Major Cooling Intersecting Peak Eemian Interglacial Warmth in Northern Europe

J.S. Salonen[1]*, K.F. Helmens[2], A. Plikk[2], S. Engels[3], M. Väliranta[4], M. Kylander[5], J. Brendryen[6], H. Renssen[7]

[1]*Department of Geosciences and Geography, P.O. Box 64, 00014 University of Helsinki, FINLAND*
*(*correspondence: sakari.salonen@helsinki.fi)*
[2]*Department of Physical Geography, Stockholm University, 106 91 Stockholm, SWEDEN*
[3]*Institute for Biodiversity and Ecosystem Dynamics (IBED), University of Amsterdam, Science Park 904, 1098 XH Amsterdam, THE NETHERLANDS*
[4]*Department of Environmental Sciences, P.O. Box 65, 00014 University of Helsinki, FINLAND*
[5]*Department of Geological Sciences, Stockholm University, 106 91 Stockholm, SWEDEN*
[6]*Department of Earth Science and Bjerknes Centre for Climate Research, University of Bergen. P.O. 7803, N-5007 Bergen, NORWAY*
[7]*Department of Earth Sciences, VU University Amsterdam, De Boelelaan 1085, 1081 HV Amsterdam, THE NETHERLANDS*

Sokli in NE Finland is one of few terrestrial sites in N Europe with sediments unequivocally dated to the Eemian Interglacial (MIS 5e). Furthermore, the steep-walled depression, formed in deeply weathered rocks of a Palaeozoic magma-intrusion, has allowed for the accumulation of unusually thick Eemian and Holocene lake sequences. Here we present a first integration of multi-proxy data obtained on 3 m of glacial lake sediment overlain by 9 m of diatom gyttja of Eemian age from the Sokli basin. Our data, at unprecedented resolution, reveals a major cooling event intersecting peak Eemian warmth. Two independent temperature reconstructions based on terrestrial plants and chironomids indicate a summer cooling of the order of 2–4 °C. The cooling event started abruptly, had a step-wise recovery, and lasted 500–1000 yr. Our results demonstrate that the common view of relatively stable interglacial climate conditions on the continent should be revised, and that perturbations in the North Atlantic oceanic circulation under warmer-than-present interglacial conditions may also lead to abrupt and dramatic changes on the adjacent continent.