

Sublacustrine hydrothermal system of the active crater lake, Yudamari of Aso Volcano inferred from Mg budget of the lake

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The crater lake, Yudamari, formed in the first crater of Mt. Nakadake, Aso Volcano, contains a large amount of dissolved components such as chloride ion (Cl) and magnesium ion (Mg), without the surface outflow of the lake. This kind of water quality is formed under the influence of subaqueous volcanic gas flowing into the lake. From analysis of the isotope composition of the Yudamari water samples (δD and $\delta^{18}O$), it was found that a large change occurred in the water isotope composition when the lake which became extremely acidic caused the dissolution of chemical components from rocks (oral presentation in the same session last year). In the period when the lake became extremely acidic, the volume of the lake and the water budget were demanded in detail (Saito et al., 2008). We calculated the Mg balance of the lake including the hydrological parameters reported there, and found that a large amount of Mg from 5 to 10 tons per day was eluted from the rock to the lake. Assuming chemical composition and density of the original rock subjected to the acid leaching and converting the Mg leaching amount to the volume of the rock, it is 50 to 200 cubic meters. This is an amazing phenomenon in which a cubic rock from 3 to 6 m is completely altered in one day. The elution of such a large amount of rock components is not caught up in the dissolution reaction only on the bottom surface of the lake. It strongly supports the existence of the subaqueous hydrothermal system that the lake water circulates continuously and reacts with the rock, for example, it is often assumed under the lake of a high temperature and strongly acidic crater lake called active crater lake similar to Yudamari.

Keywords: Aso volcano, active crater lake, magnesium budget, acid leaching, sublacustrine hydrothermal system