

Secular variation of halogen concentrations in Yugama crater lake water, Kusatsu-Sirane Volcano

Yu Kashiwagi[1]; Yasuyuki Muramatsu[1]; Takeshi Ohba[2]

[1] Dep. Chemistry, Gakushuin Univ; [2] Volcanic Fluid Research Center, Tokyo Institute of Technology

Mt. Kusatsu-Sirane is an active volcano located along the volcanic front on Honshu Island, Japan. Crater lake water in Yugama, located at the top of Kusatsu-Sirane volcano, contains high concentration of chloride. It was observed that variation of chloride concentration in Yugama water reflected the volcanic activity (Ohba et al., 2000). However, there are limited data on other halogens, such as iodine and bromine. In this study, concentrations of iodine and bromine in Yugama water were determined to know their levels and their relationships to chlorine.

Fifty four water samples, which were collected from Yugama lake during 1988-2006 and stored at Volcanic Fluid Research Center, Tokyo Institute of Technology, were used in this study. Some other samples collected surroundings of Yugama were also used. After samples were filtered and diluted with de-ionized water, iodine and bromine concentrations were measured by inductively coupled plasma mass spectrometry (ICP/MS). Chloride concentration was measured by ion chromatography (IC).

Concentration ranges of iodine, bromine and chlorine in Yugama water were 0.3-6ppm, 2-9ppm and 1500-3500ppm, respectively (data for chlorine; Ohba et al., 2000). These concentrations are much higher than those in ground water in Kusatsu-Sirane area. It is interesting to note that concentration of iodine is 100 times higher than that of sea water in Yugama water. A pattern of secular variations of iodine and bromine is similar to that of chloride. The concentrations of these three elements increased markedly during 1989-1992, suggesting a close relationship between the concentrations and the volcanic activity of Mt. Kusatsu-Sirane. In this area, there are some hot springs which are supposed to be originated from a same source as Yugama water. These samples were also analyzed for halogen. A large variation of halogen concentrations and also I/Cl ratios was observed in those samples. However, the variations of Br/Cl ratios were relatively constant. These halogen data, together with other chemical data, may be used in understanding the movement of underground fluids in this area.

Reference: T. Ohba et al., (2000): *J. Volcanol. Geotherm. Res.* 97, 329-346 (2000)

