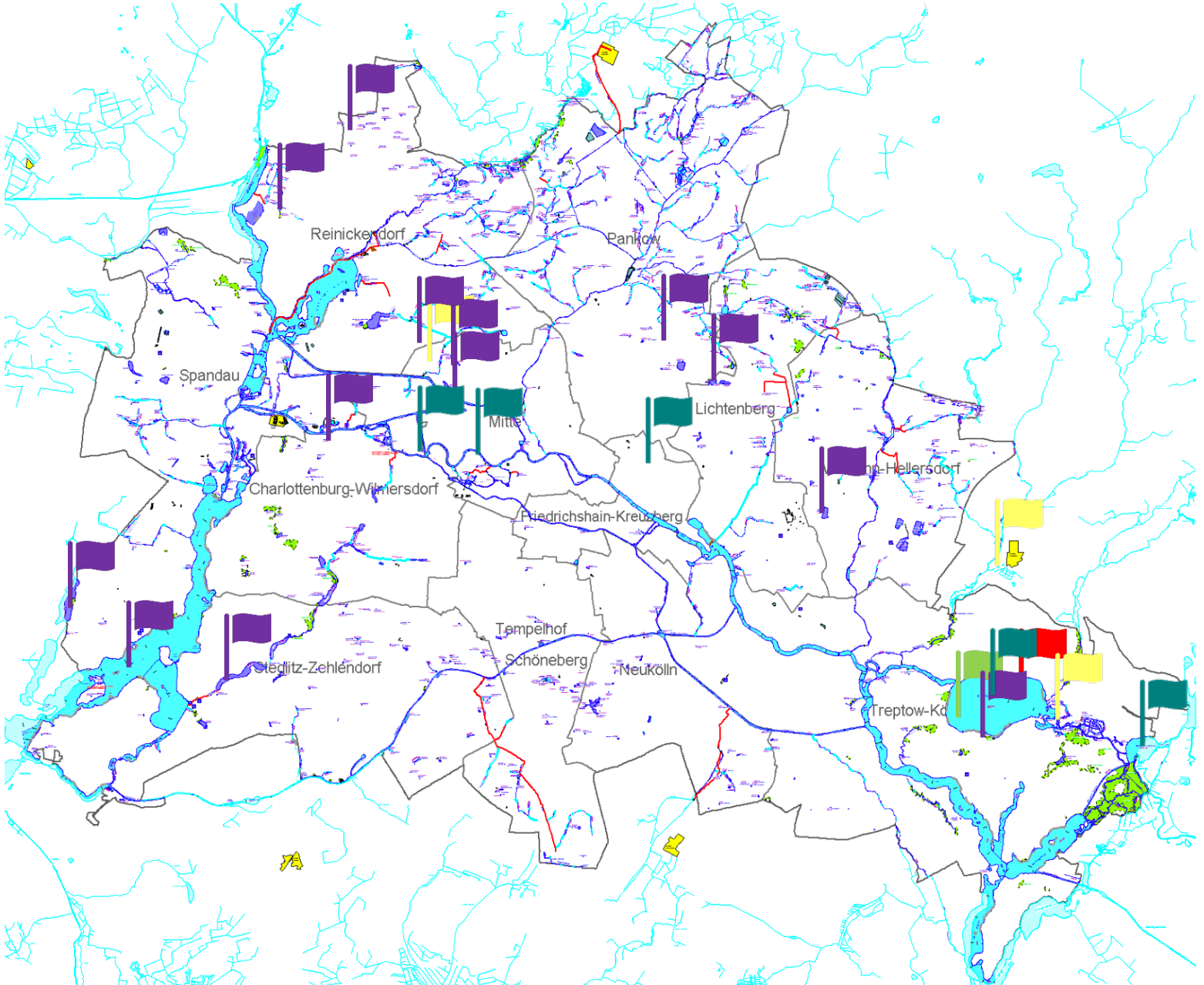
Common aim

We aim at a **mechanistic understanding of processes** at interfaces in urban freshwater ecosystems

This is key for solving major problems of metropolitan areas such as

- **drinking water supply** in sufficient quality and quantity,
- safeguarding **recreational functions** of urban freshwaters and
- **minimizing** greenhouse gas (**GHG) emissions** facilitating further warming

Which measurements are conducted where and when?



