

Color measurement of scoria at Takatsukayama in the Higashi-Izu Monogenetic volcano group

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Colors of earth materials have recently been measured quantitatively to get information of their formation processes. We applied this color measurement technique to a volcanic system to discuss volcanic eruption processes. In this study, we measured colors of natural volcanic ejecta at Takatsukayama in the Higashi-Izu Monogenetic volcano group by Minolta Spectrocolorimeter CM2002. The L*(brightness), a*(red) and b*(yellow) values were used to describe the colors. The scoria cone at Takatsukayama showed a spatial variation of color from black ($L^*=0.53$ -1.10, $a^*=8.66$ -12.18, and $b^*=2.04$ -3.29) to red ($L^*=8.85$ -16.78, $a^*=14.35$ -25.59, and $b^*=7.65$ -11.14) in about 100 m. Moreover, some of scoria blocks had color profiles of red to black from surface to the interior. These results may imply that the red coloring occurs first from the surface of scoria block and then advances into its interior. We conducted simulation experiments for this red coloring of scoria by heating black scoria powders and blocks in a Muffle furnace. These experiments showed that the color profiles can be reproduced by heating of black scoria block and that the extent of color change could be empirically expressed by the following equation:

$$b^*/a^* = -0.0028 T + 3.5 \quad (T \text{ is less than } 1150 \text{ C})$$

Based on these experimental results, we consider that the spatial variation in color of the scoria cone is due to a high temperature at around 1000 C.