Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02430, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02430
EGU General Assembly 2008

Polar yeasts : A sink for methyl-mercury. Implication on mercury cycle in polar regions.

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Mercury (Hg), is an inoffensive element in its elementary state, and is emitted by both anthropogenic and natural sources. It can be very toxic if it is methylated, and causes some irreversible neurologic troubles for human beings. For the last twenty years, emissions of Hg have been ruled and have dropped. Although a contamination of the polar ecosystems have been observed from years. The origin of such contamination is still under discussion. In 1995, a new phenomenon that leads to atmospheric deposition of inorganic mercury (Hg^{2+}) onto snow surfaces has been observed in springtime in Alert (Canada). It is called Atmospheric Mercury Depletion Event (AMDE). These phenomenon have been observed since this date in all Arctic stations and in Antarctic also. Moreover small amount of methylmercury has been detected in these snow too. Snow pack seems to play an important role in mercury accumulation during the spring. When melting Hg can then be introduced into polar ecosystems. It is known that micro-organisms can reduce divalent mercury or methylate it when Hg is at high concentration and under anaerobic conditions. Methyl-mercury is a poison for micro-organisms. Their behaviour with environmental amounts of mercury or methylmercury hasn't been studied yet. We isolated and identified 3 yeasts from polar snow collected in 2004 at Ny-Alesund, Svalbard, Norway. These strains have been cultivated with environmental amount of isotopic mercury (199) and methylmercury

(201) within 8 days in order to see they ability to react with these substances (methylation or demethylation) . During the experiment we monitored Optical Density and pH each days, and we sampled for mercury analysis at 0, 3 hours, 1,2,4,6 and 8 days. Each sample was filtered on 0,22μm filters to remove yeasts cells, the filter was rinsed with EDTA to release mercury from the cell walls and the filter in 10% hydrochloric acid was finally sonicated to assess to inside cell mercury content. The results show at these levels mercury species doesn't disturb the viability of the yeasts. They were able to reduce inorganic mercury to gaseous elemental mercury (Hg^0) after 24 hours. They were also able to transfer methyl-mercury from the extracellular media to inside cells without demethylating it. So polar yeasts seemed to be a methyl-mercury sink, and could be the first step in the bioaccumulation process.