

Mercury isotopic composition of volcanic gases from Tarumae, Tokachi and Kujyu volcanoes in Japan

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Mercury (Hg) is a globally spread pollutant, which converses between chemical forms and participate in biogeochemical cycles. For understanding of the Hg cycling, it is important to characterize Hg emission sources, such as anthropogenic and natural, and link the sources to Hg exposure of the environmental system.

Previous studies demonstrate that Hg isotopes can be used as tracers of Hg pathways in the environment (e.g. [1, 2]). In this study, we present Hg isotopic compositions of volcanic gases from craters of Tarumae and Tokachi (62-2 and Taisho craters) volcanoes in Hokkaido, and Kujyu volcano in Oita, in order to understand behavior of mercury in the hydro-geothermal environment.

Our result showed that variations in mass-dependent fractionation (MDF) ($\delta^{202}\text{Hg}$: -1.72 to -0.44, 2SD = $\pm 0.10\%$), which negatively correlate with SO_2 concentration of the volcanic gases. We also observed small mass-independent fractionation (MIF) in all samples ($\Delta^{199}\text{Hg}$: -0.03 to +0.20, 2SD = ± 0.15). The $\Delta^{199}\text{Hg}$ values of volcanic gases from Tokachi-Taisho and Tarumae volcanoes are slightly different from that of Vulcano, Italy ($\Delta^{199}\text{Hg}$: -0.12) [3], which may indicate that the physicochemical reaction(s) that causes MIF (i.e. $\text{HgCl}_{2(\text{aq})}$ - $\text{Hg}^0_{(\text{g})}$) might occur during hydrothermal processes, and that Hg isotopes may be used to better understand these processes.

References

- [1] Bergquist and Blum. (2009) *Elements*, **5**: 353-357.
- [2] Bergquist and Blum. (2007) *Science*, **318**: 417-420.
- [3] Zambardi et al. (2009) *Earth and Planetary Science Letters*, **277**: 236-243.