F1 (Anna)

F2 (Marvin)

F3 (Lena)

F4 (Ben)

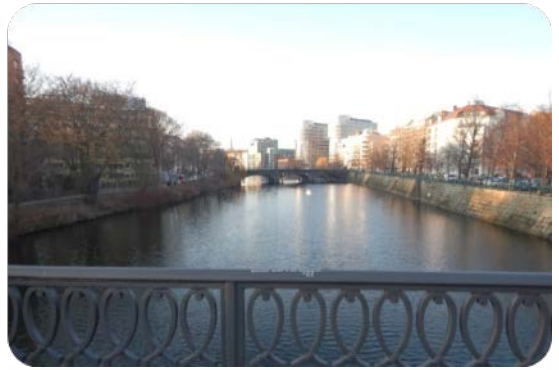
Giulia

Which measurements are conducted where and when?

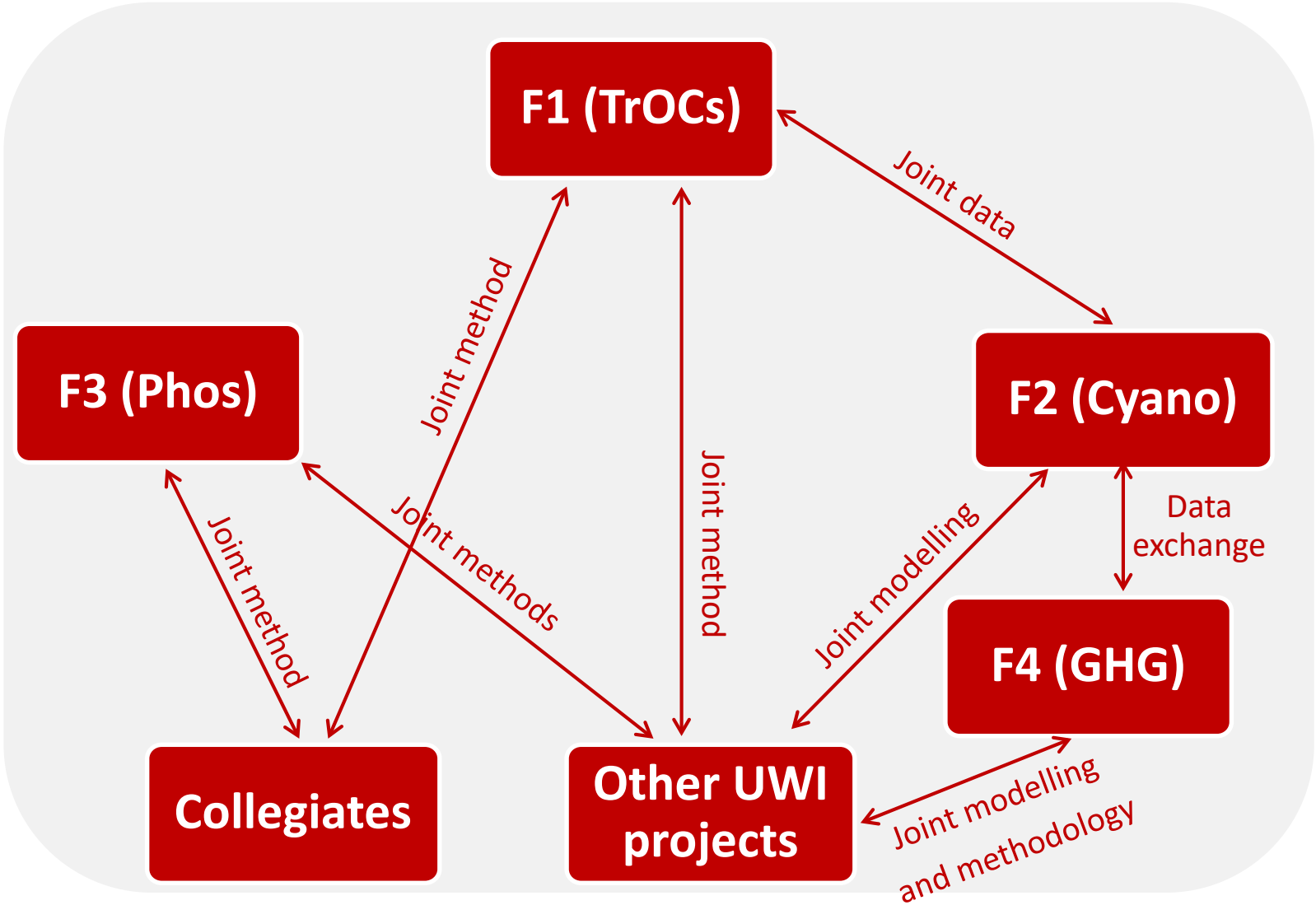
	WHO	WHERE	WHEN	WHAT
	F1 (TrOCs)	- Lake Müggelsee (sediment-water interface) - Lab column study	June/July 2019 Summer 2020 (?)	Redox parmeters, oxygen, sediment coverage (mussels/plants), sediment properties
	F2 (Cyano)	Lake Müggelsee	2013 - 2018	Phytoplankton biovolume, Zooplankton num/L, Nutrient input Spree, in-situ nutrients Müggelsee
	F3 (Phos)	- Lab incubations of (manipulated) sediments - Field studies Lakes: Plötzensee STPs: Münchehofe, more coming	Mainly random samples	P binding forms (with iron), sediment composition, pore water composition
	F4 (GHG)	POTENTIAL SITES: -7 Lake , 6 pond sites across Berlin -Sewer sites also in discussion (not annotated on map)	-N3 and N4 data 2016 to 2017 Potential further study Summer 2020 to 2021 -Potential study Spring 2020-21	CH_4 and CO_2 efflux, Dissolved oxygen, pH, conductivity, water temperature, dissolved and particulate organic and inorganic C, chl-a, dissolved and particulate P, NO_3^- , NO_2^-, NH_4^+.
	Giulia	– Along river Spree – Sediment samples 0-3 and 3-6 cm – Water: pH, O2, el. Cond., Temp., Redox state	July 2019 – Jan 2020	Metals, Heavy metals, P, CNS

