

LEAD ISOTOPES IN ICE CORES SENSE CLIMATE CHANGE AT VOSTOK AND DOME C, ANTARCTICA

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Antarctic ice is an archive of evidence of climatic conditions and natural phenomena in the Southern Hemisphere that extends approximately one million years into the past. We can sense changes through the concentration of atmospheric gases, stable isotope ratios, terrestrial dust levels, fallout from volcanism, and extraterrestrial influx. Here we present measurements of lead in the ice using its isotopic composition to sense environmental conditions in Antarctica and on the surrounding continents in the past.

The isotopic composition of lead varies in nature because three of its four isotopes are radiogenic and formed from the decay of uranium and thorium isotopes. Rocks and minerals vary in age and chemical composition resulting in large natural variations in the isotopic composition of the lead which can be used as a tracer to identifying the origin of dust in the Antarctic atmosphere.

Pristine lead was separated from ice cores using established procedures and analyzed by thermal ionization mass spectrometry (Vallelonga et al., 2002).

Ice from Vostok, dating to 409 ky and from the EPICA core at Dome C display Pb concentrations ranging from ~0.2 pg/g to ~30 pg/g and ²⁰⁷Pb/²⁰⁶Pb ratios from ~1.19 to ~1.24. The isotopic ratios strongly correlated with the Glacial/Interglacial climatic cycle at both sites.

The cyclic pattern in the data is consistent with the lead originating mainly from two sources, one of volcanic origin with a highly radiogenic composition and the other similar in composition to pelagic sediments adjacent to southern South America.

Vallelonga, P., Van de Velde, K., Candelone, J.P., Ly, C., Rosman, K.J.R., Boutron, C.F., Morgan, V.I., and Mackey, D.J. (2002) (2002) *Analytica Chimica Acta* **453**, 1–12.