Dust flux variations in last 800,000 years: changes of Platinum group elements and Pb isotopic compositions at Dome C EPICA ice cores, Antarctica

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Trace elements and Platinum group elements (PGE) concentrations and lead isotopic compositions were measured from the EPICA (European Project for Ice Coring in Antarctica) Dome C ice core, covering a period from ~570 kyr BP to ~800 kyr BP, by inductively coupled plasma sector field mass spectrometry (ICP-SFMS) and thermal ionization mass spectrometry (TIMS) for trace elements and platinum group elements (PGEs), and Pb isotopic compositions, respectively. The main trend of trace element and other proxy concentrations match well defined insoluble dust concentration profile. It shows that mineral dust was the dominant source of trace elements to East Antarctica whatever the period. For In, Tl, Bi and F- the volcanic proxies were partially increased with higher 206Pb/207Pb during the period from ~690 kyr BP to ~740 kyr BP. Although Pb concentration variations coincide with crustal dust, the Pb isotopic compositions do not coincide with crustal dust. It means that the Pb isotopic compositions were influenced by volcanic input or other materials that periods. Mean concentrations of Ir and Pt for the glacial periods were approximately two times higher than their mean concentrations for the interglacial periods. Concentration ratios (Ir/Pt) and crustal enrichment factors (EFc) of Ir and Pt indicate that atmospheric PGE in Antarctica may be originated dominantly from non-crustal sources. These geochemical and isotopic evidence suggest that changes in relative contribution of crustal dust, volcanic and extraterrestrial input to Antarctic ice during period from ~570 kyr BP to ~800 kyr BP.