Decrease of iodine isotope ratio observed in crater lake and geothermal area at Zao volcano, Japan

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The volcanic activity has become higher at Zao volcano in Miyagi and Yamagata of Japan since January 2013 after the 2011 Tohoku Earthquake [1]. Basic water quality of crater lake and geothermal area have been studied by Tohoku University since the water quality of hydeothermal system in volcano are correlating with volcanic activity. As a part of this investigation, we are trying to monitor the volcanic activity using $^{129}I/^{127}I$ ratios at Zao volcano. In our previous study, $^{129}I/^{127}I$ ratio in water collected in October 2013 from the crater lake at Zao volcano were 2.2×10^{-9}, which were affected by anthropogenic ^{129}I [2]. In terms of the global iodine cycle, chronologically-old iodine with low isotopic ratio was considered to be supplied into the crater lake and geothermal area from underground corresponding to the volcanic activity, resulting the decrease in $^{129}I/^{127}I$ ratio of the crater lake. The present study aimed to elucidate distribution of $^{129}I/^{127}I$ ratio in the crater lake and geothermal area, and the relativity between $^{129}I/^{127}I$ ratio and volcanic earthquake for the monitoring of volcanic activity at Zao volcano using iodine isotopic ratio.

The $^{129}I/^{127}I$ ratios of the crater lake increased from 2.2×10^{-9} to 5.6×10^{-9} during October 2013 to the middle of October 2014, then, abruptly decreased to 4.3×10^{-10} soon after the white turbidity in the lake. While the $^{129}I/^{127}I$ ratios of the geothermal area decreased from 5.3×10^{-9} to 1.6×10^{-9} corresponding to increase of the volcanic earthquake. Further investigations are needed to disscus the relationship of changes in $^{129}I/^{127}I$ ratio of the hydrothermal system and the volcanic activity at Zao volcano.

[1] Japan Meteorological Agency (2015) Monthly Volcanic Activity Report (in Japanese). [2] Matsunaka et al. (2015) KEK Proceedings 2015-4, 55-61.