Model based dust cycle over Europe during the Last Glacial Maximum

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This modelling study establishes a linkage between the eolian mineral dust cycle during the Last Glacial Maximum (LGM) and the loess deposits in Europe. We simulated the glacial dust cycle at high resolution using a regional climate-dust model. The simulated dust deposition rates are of a comparable order of magnitude with fieldwork-based mass accumulation rates determined from more than 70 loess sites in Europe. The highest simulated dust emissions and deposition occurred during summer, followed by autumn. In contrast to the present-day prevailing westerlies, we found that easterly (36%) and cyclonic (22%) weather patterns prevailed over central Europe during the LGM. Together with the cyclones, the recurring dry easterlies associated with a high-pressure system over the Eurasian ice sheet (EIS) dominated the dust transport from the EIS margins in eastern and central Europe. Coherent with the persistent easterlies, major westwards running dust plumes resulted in high deposition rates in western Poland, northern Czech Republic, Germany, the Netherlands, and in the southern North Sea region.