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Ice-free glacial northern Asia due to dust deposition on snow

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During the Last Glacial Maximum (LGM, 21ky BP), no large ice sheets were present in northern Asia, while northern Europe and North America (except Alaska) were heavily glaciated. We use a general circulation model with high regional resolution and a new parameterization of snow albedo to show that the ice-free conditions in northern Asia during the LGM are favoured by strong glacial dust deposition on the seasonal snow cover. Our climate model simulations indicate that mineral dust deposition on the snow surface leads to low snow albedo during the melt season. This, in turn, caused enhanced snow melt and therefore snow-free peak summer conditions over almost the entire Asian continent during the LGM, whereas perennial snow cover is simulated over a large part of eastern Siberia when glacial dust deposition is not taken into account.