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The Nordic Seas - North Atlantic regional seesaw during the last glacial millennial climate events: new evidence from biomarkers.

Mélanie Wary[1,2,3], Johan Etourneau[4,2,3], Jong-Ku Gal[5,6], Lukas Smik[7], Jens Matthiessen[8], Sujin Kang[6], Simon Belt[7], Maria-Fernanda Sanchez-Goñi[2,3], Kyung-Hoon Shin[6], Jung-Hyun Kim[5,6]

[1]Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona, Bellaterra, Spain. [2]École Pratique des Hautes Études (EPHE), PSL Research University, Paris, France. [3]Environnements et Paléoenvironnements Océaniques et Continentaux (EPOC), UMR 5805, Université de Bordeaux, Pessac, France. [4]Instituto Andaluz de Ciencias de la Tierra (IACT), CSIC-Universidad Granada, Armilla, Spain. [5]Korean Polar Research Institute (KOPRI), Incheon, Korea, Republic of. [6]Hanyang University, Ansan, Korea, Republic of. [7]Biogeochemistry Research Centre, University of Plymouth, Plymouth, United Kingdom. [8]AWI, Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany

Abstract

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 IP_{25} 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. Reversely, the strong variability of the three PIP_{25} signals (calculated by combining IP_{25} concentration with either triene, brassicasterol, or dinosterol concentration), between each other as well as relatively to our two other independent indicators of sea-ice dynamics, highlights the need to better constrain this semi-quantitative proxy of seasonal sea-ice.