

Bacterial sulfide oxidation in coastal sediments

Name of supervisors (daily supervisor & responsible staff): Marit van Erk, Caroline Slomp

Desired starting date internship: Flexible, from January onwards

Short project description: In coastal sediments, toxic sulfide can be formed as a result of anaerobic degradation of organic material. Several types of bacteria are able to oxidize sulfide within surface sediments, including cable bacteria. Sulfide-oxidizing bacteria thus have the potential to prevent sulfide to escape to the water column. In this project, we will incubate sediments under different conditions to study which sulfide-oxidizing bacteria are present within the sediments, their activity, and their effect on critical element cycling. Microsensors will be used to measure pH and concentrations of oxygen and H₂S in surface sediments. Microsensors have very thin (µm-scale) tips and allow for non-invasive, high-resolution measurements. In this project also fluxes across the sediment-water interface can be determined, and sediment and porewater analyses will be conducted. Sulfide-oxidizing bacteria can be identified using several techniques, including FISH and scanning electron microscopy.

Relevant literature:

- Glud, R.N. (2008). Oxygen dynamics of marine sediments. *Marine Biology Research* 4(4), 243-289.
- Jørgensen, B.B., Findlay, A.J. & Pellerin, A. (2019). The biogeochemical sulfur cycle of marine sediments. *Frontiers in microbiology* 10, 849.

Methods covered during the internship:

- Microsensor measurements (e.g. oxygen, H₂S, pH)
- Determination of fluxes across the sediment-water interface
- Sediment and porewater analyses (e.g. colorimetric assays)
- Microscopic techniques (e.g. FISH and scanning electron microscopy)

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