

Fumarolic activity from 1999 and discovered opened fractures at the Iwate volcano

Nobuo Doi[1], Tokumi Saito[2], Saeko Doi[3], Masaru Noda[2], Shin Koshiya[2], Chisato Obara[4], Yuusaku Akutu[5], Shiniti Kimura[5], Tadashi Numakunai[2]

[1] Geo-E, [2] Civil and Environmental Eng., Iwate Univ., [3] Matsuo Village, [4] Shizukuishi Town Office, [5] Civil and Environmental Eng., Iwate Univ

The volcanic activity of the Iwate volcano started at September 25, 1995 with the tremor in 45 minutes. Some volcanic activities have continued after the event at the West-Iwate volcano: a start of earthquake activity at shallow depths from December 29, 1997; an occurrence of a large number of earthquake and tremor, and the ground movement from the middle of February, 1998; and a start of fumarolic activity from March, 1999. The high fumarolic activity has continued to the end of this month (February, 2002). The area where fumaroles were occurred is about 2.3 km and about 0.75 km in width at EW and NS direction, respectively. It is seemed to be a rare case in the world that the fumarolic activity was occurred in the wide area like this before eruption.

The investigation and observation of fumarolic activity and related phenomena have clarified the following results.

1) The short- and long-term harmonic activities between fumaroles have occurred in the region because of the same or continuous subsurface geothermal reservoir that was boiled and activated by a new heat supply from the injected magma.

2) An expansion rate of the area with surface volcanic phenomena became large when the amount of steam from fumaroles increased rapidly. The rate became small when the amount of steam was constant.

3) The fumarolic activity is weakened in around June by a rise-up of groundwater level. The activity is also influenced with the shocks of earthquake in shallow depths and the rains.

4) The fumarolic activity has occurred through the fault systems trending EW, NS, and NW-SE directions. The landslides with thin sliding block occur parallel to the arrangement of fumaroles.

5) The fumarolic activity has occurred in the same area where the past fumarolic activity occurred.

The geothermal fluids reached to the ground surface as gas emission at first, and as hot spring, and finally as steam spout (fumarole) at the Nishikozawa area. The phenomena occurred because the temperature in faults near the ground surface was cold at first, the steam and condensed hot water could not reach to the ground surface expect for volcanic gas. When the temperature in faults became higher, the hot water and steam could reach to the ground surface sequentially. This is also the reason that the fumarolic activity was delayed about one year after injection of the new magma.

The uplift of the volcanic edifice turned to the subsidence at the West-Iwate volcano although the local area near the Kurokura-yama continues separating from the Shimokura-yama to about southeastward at present (Geographical Survey Institute, 2001). Four opened fractures in the direction of EW were found out at the Kurokura-yama to the Ubakura-yama accompanying with fumaroles. The width of fracture opening is wider at the Kurokura-yama than at the Ubakura-yama. It seems that the fractures in the direction of EW are opened by the separation of the Kurokura-yama to about southeastward. It is needed to monitor the behavior of the opened fractures.