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Marine Arctic Diatoms working group

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Marine diatoms (*Bacillariophyceae*) are the most important primary producers in the world's oceans and are highly sensitive to changes in their environment (e.g. sea-surface temperature, salinity, and sea ice). Additionally, diatoms have a high species diversity, a well-known morphological classification, and their fossilized valves, which are made of silica, generally preserve well in sediments.

Due to these features, diatoms have been widely used as a paleoceanographic proxy for reconstructing past sea-surface conditions (Koç Karpuz and Schrader 1990). Diatoms have been used for both qualitative and quantitative reconstructions, which are often based on surface-sediment datasets. These datasets include information on diatom assemblages, as well as data on ocean-surface conditions (e.g. temperature and salinity) at each sampling site.

Multiple diatom surface-sediment datasets have been created for the Arctic region (e.g. Caissie 2012; Krawczyk et al. 2017; Miettinen et al. 2015; Ren et al. 2014; Sha et al. 2014). However, these datasets have been built using slightly different methodologies and diatom taxonomies. This can have an influence on the final reconstruction, depending on which dataset is used. Additionally, training sets are a valuable tool for understanding the autoecology of individual species (Oksman et al. 2019), which is essential for the robustness of both quantitative and qualitative reconstructions.

The Marine Arctic Diatoms (MARDI) working group (WG) aims to bring together diatomists working with paleoceanographic reconstructions, to align diatom taxonomy across different Arctic diatom datasets, and to unify the used methodologies in diatom-sample preparation.

Scientific goals and objectives

MARDI aims to improve the precision and reliability of diatom-based paleoceanographic reconstructions in the Arctic and sub-Arctic areas. The WG launched in November 2022 and during its first months gathered 11 diatom surface-sediment datasets from (sub) Arctic regions, including over 1300 surface-sediment samples (Fig. 1).

The MARDI WG will align and harmonize diatom taxonomies in the datasets and integrate them into an open-access pan-Arctic database. MARDI aims to advance the use of quantitative diatom transfer functions, as well as develop new semi-quantitative approaches. Furthermore, the WG aims to bring together Arctic marine diatomists to agree on community-wide protocols for the preparation of diatom samples.

Harmonization of Arctic diatom taxonomy was initiated during the second MARDI workshop: "Harmonisation of (sub)Arctic diatom taxonomy" (p. 126) held from 6–8 June in Helsinki, Finland. The workshop brought 17 participants from 10 countries together to discuss issues in Arctic diatom taxonomy and methodology.

Upcoming activities

The next MARDI activities will include a series of mini-workshops focusing on the challenging diatom taxa identified during the taxonomic workshop. These one-day workshops will be organized in the upcoming months and will be held online, where each workshop will have a focus on one species.

The next in-person workshop will be held in June 2024 in Aarhus, Denmark. This workshop will focus on the statistical relationship between species and environmental variables, and on improving the robustness of quantitative reconstructions. Finally, a summer school has been planned for June 2025 in the USA (Iowa Lakeside Laboratory) and will be specifically targeted to early-career researchers.

Visit the MARDI website at pastglobalchanges.org/mardi and sign up to our mailing list to receive news and updates on our activities.

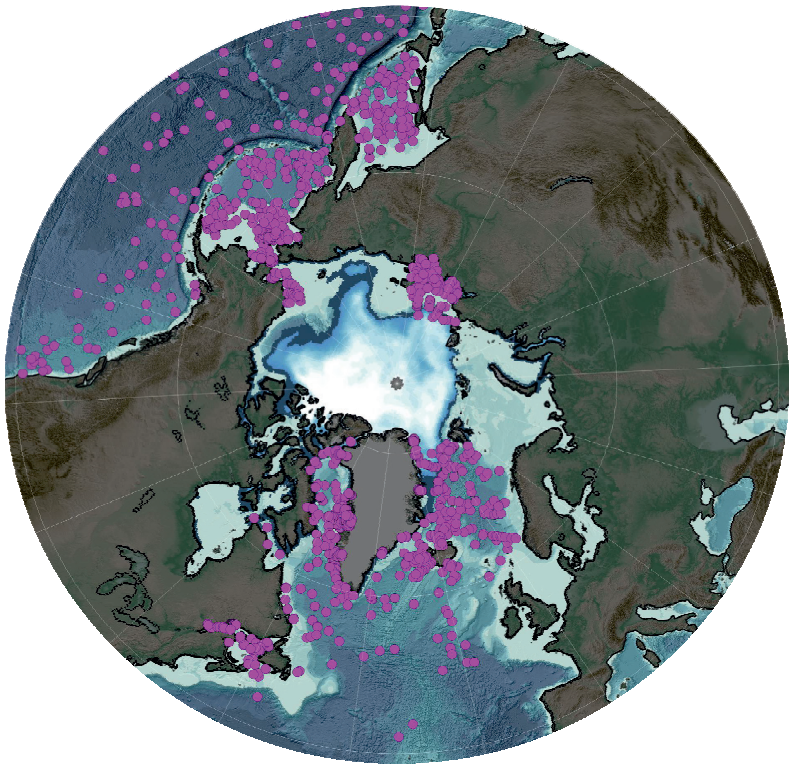

Figure 1: Map of the location of the surface-sediment samples with diatom floral data (purple dots) in the Arctic region (n>1300).

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