

Arsenic in river waters of the Hokusetsu Area of Osaka Prefecture - Distribution, origin and transport process

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Within the present study, extent of high arsenic concentrations is investigated in river waters of the Hokusetsu area of Osaka and Kyoto Prefectures where naturally As contaminated waters have been reported. For example, after the 1995 Kobe earthquake and the following years, waters of Ina and Yono rivers systems were reported with high concentrations (>10ppb) of arsenic.

The distribution of As in water (<1 to 38ppb) reveals a pattern related to the Ibaraki plutons that intrude the Permian to Jurassic sedimentary rocks (sandstone, shale, bedded chert); high As concentrations are found in the areas around the intrusive rock body, while concentrations are rather low in areas of sedimentary rocks far from the plutons. High concentrations in water correlate with high As contents in riverbed sediments (<2.5 to 55ppm) which are also distributed in accordance with the local geology of pyrite-rich sedimentary rocks.

Isotopic analysis of $\delta^{34}\text{S}_{CDT}$ of sulfate ions in river waters (+4.5 ‰ median) fall within the same range of previous studies, but these values seem to show river waters impacted by atmospheric depositions. One spring sample (+2.6 ‰) tends to confirm that the As origin is pyrite in shale rocks (-3.0 ‰ to +1.4 ‰) rather from pyrite in chert (-8.8 ‰).

Analysis of river concentrations in unfiltered, 0.7 μm and 0.2 μm filtered waters show that As remains mostly in the dissolved pool (<0.2 μm) along the river course, while the particulate fraction of Fe, Mn and Al represent 68% of the total concentration in average. These results as well as Principal Component Analysis suggest that As is therefore not transported with clay particles and/or Fe/Mn/Al oxides as believed by many researchers.

Keywords: Arsenic, river water, source rock, sediments, transport