EGU25-3549, updated on 11 Mar 2026
https://doi.org/10.5194/egusphere-egu25-3549
EGU General Assembly 2025

A remote input of African dust to Last Glacial Europe

Denis-Didier Rousseau[1,2,7], Catherine Chauvel[3], Peter Hopcroft[4], Pamela Gutiérrez[3], Ségolène Saulnier-Copard[5], Pierre Antoine[5], Markus Fuchs[6], and Alicja Ustrzycka[7]

[1]CNRS - University of Montpellier, Geosciences Montpellier, Montpellier, France (denis-didier.rousseau@umontpellier.fr)
[2]Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY 10964, USA
[3]Université Paris Cité, Institut de Physique du Globe de Paris, CNRS, F-75005 Paris, France
[4]School of Geography, Earth & Environmental Sciences, University of Birmingham, Birmingham B15 2TT, UK
[5]Laboratoire de Géographie Physique, Université Paris 1, Thiais, France
[6]Department of Geography, Justus Liebig-University Giessen, 35390 Giessen Germany
[7]Institute of Physics-CSE, Division of Geochronology and Environmental Isotopes, Silesian University of Technology, Gliwice, 44-100, Poland

During the Last Glacial Maximum (approximately 20,000 years BP), intensified mineral dust activity significantly impacted the Earth's climate system and aerosol dynamics. While increased emissions from traditional dust sources are often cited as the primary cause of this intensification, direct evidence linking specific source regions to observed dust patterns remains limited. Ice core records from Greenland suggest an increase in East Asian dust storms. However, recent loess sedimentary records from Europe reveal substantial dust accumulation, aligning closely with the timing and intensity of the Greenland records.

Our study seeks to resolve long-standing uncertainties regarding the origins of European loess and its potential connection to Greenland dust deposits. By analyzing geochemical data from 16 European loess profiles along a longitudinal transect from Western France to Ukraine, we demonstrate that Europe was influenced by a remote dust source distinct from local deposits. Notably, elemental signatures in different grain size fractions trace this source to North Africa. Supporting this, atmospheric model simulations confirm an influx of African dust during the coldest phases of the glacial period, underscoring its far-reaching impact on northern latitudes.

This research provides a groundbreaking perspective on the atmospheric dust cycle during the Last Glacial Maximum, identifying—for the first time—a remote dust source active over Europe. Moreover, the findings suggest that this African dust may have reached northern high latitudes, including Greenland, as corroborated by Earth system model simulations. These results challenge the prevailing assumption that East Asian deserts were the dominant contributors to glacial dust, offering a fresh framework to reexamine aerosol-driven biogeochemical processes during this period. This study advances our understanding of the dust cycle's complexity and its role in abrupt climate shifts during the Last Glacial Maximum.

Ref: Rousseau, D.-D. et al. (2025) A remote input of African dust to Last Glacial Europe, submitted.