

## Occurance and origins of Arsenic in the Hokusetsu area, Japan

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Arsenic (As) contamination have been chronically reported since 1994 in ground and river waters of the Hokusetsu area, Osaka, Japan. In order to asses the spread of As contamination and its origins, a broad geochemical investigation of river waters and bed sediments have been conducted. Former studies have targeted sulfides hosted in Mesozoic to Paleozoic sedimentary rocks as the source of As[1]. Upon the sulfide hypothesis, As and the associated trace elements in the sulfides in the sedimentary rocks and the nearby ore deposits related to Late Cretaceous granitic magmatism were compared to document the genetic relationship between As-bearing minerals and numerous xenothermal and mesothermal ore deposits of the area.

The geochemical mapping of As was achieved through ICP-MS analysis of river water and alkali-fused bed sediments. Imaging of As and trace elements within the sulfides from sedimentary rocks, contact-metamorphosed rocks and ore deposits were compared using LA-ICP-MS.

The As contamination was restrained to the sedimentary rocks around an igneous intrusion, but the most contaminated waters appeared nearby faults. It is likely that the dissolution of As-bearing sulfides by groundwater was enhanced by the increasing surface contact of the sheared host-rocks. The As level of water was lower in the area of sedimentary rocks indurated by contact-metamorphism than in the area of non-metamorphosed sedimentary rocks, probably due to the potential dissolution rate of As-bearing sulfides.

In the contaminated areas, sulfur isotopes confirmed that the disseminated sulfides (mainly pyrite, pyrrhotite and chalcopyrite) in the contact-metamorphosed rocks were induced by the igneous intrusion. Ni and Co were found in these disseminated sulfides and in some felsic magma related ore deposits, corroborating the common origins. But some sulfides in the Paleozoic sedimentary rocks were related to the submarine hydrothermal ore deposits. As was detected in both kinds of sulfides, and also in Mn-hornfels likely from Paleozoic times and later metamorphosed by the Cretaceous magmatic activities.

[1] Ito *et al.* (2003) *J. Groundw. Hydrol* 45, 3-18. (In Japanese with english abst.)