

## **Mobilization of geogenic arsenic and iodine in shallow aquifer along the middle reaches of Yangtze River**

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Natural occurrence of high arsenic, iron, manganese and ammonium in shallow groundwater have been widely distributed in the Yangtze river basin. In this research, we firstly discovered co-occurring geogenic arsenic and iodine in the shallow groundwater along the middle reaches of Yangtze river, which is characterized by concentrated distribution of oxbows and meandering banks of Yangtze river. To understand the major processes controlling geogenic arsenic and iodine mobilization in shallow aquifers, hydrochemical and H, O, C isotopic compositions of groundwater samples were analyzed, arsenic and iodine speciation were characterized, excitation emission matrix with parallel factor analysis (EEM-PARAFAC) of dissolved organic matter were used to clarify the potential relationships among arsenic/iodine species and DOM.

Results show that high As and I groundwater was characterized by neutral pH, high  $\text{HCO}_3^-$ , Fe(II) and DOC concentrations with As(III) and iodide as the dominant species. The arsenic concentrations of groundwater range from 0.26 to 625  $\mu\text{g/L}$  with 63% samples exceeding the Chinese drinking water guideline of 10  $\mu\text{g/L}$ . It was found that the ratios of MMA and DMA to total arsenic in groundwater ranged from 5.7%-10.8% and 1.9-6.2%, respectively. Thirty percent of groundwater samples have iodine concentrations greater than 100  $\mu\text{g/L}$ , with the highest concentration up to 1640  $\mu\text{g/L}$ , while 40% of samples have ratios of organic iodine to total iodine greater than 20%. EEM-PARAFAC analysis demonstrates the dominance of terrestrial DOM sources and the presence of microbial activities in shallow aquifer.

Channels shifting and sedimentological evolution of the central Yangtze river have great impacts on spatial variation of arsenic and iodine in the shallow groundwater. Oxbows with abundant reactive organic carbon supported microbial respiration in an anoxic environment that triggers the degradation of organic matter and reductive dissolution of iron oxy-hydroxides, which are major hydrogeochemical processes responsible for the mobilization of arsenic and iodine release.