

Changes in the chemistry of spring water related to the recent volcanic activity of Mt Iwo-Yama, Kirishima volcanic area

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Mt Iwo-Yama is an active volcano in the Kirishima volcanic area. The west flank of the volcano is known as the Ebino Highland. The volcano erupted in April 2018 for the first time in 250 years. The vents have opened with the phreatic eruptions and then formed boiling muddy pools. In this study, we discuss the current status of the volcanic activity of Mt Iwo-Yama based on the water chemistry of muddy crater lakes and the springs in the Ebino Highland.

We collected the sample water repeatedly from the muddy crater lakes at the summit area (V1) and the west flank (V2). The former one is the vent opened on April 19th, 2018 and the latter one is that opened on April 26th, 2018. In addition, we also collected repeatedly the specific spring water located along the small stream in the Ebino Highland. We labeled the spring water as S1 to S4 in the order of distance from the summit area. The collected water samples were chemically analyzed in our laboratory.

The V1 and V2 water contain extremely high concentrations of chloride and sulfate ions. Those two are very acidic, and the pH of them sometimes show the value lower than unity. These are considered that thermal water is supplied from the geothermal reservoir directly. At this writing, although the estimated temperatures for both reservoirs of V1 and V2 by the quartz geothermometer are over 200 deg-C, the temperature for V2 is a little higher than that of V1.

The fluctuations of Cl/SO₄ ratio at S1, S2 and S3 are similar to that of V2. Also, the fluctuation of the ratio at S4, which is most far from the summit among the four, seems to be similar to these with 1-month time lag. From this, it is suggested that these springs in the Ebino Highland are affected by the geothermal activity related to V2. The concentration of dissolved chemical components and water temperature at S1 changed from an increasing trend to decreasing trend in August 2018. Conversely, these at S4 are on an increasing trend since September 2018.

The volcanic activity of Mt Iwo-Yama is remained to be active. Based on the water chemistry, the temperature of the geothermal system seems to be higher in the west flank area, that is the Ebino Highland area, than the summit area. The changes in the water chemistry of the hot springs suggesting the rise of thermal activity in the Ebino Highland have been observed. Further, the new fumaroles were opened in the west flank area since autumn 2018. In conclusion, it is considered that the geothermal activity of Mt Iwo-Yama is expanding from the summit area to the west flank area. This means that the thermal activity in the Ebino Highland area will become more active, and the fumarolic area will expand to the western part of the Ebino highland.

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