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# Changes in mineral dust transport and deposition to Antarctica between the Last Glacial Maximum and current climates: modelling concentration, size and provenance.

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Mineral dust aerosols represent an active component of the Earth's climate system, through both direct and indirect effects. In addition, mineral dust records from polar ice cores have proven to be very useful paleoclimate proxies, carrying information about climatic conditions at source and deposition areas, hydrological cycle and atmospheric circulation dynamics.
The understanding of dust transport mechanisms is fundamental in interpreting ice core dust records. Based on those proxies alone it is only possible to compare the geochemical features of the two end-members of the dust life cycle: soils and erodible surfaces from the potential source areas and dust deposited in ice cores. For this reason physical models are a powerful tool we have to study dust transport patterns.
Here we present the results from a study based on outputs from existing, documented climate model simulations using the Community Climate System Model (CCSM). The focus of this work is to analyze simulated differences in the dust concentration, size distribution and sources in current climate conditions and during the Last Glacial Maximum at specific ice core locations in Antarctica, in comparison with available paleodata. Model results suggest that both Australia and South America are equally important sources for dust deposited on Antarctica in current climate; during the Last Glacial Maximum the main source was South America, because of the increased activity of glaciogenic dust sources in Patagonia and the Pampas regions, as well as a likely more efficient transport to West Antarctica. Observations and model consistently suggest a spatially disparate shift in sizes, which we attribute to the combination of increased source activity and reduced en route wet removal favoring a generalized shift towards finer dimensions, and on the other hand to an enhanced relative contribution of dry size-selective deposition in the LGM in areas with already low precipitation rates. We also discuss dust transport patterns at different vertical levels towards Antarctica accounting for geographical differences and tentatively link them to the dust deposition flux "magnification" observed in ice core records in the Last Glacial Maximum compared to the Holocene.