



A 220 ky record of Pb isotopes at Dome C Antarctica from analyses of the EPICA ice core

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From the Vostok and the new EPICA Dome C ice core records it has been clearly demonstrated that dust concentrations were higher during cold climatic periods. High Pb concentrations observed during cold climate stages 2, 4 and 6 in the Vostok ice core have been attributed to increased dust levels while analyses of Sr and Nd isotopes have shown that the southern South American regions of Patagonia and the Pampas are the most likely origins of this dust. In this research work, Pb isotopic compositions and Pb and Ba concentrations are reported in EPICA Dome C ice core samples extending back to 220 ky BP, providing conclusive evidence that Pb isotopic compositions in Antarctic ice vary with changing climate. $^{206}\text{Pb}/^{207}\text{Pb}$ ratios decrease during glacial periods, with the lowest values occurring during colder climatic periods (stages 2, 4 and 6) and the Holocene. Pb and Ba concentrations are low, <1 pg/g, during the Holocene and climate stage 5.5 interglacials and higher, >10 pg/g, during cold climatic periods with crustal Pb sources usually accounting for $\sim 70\%$ of total Pb. Pb isotopic compositions at Dome C are similar to those reported in pre-industrial ice from other Antarctic locations, resulting from the mixing of crustal and volcanic Pb emissions in the Southern Hemisphere. This record, covering the past two glacial cycles, is the longest time series of Pb isotope data reported from an ice core.