

EPICA DOME C ICE CORE DUST PIXE ANALYSIS: GEOCHEMICAL CHARACTERIZATION AND PALEO-ENVIRONMENTAL IMPLICATIONS

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The identification of the regional dust sources and in particular the link between changes of atmospheric dust loads and paleo-environmental modifications that occurred at the source areas under different climatic regimes, is one of the topics still open in the interpretation of the ice core dust record. Varying climatic and environmental conditions are reflected by the type and extent of vegetation cover and/or the prevailing of erosion, deposition or pedogenetic processes acting on continental surfaces. Such processes, in turn, can induce a change in mineral assemblages and geochemistry of the windblown dust. Through this work, we present the geochemical characterization (major and minor elements: Si, Al, Fe, Ca, Na, Mg, K and Ti) of polar dust found in the first 2200 m of the EDC EPICA ice core (corresponding to about the last 220 kyr) obtained by the PIXE (Particle Induced X-ray Emission) technique. Our results point to two main features: 1. there are differences in the compositional variability between interglacial and glacial periods. 2. there are compositional differences among the three main cold stages discussed herewith (LGM, MIS4 and MIS6). Compositional diagrams permit a comparison between polar and PSA (Possible Source Areas data from the literature) dust, together with parental material, and therefore indicate that Argentinian loess (or its precursors) could be a major dust source during LGM, while the previous cold period (MIS4) seems to show a more immature dust signature, pointing out that processes of geochemical evolution must have existed at the source during the last climatic cycle. On the other hand, MIS6 appears to have an intermediate "character" between the LGM and MIS4, probably because of its higher temporal extension, covering several cycles of climatic variation (e.g. precessional cycles). Significant compositional differences for the Holocene and Stage 5.5 dust, point to a possible different source mixing in which the Australian source could have played a larger role. Possible implications of polar dust compositional variability on the environmental conditions at the dust source, possibly involving latitudinal shift of climatic belts (hence potential dust source areas), are also presented.