Bioaccumulation of gold by macrofungi from the Mokrsko gold deposit, Czech Republic

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Microorganisms capable of actively solubilizing and precipitating gold appear to play a larger role in the biogeochemical cycling of gold than previously believed. Investigation has focused mainly on prokaryotic microbiota [1], however new studies reveal that eukaryotic organisms (specifically macrofungi), are able to absorb significant amounts of gold in their tissues, even where growing in non-auriferous unpolluted areas [2, 3].

Analyses of macrofungi from the vicinity of the Mokrsko gold deposit have shown a surprisingly high ability of several species to accumulate gold. Whereas the gold content (dry tissue) in ectomycorrhizal fungi was modest (median 10.8 ppb), concentrations in saprobic macrofungi were high (median 47.9 ppb), with extremely high concentrations in *Lycoperdon perlatum* (up to 7.75 ppm). It was estimated that 50 fruitbodies of *L. perlatum* growing in a site of 4 m^2 take up approximately 50, 86, 150 and 1600 μg of Au, Ag, Se and As, respectively. A highly significant correlation was found between the total gold content and fruit-body weight; conversely, gold concentration decreased significantly with the total weight of fruit-body biomass. It can be concluded, that the accumulation of gold in *L. perlatum* is a continual process that slows down with the fruit-body growth.

The factor influencing the different ability of both groups of macrofungi to accumulate gold remains unknown; the distribution of ergosterol and ectomycorrhizal tips in the soil profile indicates that both groups of fungi share largely the same space. Gold was enriched in 9 samples of ectomycorrhizae (median 15.2 ppb) compared to non-mycorrhizal fine spruce roots (2.42 ppb in a composite sample).

The ability of macrofungi to accumulate gold is much higher than that of vascular plants and results indicate a possible significant role of macrofungi in biogeochemical cycling of gold.

[1] Reith *et al.* (2007) *ISME J.* **1**, 1-18. [2] Borovička *et al.* (2005) *Mycol. Res.* **109**, 951-955. [3] Borovička *et al.* (2006) *J. Phys.: Conf. Ser.* **41**, 169-173.

Time series of lead isotopes in insoluble particles from recent snow layers at NorthGRIP, Greenland

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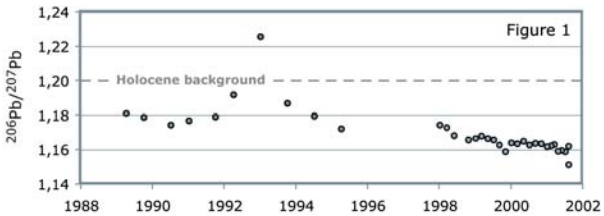
Impurities found in snow, firn and ice layers in polar regions potentially contain valuable information on the changing atmospheric dustiness and pollution, the varying contributing sources of natural and anthropogenic aerosols, and the dominant atmospheric transport pathways, providing that their provenance can be determined. Lead isotopes are particularly useful tracers as they vary widely in both natural and anthropogenic sources of aerosols.

Here we report Pb isotope data of insoluble particles extracted from recent snow layers at North GRIP, Greenland (75.1°N, 042.3°W), obtained at MPI using the Pb triple-spike method. This time series covers the period 1998-2001 and is compared with similar data for the period 1989-1995 obtained at LDEO. Figure 1 shows the $^{206}Pb/^{207}Pb$ variations.



The time series reveals a progressive shift with time towards less radiogenic values, indicating dilution of the natural particulate Pb isotopic signal by an additional source. We suggest that this recent Pb isotope decrease reflects either an increasing anthropogenic lead contribution and/or changes in the contributing anthropogenic sources. Potential sources of natural and anthropogenic lead deposited in Greenland will be discussed in the light of these new Pb isotope data along with constraints from Sr and Nd isotopes [1].

[1] Bory *et al.* (2003) *Geophys. Res. Lett.* **30** (4), 1167, doi:10.1029/2002GL016446.