

Chasing sea butterflies

Where are the sea butterflies, the unsung heroes in the climate crisis?

Department: Earth Sciences

Research group: Geochemistry

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Project description

In the open ocean, far from the coast, live very special creatures called sea butterflies. These tiny animals carry a shell that the sea butterflies make from the mineral aragonite. Aragonite is a calcium carbonate, like calcite, but much more soluble. The sea butterfly shell is very sensitive to climate change and ocean acidification, and sea butterflies are sometimes seen as the canary in the coal mine. At Utrecht University, we have recently shown that there are a lot of sea butterfly shells dissolving in the ocean, and that in return, the buffering effect of these dissolving shells has a protective effect for the calcite grains that manage to accumulate at the seafloor. This explains the fact that calcite grains, rather than sea butterfly aragonite shells, cover about a third of the seafloor and form the limestones that we see on land and that compose many ancient buildings. Due to acidification of the oceans, the sea butterfly makes thinner shells, and may decline in numbers. If the sea butterfly disappears completely, calcite would take over this buffer function, but this cannot continue indefinitely. Unfortunately, today we cannot predict where and how strong is the buffering effect of sea butterfly dissolution, because we do not know where sea butterflies live and how many they are.

To address this issue, we have started to compile a new dataset that documents the concentration and location of aragonite sea shells at the ocean surface using field-data (in situ observations, sediment traps). This unique dataset delivered very promising preliminary results showing that unlike common beliefs, aragonite produced by sea butterflies could dominate open ocean calcium carbonate production. There are, however, a few additional studies yet to be included, and a statistical treatment to apply to these data in order to produce publishable scientific results. The goal of this research project is to complement this newly built dataset with the most recent published data, apply interpolation techniques to the data spatially, over depth and over time in order to extract statistically robust results, and draft a manuscript describing the findings.

There is no laboratory work planned, although this could be a possibility. The assistant will be able to travel to present the research to collaborators at Naturalis (Leiden), NIOZ (Texel) and CEREGE (Aix-en-Provence, France). The assistant will be free to work remotely or on campus. There will be weekly (online or in person) meetings with the project supervisors.

Job requirements

No requirement, come as you are.