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Mineral dust transport and deposition to Antarctica: a climate model perspective

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Windblown mineral dust is a useful proxy for paleoclimates. Its life cycle is determined by climate conditions in the source areas, and following the hydrological cycle, and the intensity and dynamics of the atmospheric circulation. In addition aeolian dust itself is an active component of the climate system, influencing the radiative balance of the atmosphere through its interaction with incoming solar radiation and outgoing planetary radiation. The mineral aerosols also have indirect effects on climate, and are linked to interactions with cloud microphysics and atmospheric chemistry as well as to dust's role of carrier of iron and other elements that constitute limitating nutrients for phytoplancton to remote ocean areas.
We use climate model (CCSM) simulations that include a scheme for dust mobilization, transport and deposition in order to describe the evolution of dust deposition in some Antarctic ice cores sites where mineral dust records are available.
Our focus is to determine the source apportionment for dust deposited to Antarctica under current and Last Glacial Maximum climate conditions, as well as to give an insight in the spatial features of transport patterns.
The understanding of spatial and temporal representativeness of an ice core record is crucial to determine its value as a proxy of past climates and a necessary step in order to produce a global picture of how the dust component of the climate system has changed through time.