Respective contribution of the dust flux and the dust concentration of activity in the enhancing level of radioactivity in air during a Saharan dust outbreak

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Among various Saharan dust sampled at different locations in France during the same Saharan event, it was shown quite steady values of artificial radionuclides in dust deposited. This can be interpreted as a global homogeneity of the characteristics of dust inside the plume, far from the emission area. Regarding several majors events involved over France since 2004 it is also shown that from one event to the other, variability of the concentration of activity remains restricted within a factor of 2, either reflecting the homogeneity of former deposit in Saharan desert and several decades of mixing conditions that have completely homogenised the possible primary variability. Regarding anthropogenic radionuclides (^{137}Cs, $^{239+240}Pu$), an average enrichment factor of 2 to 4 was found after the long range transport compared to the activity of the emitter soils. This enrichment comes from size and/or mineralogical fractionation. Regarding the atmospheric concentration of activity during recent events, we estimate that 2/3 belongs to the dust flux while the last 1/3 may be attributable to dust enrichment.

Comparison of terminations I and II in EPICA Dome C ice core

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Local, regional and globally relevant parameters measured at high resolution in polar ice cores provide clues on the sequence of events during terminations. Recent high resolution measurements have revealed brutal deuterium excess shifts in Greenland NorthGRIP ice core during termination I [1], pointing to abrupt changes in moisture origin.

The EPICA Dome C ice core [2] offers insights on the past 9 terminations [3]. Here, we focus on the deuterium excess variations during termination I [4] and termination II. The data reveal a north-south see saw behaviour during termination II, with an slow methane rise [5] associated with fast Antarctic temperature warming, and an abrupt methane rise which corresponds to the end of early MIS5e peak Antarctic warmth and to a sharp reorganisation of Antarctic moisture origin as recorded by EDC deuterium excess. This abrupt change in Dome C moisture origin occurs within 30 years, much faster than the two abrupt excess rises of termination I. It appears in phase (within dating uncertainties) with Asian monsoon sharp intensification [6], and probably involves rapid reorganization in the southern annular mode.

We suggest that MIS5e early Antarctic temperature optimum is due to Antarctic heat piracy in response to deglaciation-forced changes in latitudinal ocean heat advection. The shape of Antarctic temperature changes during the past interglacial periods may therefore bring insights on large scale reorganisation in latitudinal ocean heat transport, itself influenced by northern hemisphere ice sheet deglacial melt water flux.

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