The fate of arsenic in offshore sediment under microbial reduction

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The fate of arsenic in offshore sediment is directly related to its speciation in environmental. Microbial activity strongly affected the redox conditions within the sediment, speciation transformation and stability of arsenic. Anaerobic incubation experiments were performed at 30 °C on a sediment sample collected from a heavily contaminated Bay in China. The content of arsenic and iron in the soild was ~757 μg/g and ~32 mg/g respectively. Artificial seawater media with lactate as carbon source was used. During incubation, arsenic was rapidly released into solution followed by quick reduction to arsenite. After reaching a maxima at fourth day of incubation, the concentration of aqueous arsenite decreased rapidly indicating its sequestration into a more stable form in the solid. Phosphate and HCl extract arsenite in soild did not increase appreciably. Since phosphate and HCl extracted form is usually tied to adsorbed form and amorphous iron oxyhydroxide associated form, it can be inferred that the disappeared arsenite was not incorporated into solid by adsorption or coprecipitation with biogenic poorly ordered iron oxyhydroxide or acid volatilizable sulfide (AVS), but into a non-acid-dissolvable form (arsenic sulfide or arsenopyrite).

XANES spectra of microbial reducted sediment showed that the spaciation of arsenic was transformed from arsenate to lower valence state. Although the peaks cannot be resolved to specific arsenic containing component, the new bands fell into the domain of reference minerals (realgar, orpiment arsenopyrite).

Sulfate and ferric iron were also observed to be reduced during incubation. While there was an appreciable release of ferrous iron into solution, most reduced iron was retained as HCl dissolvable form (iron sulfide) in solid. This is the probable reason why arsenic was rapidly released in the beginning of incubation. Since sulfide was preferentially precipitated by ferrous iron, arsenic sulfide was formed only after iron reduction and precipitation reached a steady level.

We thank NSFC of China (40803032, 40773076) and MOST 973 Project (2009CB426301) for their financial supports.

Thin skin tectonics through the entire continental crust in the Dabieshan, Eastern China

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Although the thin skin tectonics is theoretically applicable to entire continent crust, the extent and mode below the upper crust has been poorly constrained. Seismic reflection profiling crossing the Dabieshan reveals that the Dabieshan is characterized by thin skin tectonics through entire continental crust. The thin skin components have been deformed as a huge duplex, which can be subdivided in to three segments. The southern segment is composed of two antiforms, the northern segment is the collision suture and the middle segment is a huge granite intrusion. The Dabieshan is dominated by a compression regime and extension is insignificant.

This project is supported by the 973 Chinese National Key Project for Basic Research (203 CB716500) and National Natural Scientific Foundation of China (Grant no: 40399104, 40172079 and 40542012).