Sea-ice dynamics in the Southern Norwegian Sea during the last glacial millennial climate events: insights from combined dinocyst and biomarker analyses.

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Résumé

Dansgaard–Oeschger and Heinrich events constitute ones of the most enigmatic features of the last glacial period. Many studies have focused on their characteristic millennial climate variability, testing atmosphere-cryosphere-ocean couplings, but major uncertainties and discrepancies still remain. A new scenario, mainly supported by dinocyst-derived paleoreconstructions and freshwater hosing experiments, has recently emerged. Reconciling most of the up to now hypothesized theories, it suggests the occurrence of a regional paradoxical seesaw pattern: cold Greenland and North Atlantic phases coincide with warmer sea-surface conditions and shorter seasonal sea-ice cover durations in the Norwegian Sea, in relation to enhanced subsurface advection of warm Atlantic waters re-emerging in the Norwegian Sea. Here we provide new paleoreconstructions of sea-ice dynamics in the Southern Norwegian Sea (core MD95-2009), over the 35-27 ka BP interval encompassing four interstadials-stadials (including HS3) cycles, based for the first time on the combination of biomarker IP25 concentration and dinocyst-derived sea-ice cover duration. The striking correspondence, over the millennial climate shifts, between these reconstructions derived from two independent proxies, further provides robust evidence for the occurrence of this atypical hydrographical pattern. In contrast, the strong variability between the three PIP25 signals (calculated by combining IP25 concentration with either triene, brassicasterol, or dinosterol concentration), and between them and our two other independent indicators of sea-ice dynamics, highlights the need to better constrain the PIP25, a semi-quantitative proxy of seasonal sea-ice.

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