Which models are used to represent which process?

KEY PROCESSES	WHO	USED MODEL
Redox gradients at the sediment-water interface	F1, F3, F4	
Cyanobacteria blooms – fate of microcystis	F1, F2	MMEMI (Mechanistic microbial ecosystem model inference)
Thermodynamic calculation of mineral saturation indices	F3	PhreeqC



Collaboration within common topics group



Where are already overlaps, where can we cooperate better?

- **Possible topics** that can be still considered:
  - Shared knowledge on redox parameters under various urban stressors
- **F1+F2:** knowledge on field site characteristics, Understand (mechanistic) interactions of Quagga mussels and phytoplankton species
- **F2+F3**: Investigating phosphor fluxes and redox potential of lake-sediment interaction
- **F4 + S1:** Investigating gravity mains degassing strategies in the perspective of H_2S and GHGs.

What we offer!

- time series of oxygen concentration in Müggelsee littoral sediments (affected by bank filtration)
- Coverage data on littoral sediments
- Lab column data for potential modelling?

- understanding of **pollutant and GHG transformations and fluxes** at the **atmosphere – water – sediment interfaces**

What we need!

- a lake which is contaminated with TrOCs and ideally colonised by Quagga mussels → future fieldwork (F1)

Common Publications & Conferences

- **Realized publications:**

N5-F1-MOSAIC: Wegner, B., **Kronsbein**, A.L., **Gillefalk**, M., Van de Weyer, K., Köhler, J., Funke, E., Monaghan, M.T., **Hilt**, S. (2019) Mutual facilitation among invading Nuttall's waterweed and quagga mussels. Frontiers in Plant Sciences, 10, 789.

- **Ideas for joint publications** (beyond freshwater common topic):

Redox dynamics at urban water interfaces……(discussed during last meeting)

Building cities from scratch: urban water management without limits (Ferdi)

Improving urban resilience: Managing urban freshwater interfaces to mitigate multiple stress in cities? (Sabine)

- Two international **UWI conferences** (2020 + 2024)