

# Mapping cliff face in central crater of Miharayama using UAV-based SfM-MVS

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## 1. Introduction

We succeeded in measuring Izu Oshima Miharayama central crater by UAV-SfM. And based on the data, an altitude-volume curve was created. When the lava lake was formed by the magma flowing in the next eruption, it was easy to obtain the cumulative ejection volume by checking the height of the lake surface.

## 2. Relationship between topographical features and eruption of Mt. Mihara

Izu Oshima is one of the most active volcanoes in Japan. Miharayama located in the center is particularly active, and there is an active lava lake at the bottom of the crater until about 1974. Later, the lava lake was filled with collapsed deposits. In the past case, new eruptions often start near the crater wall of this crater, the 1950 eruption and the 1986 eruption

Immediately after the start of the eruption, most of the erupted magma accumulates in central crater and makes lava lake. It does not overflow until the lake surface rises and reaches the rim. The 1986 eruption began on November 15, it took three days to landfill, it was 19th that it filled the nairinzan and dropped down to the caldera floor. This lava flow is called LA lava and its volume is required to be 10 to 12 million m<sup>3</sup>. In terms of volcanic disaster prevention, it is very important to determine the volume of this crater.

## 3. Measurement of central longitudinal hole crater by UAV

Measurement was carried out using Inspire2 as the departure point from the crater observatory which is closest to the Miharayama central crater. The total number of images was about 1,000. Model creation was done with low resolution, medium resolution, high resolution. In the case of low resolution, it failed in the north overhang portion, and in the middle resolution and high resolution, the crater bottom portion failed. For this reason, we joined the model with low resolution and high resolution.

## 4. Create HV curve

Based on the measurement, RRIM and HV curve were created (attached). As a result, it was found that the altitude of the present Miharayama Central Vent crater bottom is 497 m, the altitude that overflows the inner race and overflows the Miharayama slope is 685 m. The altitude difference between them is 188 m. Ultimately, it was confirmed that the volume of Miharayama central crater crater is about 10 million m<sup>3</sup>. This amount is slightly smaller than the volume of 12 million m<sup>3</sup> of the lava flow that flowed from the A crater in 1986 and is almost the same as the measurement value just before eruption in 1986. In addition, this measurement was done as a study of the crater measurement method by UAV. D1 issue of next generation volcano research and human resources development project of Ministry of Education, Culture, Sports, Science and Technology.

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