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Interglacial (Holocene and Stage 5.5) dust provenance and variability in the EPICA-Dome C ice core

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The EPICA-Dome C (EDC) ice core shows extremely low aeolian dust inputs (0.4-0.6 mg/m^2 yr^{-1}) during late Quaternary interglacial periods, i.e. 10 to 25 times lower than in cold glacial times. The main causes for such decrease are the reduced primary production and mobilization of dust from continental areas ("source strength"), as well as the changes in the hydrological cycle and in atmospheric transport. Dust size variability in the EDC ice core, moreover, suggested shorter transport time for dust or a more direct air mass penetration to the site during interglacials with respect to glacial periods and a clear multi-secular scale mode of atmospheric circulation variability during the Holocene.

In order to understand glacial/interglacial atmospheric circulation changes, the geographic provenance for dust must be identified. The ^{87}Sr/^{86}Sr versus ^{143}Nd/^{144}Nd isotopic fingerprint of aeolian dust in Antarctica suggests that southern South America is the dominant (70-90%) dust source in Quaternary glacial times only; indeed, significant differences arise for the Holocene and Stage 5.5 and point to a different source mixing.

Also PIXE (Proton-Induced X-ray Emission) elemental analyses on glacial (St. 2,4 and 6) and interglacial (Holocene and St. 5.5) dust extracted from ice show slight but significant differences in the major elements composition (Si, Al, Fe, Ca, Na, K, Mg) of dust particles. Indeed, higher Al and lower Si percentages together with Na and Mg values very close to the detection limits clearly characterize interglacial dust content

with respect to glacial values.

Very recently, the Sr-Nd isotopic characterization of target samples from the Australian continent has pointed to this region as likely dominant dust supplier to the East Antarctic during interglacials.

The relatively greater contribution of Australian dust does not necessarily reflect dust transport changes but it could be related to a differential weakening of one source (South America) with respect to the other (Australia).