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# A Chinese Imprint in Insoluble Pollutants Recently Deposited in Central Greenland As Indicated by Lead Isotopes

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## Abstract

Impurities contained in snow and ice layers in Greenland provide a record of the history of atmospheric dustiness and pollution in the Northern Hemisphere. The source of the particles deposited onto the ice cap may be investigated using specific intrinsic tracers. Provenance discrimination may then provide valuable constraints for the validation of atmospheric transport models as well as for the monitoring of natural and anthropogenic aerosols emissions at a global scale. Clay mineralogy combined with the strontium and neodymium isotope composition of the insoluble particles extracted from recent snow deposits at NorthGRIP (75.1°N, 042.3°W), for instance, enabled us to demonstrate that the Taklimakan desert of North-western China was the main source of mineral dust reaching central Greenland at present [Bory et al., *EPSL*, 2002; *GRL*, 2003]. Here we report the lead isotopic signature of these snow-pit samples, covering the 1989-1995 and 1998-2001 time periods. Unradiogenic lead isotopic composition of our Greenland samples, compared to Asian dust isotopic fingerprints, implies that most of the insoluble lead reaching the ice cap is of anthropogenic origin. Lead isotopes reveal likely contributions from European/Canadian and, to a lesser extent, US sources, as well as a marked overprinted signature typical of Chinese anthropogenic lead sources. The relative contribution of the latter appears to have been increasing steadily over the last decade of the 20th century. Quantitative estimates suggest that, in addition to providing most of the dust, China may have already become the most important supplier of anthropogenic lead deposited in Greenland by the turn of the 20th to the 21st century [Bory et al., *ES&T* 2014]. The close timing between dust and anthropogenic particles deposition onto the Greenland ice cap provides new insights for our understanding of intercontinental Chinese aerosols transport.

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