The effect of microbially mediated sulfate reduction on arsenic mobilization in the shallow aquifer

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Experimental Materials and Methods

To better understand the coupled Fe-S biogeochemical processes controlling the fate of As in shallow groundwater, microcosm incubation experiments were conducted by mixing 5 g sediments collected from Jianghan Plain, central Yangtze River Basin and 50 mL artificial groundwater. Dissolved As species (including thio-As), Fe(II), *dsrB/arrA* functional gene abundance, 16S rRNA gene sequences and iron mineral phase transformation were monitored during the incubation.

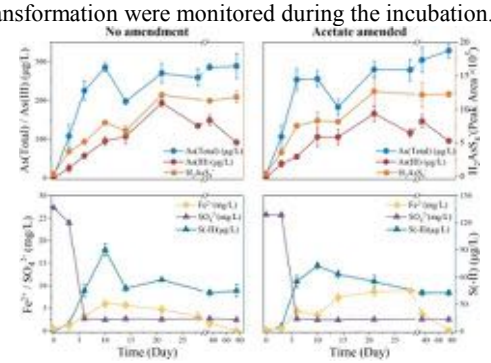

Figure 1: The temporal change of As/Fe/S species

Disscusion of Results

On one hand, Sun *et al*. [1] suggested the sulfide can promote As release via reducing Fe (hydro)oxides indirectly and forming thio-As. On the other hand, Kocar *et al*. [2] illustrated sulfidogenesis can form Fe-sulfide minerals.

In the present study, As-loaded iron mineral phase transformation under sulfate reduction condition can cause the decoupling change of Fe/As in groundwater, which can contribute to the formation of high As and low Fe groundwater. SRB and FeRB play important roles as the main divers. The detection of thio-As provided new insight into the mechanism of As mobilization and transformation in aquifers.

[1] Sun *et al*. (2016) *Chemosphere* 153, 254-261. [2] Kocar *et al*. (2010) *GCA* 74, 980-994.