
Binge/purge oscillations during the deglacial decay of the Scandinavian Ice Sheet revealed by ϵNd and biomarkers

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Résumé

At its maximum extent, the Scandinavian Ice Sheet advanced into the watershed of the Dnepr River, one of the main rivers feeding the former Black Sea "Lake". As a consequence, the Black Sea basin potentially represents a suitable location to investigate the dynamics of

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the decaying FIS and its impacts on global/regional climate and European hydrographical reorganizations in the context of the Last Deglaciation. Here, we report high-resolution geochemical data from a core retrieved in the Black Sea. We combine the use of Nd isotopes in clay fraction (ϵNd) and bulk XRF-Ti/Ca as tracers for sediment provenance, together with biomarkers as tracers for river runoff (BIT-index) and boreal soil leaching (C25-alkanes). During Heinrich Event 1 (HE1), four periods of drastic increase in runoff (Deglacial Water Pulses; DWP) occurred as unequivocally revealed by the biomarkers. Concomitantly, ϵNd signatures clearly demonstrated that the DWPs were generated by the decaying FIS. Each period of DWPs (~ 200 yr in duration) occurred repeatedly every 200 yr, displaying a peculiar cyclic-like pattern. We invoke binge-purge oscillations of the FIS to explain the observed cyclicity: the binge period requiring a continuous FIS retreat, the purge period involving an ice sheet re-advance linked to some interactions between the FIS, the proglacial lakes and the atmosphere.