

Long term variation of volcanic activity inferred from leveling survey at Mt. Hokkaido-Komagatake

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After the large eruption occurred at Mt. Hokkaido-Komagatake in 1929, that is the largest eruption in Japan in the 20th century, it took only small activities excluding a medium eruption in 1942. Recently, the steam explosions are repeated in 1996, 1998 and 2000. The volcano is in the stage that looks like the situation in which the steam explosion were repeated before the major eruption.

Geophysical observations are necessary to evaluate a present activity of active volcanoes. But, most of geophysical observations, that obtain highly accurate data in a mid/long term, are developed by the recent advancement of equipments. Moreover, at Mt. Hokkaido-Komagatake, the mid/long-term activity evaluation by a seismological technique is difficult because of an extremely low seismic activity.

The first order leveling is done repeatedly along the national road since the Meiji era, and is almost only one geodetic observation technique to obtain highly accurate data since a hundred years ago. The first order leveling route passes the foot of the mountains other than the south, and there is a highly accurate and homogeneous data in Hokkaido-Komagatake. It thought to be estimated the potential of Hokkaido-Komagatake mid/long-term activity by using this first order leveling data.

As the 1st time of leveling, it is done in 1904. As a result of the measurements before and after the eruption in 1929, the subsidence of the mountain is detected. In the observations after that, the tendency of the upheaval of the mountain body is observed. Because in the result of the first order leveling from Hakodate to the Yakumo, there was a trend of the north side upheaval since 1929, the trend can be approximated in the straight line and after subtracting this trend it will appear a change caused by the volcano. When J17 in Hakodate is fixed, the upheaval related to the volcano is distributed from Hakodate to the southern part of the Yakumo town. And the maximum upheaval point in the leveling route is presumed to be the vicinity of Lake Onuma at the southwestern foot of Mt. Hokkaido-Komagatake. As the maximum uplift in the leveling route observed not at the place near the volcano and at the southwestern foot of the volcano, the source of the uplift is located not beneath the central crater and under the southern foot of the volcano. This fact corresponds to that the center of the subsidence estimated by Nakamura (1935) accompanied by the 1929 eruption is located at the southeastern foot of the volcano. Upheaval rate seems to increase gradually in recent at the foot of a mountain though it is difficult to say the change of the upheaval rate determinately because there is little benchmarks preserved since 1904.

Along another the first order leveling route from Mori town toward southeast along the coast, the measurements made extremely little frequency compared with the west side route, and we cannot estimate the trend. If we use the same trend along the west leveling route, it seems that the position of the source may be defined and shown at the meeting.

Moreover, the benchmarks set up overall in sands along the coast and the benchmarks around Lake Onuma appear greatly influenced by the 1993 Southwest off Hokkaido earthquake, and we should pay much care to the handling of the change at the period including this event.