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New insights on Antarctic Quaternary climate from high – resolution aeolian dust data from the EPICA – Dome C ice core

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Long and detailed sequences of Quaternary windborne terrigenous material constitute unique archives for paleoclimatic and paleoenvironmental information. The East Antarctic Plateau is unique in this respect, as minerals entrapped in ice layers are exclusively of aeolian origin and snow accumulation is extremely low thus allowing recovery of time series reaching far back in time.

Here we present a study of the EDC (European Project for Ice Coring in Antarctica - Dome C; 75˚06'S; 123˚21'E, East Antarctica) aeolian dust record, the longest from polar ice cores by spanning the last ∼800 ka back to Marine Isotopic Stage (MIS) 20.

Dust fluxes are relatively high during Pleistocene cold times and low during interglacials, and they appear remarkably homogeneous over the East Antarctic. The dust data indicates warmer interglacials, but also colder glacial stages since the Mid – Brunhes Event (MBE, 430 ka BP) in comparison to the time before the MBE, an evidence which is likely of global character.

Particle size data suggest enhanced upper troposphere advection to Dome C during Quaternary glacial times and show a general progressive deepening of the polar vortex over the last 500 ka, as well as increasing amplitude of glacial/interglacial changes of atmospheric circulation regime.

The dust input is tightly coupled to temperature changes during glacials but decoupled during warm times. Overall, the time spent in a state of weak climate coupling

increases after the MBE, as a consequence of generally warmer interglacial temperatures.

Comparison with synchronized data from Greenland ice cores shows an inter – hemispheric connection, the abrupt dust fall associated to Dansgaard – Oeschger events in the North being preceded by a slower dust decrease in the Southern Hemisphere. We now show that the Antarctic warming events typically occur in two phases separated by a few hundred years of stable, slightly cooling conditions.