4th Polar Marine Diatom Taxonomy and Ecology Workshop

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The Polar Marine Diatom Workshops (PMDW) arose to meet the need for a forum that would encourage the exchange of taxonomic skills and associated new techniques, while providing an excellent platform for students to receive training and guidance from experienced diatomists. Since 2005, the workshop has become a successful biennial event, bringing polar diatomists together to exchange new ideas, share recent results and data, and build future collaborations with other researchers around the world. The 4th PMDW was hosted by Jennifer Pike at Cardiff University and was attended by 36 participants from 14 countries. It consisted of research presentations and practical microscope-based sessions on polar diatom taxonomy and ecology.

Diatoms are a major phytoplankton group accounting for 40% of global marine primary productivity; in high latitudes this figure is over 60%. They play an integral role in the export of carbon and are extremely sensitive to changing environments. As research continues in the polar regions, novel applications emerge as a result of our increased understanding of species-specific ecology. Diatom studies in such extreme environments are essential for improving our understanding of glacio-marine settings - an understanding that may be applied to reconstruct paleoenvironments including temperature, sea ice extent, the growth and decay of ice sheets, and to assess future climate scenarios. The PMDW provided an indispensable forum for polar diatomists to discuss all these issues.

Fifteen 1.5-hour microscope sessions dominated the week's activities, and were complemented by nine 30-minute lectures and 12 poster presentations. Microscope tutorials spanned both the Arctic and Antarctic, and covered topics on diatom morphology, modern day communities, fossil records and biostratigraphy.

Some of the highlights of the meeting were the following: M. A. Bárcena presented new data on *Eucampia antarctica* as a proxy for paleoceanography and sea-ice concentration in the Drygalski Basin (Fig. 1). Under higher light intensity and thinner/less sea-ice cover, *E. antarctica* undergoes more cell divisions and average chain length increases (Fryxell and Prasad 1990). However plankton net samples (L. Armand) suggest this paleoproxy may underestimate sea ice extent because the ratio used to estimate chain lengths from fossil frustules might be biased.

R. Crawford presented a new morphological investigation on the understudied genus *Corethron*. This was further complemented by modern-day plankton net studies at Anvers Island and Biscoe Bay, Antarctica, where *Corethron* sp. dominated the assemblage (D. Karentz). Future work will compare species with environmental variables as well as RNA sequencing to determine their proteinic response to temperature changes (D. Karentz). A. Leventer presented a laminated *Corethron* ooze record from Iceberg Alley, East Antarctica.

C. Allen ran a practical session on the largely overlooked giant diatom species *Arachnoidiscus* sp. from the Firth of Tay, Antarctic Peninsula. The importance of this species to the silica and carbon export budget was discussed. Another large species, *Coscinodiscus* sp. and its morphology and identification were presented in practical sessions with sedimentary samples from Southern Iceland (K. Hendry) and plankton net samples from Admiralty Bay, Antarctica (B. Jerzak).

R. Jordan and K. Abe presented Eocene diatoms from IODP 302 (Arctic) and other siliceous fossils. The earliest diatom Cretaceous deposits were also reviewed and their origins discussed (D. Harwood).

One of the goals of the workshop was to provide a launch pad for future collaboration between early career and established researchers, and we hope to see the fruits of these collaborations at the 5th PMDW, which will be take place at Salamanca University, Spain in 2015. Further information about the workshops, previous workshop publications and future events can be found at: https://sites.google.com/site/polarmarinediatom-workshop/. This workshop was supported by PAGES, the Micropalaeontological Society, Linnean Society of London, BetaAnalytic, GX Optical, and the Annals of Botany Company.

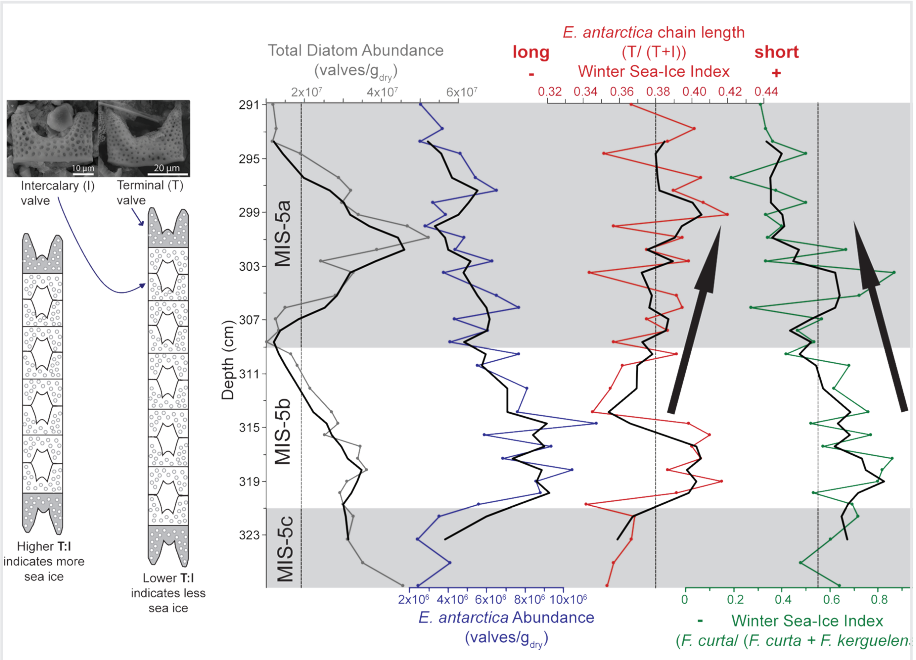

Figure 1: Morphometrics of horned diatom *Eucampia antarctica* as a proxy for sea-ice occurrence during Marine Isotope Stage 5 at Drygalski Basin, Antarctica (M.A. Bárcena, personal communication). The ratio of Terminal (T) and Intercalary (I) valves is calculated as a measure of chain length. Longer chains (i.e. lower T:I) indicate higher light conditions and thinner/less sea-ice cover (Fryxell and Prasad 1990). The interpretation of these results differs from a *Fragilariopsis* Index that compares sea-ice related species *F. curta* with open marine species *F. kerguelensis* (after Denis et al. 2010), and suggests our understanding of these proxy indices needs to be updated.

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