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Interactive comment on “Methylated arsenic and antimony species in suspended matter of the river Ruhr, Germany” by L. Duester et al.

Anonymous Referee #1

Received and published: 16 April 2008

General comments:

The deterioration of environmental quality has existed as a serious problem since the industrial revolution. Elevated levels of arsenic or antimony in river water and sediments may originate from anthropogenic sources in the river's catchment area, like disposal of industrial waste, application of phosphate fertilizers, agricultural use of arsenical pesticides, as well as atmospheric deposition of airborne dust from the burning of fossil fuels. Due to microbial activity in the soils, arsenic compounds are transformed to As(V), As(III), monomethylarsonic acid, dimethylarsinic acid, and other species. The arsenic percolates below the root zone of soils mainly by colloidal transport. Although organic forms of arsenic were once thought to possess less potential to cause adverse health and environmental effects than inorganic arsenic, new research on the

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metabolism and toxicity of both organic and inorganic arsenic has changed that view.

The authors present an interesting set of data on key organic arsenic and antimony metabolites adsorbed on suspended particles in the large regulated river Ruhr. Their approach is in accordance with the current opinion that suspended particles play a leading role in the arsenic and antimony migration along river ecosystems. The sound analytical methods used in this work suggest that the quality of the data is excellent. These data are of particular importance, since there are only a few analyses of river waters for methylated arsenic and antimony compounds available at the moment. The objective of the study was to examine the biogeochemical behaviour of methylarsenic and methylantimony species in the course of a complete annual cycle. In my opinion, the paper leads to better quantification and understanding of the complex fate of arsenic and antimony during river transport. However, there are some minor problems in the manuscript that should be considered by the authors.

Specific comments:

There is a lack of information on the chemical composition ranges of the river water masses as well as on the composition of the suspended particles that serve as vehicles for arsenic and antimony in the river Ruhr. Particle characterisation should at least include organic carbon content.

Please provide a map showing the precise locations of sampling sites.

Page 1363: line 17. "... may be transported from soils in true sediment pore water solution". - Colloidal transport of arsenic and antimony in soils and groundwater can be even more important.

Page 1366: line 4. "Silicate associated arsenic and antimony minerals do not occur in the environment to any significant extent". I agree, but there are some exceptions. Recently, an extremely arsenic-rich smectite has been found in Japan (Pascua et al., 2005, Mineralogical Magazine 69, pp 897-906).

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Typing errors:

Page 1367: line 11. "Chlorophyceae" instead of "Chlorphyceae"

Page 1375: line 1. "antimony species" instead of "arntimony species"

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