First high-resolution reconstruction and quantification of dust flux provenance in East Antarctica over the Last Glacial-Interglacial Transition.

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Interactions between the atmosphere and ocean greatly affect Earth's weather, climate and its current global change[1]. To elucidate the role of atmospheric circulation in the past and present climate, the determination of dust provenance in eolian deposits - i.e., deep-sea sediment or ice cores - is paramount. So far, the record of dust provenance is ambiguous as the geochemical methods used to trace dust lack considering dust mixing processes (during atmospheric transport, deposition and burial) and require substantial amounts of dust (for isotopic tracing) that limit drastically the temporal resolution. Here, using a in-depth statistical analysis of Rare Earth Elements patterns from dust collected in ice cores (Epica Dome-C and Dronning Maud Land)[2,3] and from potential source area (PSA) over the Southern Hemisphere, we identified and quantified the sources of dust in Antarctica over the Last Glacial-Interglacial Transition (LGIT). Those results represent the first quantitative reconstruction of dust flux in deep Antarctic ice cores at multi-decadal to centennial temporal resolution. Globally, our results reveal that, during the Last Glacial Maximum, Patagonia show very stable dust flux corresponding to ~50% of the contribution while dust flux variation and the other half contribution result mainly from New-Zealand and Southern Africa accounting for ~25-30% and ~15-20% of dust input respectively. The transition to the Holocene saw a gradual shift where influx from Patagonia and New Zealand both declined until the Holocene where Southern Africa became the main supplier of dust (~40-50%). Over the studied period, all main variations of dust flux recorded in Antarctica are related to known climatic evolution at the hemispherical or local PSA scale. This study not only represents a breakthrough in our capacity to trace dust sources but also provide the first dataset of dust flux provenance covering the last glacial-interglacial transition in Antarctica. We anticipate our work to be a starting point for a complete reassessment of dust records in many depositional environments with major implications for the reconstruction of atmospheric paleocirculation and paleoclimate.

1- Martínez-Garcia, A. *et al.* [*Nature,* 476 (2011)**,** 312–315]

2- Gabrielli P. *et al*. [Quaternary Science Reviews, 29 (2010), 265-273]

3- Wegner A. *et al*. [Climate of the Past, 8 (2012), 135-147]