

Geothermal Activity by Observation using Infrared Thermal Camera during the 2018-19 Volcanic Activity at Azumayama

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Introduction

Ground-fixed infrared thermal camera observation provides the nighttime data without influence of solar radiation besides the images with a fixed angle of view, as compared with mobile observation. It allows us the detailed pixel analysis of the thermal images. We report the expansion of the geothermal area and temperature changes during a series of 2018-19 activities at Azumayama.

Data and Analysis

Japan Meteorological Agency (JMA) has deployed infrared thermal camera at Jododaira, east flank of Azumayama, and performed continuous monitoring since 2016. The infrared thermal camera records thermal images every 5 second and thermal data every hour. Thermal data is a binary file consisting of temperature data for each pixel. We convert this binary data to a CSV file and perform two ways of analysis. One is to extract the maximum temperatures in the specified ranges. The other is to count the number of pixels with a temperature above a specific threshold.

Result

During the 2018-19 activity, the maximum temperature of geothermal area increased and the area expanded around October 2018 at Ooana crater, the main geothermal area in Azumayama with some active fumaroles, and at the NW region from Ooana crater.

Magnetic observation suggests demagnetization at the shallow subsurface around Ooana crater and volcanic gas monitoring (Multi-gas observation data) shows simultaneous increase in the ratio of SO₂/H₂S during the activity. In addition, the main type of volcanic earthquakes changed from relatively deeper BH-type to shallower low frequency earthquakes and volcanic tremors.

The data collected by geothermal observation using infrared thermal camera will be able to play important roles for evaluation of the volcanic activity by correlating to various data, such as activity of volcanic earthquakes, magnetic total intensity, volcanic gas, and ground deformation.

Keywords: Geothermal area