

OH1 The changing concentrations and isotopic character of lead in aerosols and polar ice

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Pb in aerosols and polar ice is providing a better understanding the terrestrial environment.

Lead is an important environmental tracer. Its use extends into antiquity and it has been associated with major historical and pollution events. Its isotopic composition varies in nature because three of its four Pb isotopes are stable products of uranium and thorium decay, making it a powerful isotopic tracer. In pre-industrial times natural aerosols contained Pb that originated largely from eroding rocks and volcanic emissions. However, beginning 5 millennia ago with technological advances in mineral processing, anthropogenic levels increased to ultimately overwhelm the natural Pb signal [1]. Atmospheric Pb emissions peaked in the 1970s responding to the world wide consumption of leaded petrol particularly in the USA [2]. However, the introductions of unleaded petrol and lower industrial emission controls have significantly lowered atmospheric Pb levels, but an altered atmospheric isotopic composition remains a legacy of the earlier pollution. The Greenland and Antarctic ice caps via atmospheric transport are repositories of this Pb, and archive its changing concentration and isotopic composition in the two hemispheres. Although the climatic isolation and remoteness of these regions results in extremely low concentrations in the ice, highly refined ultra-clean methods for handling samples coupled with advanced highly sensitive Thermal Ionisation Mass Spectrometer techniques yield reliable measurements even at sub-pg/g concentrations.

[1] K.J.R. Rosman et al., *Nature*, 1993, 362: 333-335.

[2] A. Bollhöfer and K.J.R. Rosman, *Geochim. Cosmochim. Acta*, 2001, 65: 1727-1740.