

Concurrent DMS and isoprene surface seawater variability in the Eastern Atlantic Ocean

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Remote Marine Aerosol Precursors?

DMS, formed in the surface ocean from the algae metabolite DMSP, is thought to be an important precursor of remote marine aerosols [1]. Isoprene is known to be emitted from terrestrial vegetation and form secondary organic aerosols [2]. Isoprene can also be produced in the ocean [3], although the production of marine isoprene and its influence on aerosol formation over the oceans has not been widely studied. In this study, surface seawater DMS, DMSP and isoprene were measured in the eastern Atlantic Ocean in November 2008. Continuous DMS and isoprene measurements were made with an atmospheric pressure chemical ionization mass spectrometer (AP-CIMS) coupled to a membrane equilibrator. Discrete DMS and DMSP measurements were made with a purge and trap gas chromatograph-flame-photometric detector (GC-FPD) system.

Discussion of Results

DMS measurements from AP-CIMS and GC-FPD show similar geographic trends over the cruise track, but a systematic difference in concentrations was observed between the two data sets. Surface ocean DMS and isoprene levels exhibit different latitudinal trends. The biological factors controlling these differences are not yet understood.

[1] Charlson *et al.* (1987) *Nature* **340**, 437–438.

[2] Matsunaga *et al.* (2005) *Atmos. Chem. Phys. Discuss.* **5**,

11143–11156 [3] Shaw *et al.* (2003) *Mar. Chem.* **80**, 227–245.

Simultaneous immobilization of As and Pb in contaminated soils

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Arsenic and lead have been classified as the top two contaminants in the USA by the US EPA for at least a decade. This is not only due to their toxicity, but also abundance. They pose the greatest threat to people and animals when present in drinking water, which they can reach by infiltration through soils and sediments. Therefore, remediation of media contaminated with As and Pb has been the focus of researchers for many years. However, few studies have addressed simultaneous *in situ* immobilization of As and Pb.

This study investigates the possibility of immobilization of As and Pb in natural soil samples collected in northern Florida. The soil is mostly comprised of fine grained quartz with small amounts of feldspar. The concentrations of As and Pb in the soil vary and reach maximum values of 5.7 ppm and 3.6 ppm, respectively. As is most likely associated with iron oxides and pyrite, Pb with Pb-sulfides or sulfates.

Immobilization experiments were conducted by reacting 50 g soil samples with 0.5L of aqueous solutions containing Ca, P and Cl. Reactions were carried out at ambient temperature for 1 and 30 days. Concentrations of Ca were varied from 0.07 to 2.17 g/L (in form of CaCl₂) and P from 0 to 0.05 g/L (in form of H₃PO₄ or Na₃PO₄ x 12 H₂O). The releasability of As and Pb before and after the reactions, and hence effectiveness of the treatment, were evaluated by Toxicity Characteristic Leaching Procedure (TCLP).

The results show that reaction of contaminated soil with solutions containing Ca and P vastly reduces leachability of the pollutants. TCLP-releasable As concentrations were reduced from about 300 ppb to 6-28 ppb when Ca concentration was at least 0.36 g/L and P concentration at least 0.03 g/L. TCLP-releasable Pb concentrations decreased from about 200 ppb to 17 ppb or lower in every experiment where P was added (0.01 g/L was the lowest used P concentration). The presence of P was necessary for a large reduction of leachable As and Pb. Reaction time and the P source did not influence the effectiveness of treatment. We speculate that the mechanism of As and Pb immobilization is through coprecipitation with Ca-phosphates, possibly apatite or its low temperature precursors. Evaluation of sequestration mechanisms is ongoing.