Arsenic biogeochemistry in hot springs in Tengchong geothermal area, China

Ping Li*, Zhou Jiang.
China University of Geosciences, Wuhan 430074, PR China
*pli@cug.edu.cn

Arsenic (As) biogeochemistry in acid and alkaline hot springs of Tengchong geothermal area was investigated using Illumina MiSeq sequencing, functional gene clone library and geochemistry analyses. In an acid hot spring Zhenzhuquan, As(III) oxidation occurred at the discharge source due to the distinctly low concentrations of sulfide. Along the outflow channel, coupled with iron oxidation ($FeIII/Fe_{Tot}$ increase from 0.09 to 0.34) and sulfur oxidation (SO_4^{2-}concentrations increase from 120.05 to 158.21 mg/L), As and Fe co-deposit in downstream sediments, with As concentrations up to 16.44 g/kg and As/Fe mole ratios up to 6.72. The oxidation of As, Fe and S might be contributed by some putative functional microbial populations including *Aquificae* and *Pseudomonas* (As oxidation), *Sulfolobus* (S and Fe oxidation), *Metallosphaera* and *Acidicaldus* (Fe oxidation), respectively. In an alkaline hot spring Zimeiquan outflow channel, As_{Sum} concentrations significantly increased from 5.45 to 13.86 μmol/L from 0-4 m and then decreased, with thioarsenate first converted to As(III) and then oxidized to As(V). The reduced sulfur generated from thioarsenate transformation was oxidized to sulfate as DO increase after 4 m, which led to the increase of S_{sum} from 4m to 12m. The predominant *Thermocrinis* in upstream samples was probably responsible for transforming the thioarsenate to As(III). *Thermus* and *Hydrogenobacter* might attribute to As(III) oxidation downstream. This study improves our understanding of microbially-mediated As mobilization in hot springs.