

Recent volcanic eruptions and challenge for volcano disaster mitigation in Japan

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Recently, even a small scale eruption has been reported on a nationwide scale through mass media, and many people may feel that volcanic activity in Japan is becoming more active. In particular, some people claim that it became active after the Great East Japan Earthquake in 2011. In terms of the number of volcanoes that erupt, however, there is no particular increase. In the 70 years after World War II, the number of volcanoes that erupted every year has ranged from 3 to 8, with no particular tendency toward increase or stagnation (Fig. 1). In terms of the number of erupted volcanoes, comparison with the prewar data is not very useful because the Japanese Meteorological Agency (JMA) has been successfully monitoring volcanoes only after World War II,.

On the other hand, comparisons of the past hundreds years are significant in terms of the magnitude of large-scale volcanic eruptions. Large-scale eruptions are almost certainly recorded in literatures and geological strata even if small-scale eruptions may be missed.

In the 17th to 19th century there were 4 to 6 eruptions with over 800 million tons of ejecta or lavas per century. However, there were only 2 large scale eruptions in the 20th century, Sakurajima eruption in 1914 and Hokkaido-Komagatake eruption in 1929. Only much smaller eruptions occurred for almost 100 years. The largest eruption after the 1929 eruption of Mt. Hokkaido-Komagatake was the 500 million ton eruption of Mt. Fugen in Unzen during 1990 to 1995, accounting for only about half of the previous large-scale eruption. The largest eruption in the past 20 years was that of Nishinoshima from 2013 to 2017, at 400 million tons of lavas. The eruption at Owakudani, Hakone in 2015 was extremely small at 100 tons of ejecta.

In particular, few recent eruptions have affected residential areas, and most of the victims are climbers and tourists who approached the crater area. 63 people were killed in the eruption of Mt. Ontake and 1 in the eruption of Mt. Moto-Shirane of Kusatsu-Shirane. Since 2007, volcano alert levels have been introduced for major active volcanoes in Japan. The above two fatal eruptions were at Level 1, and no warning was issued before the eruption. Both were phreatic eruptions, indicating that it is difficult to detect signs of phreatic eruptions in advance.

The basis of volcanic disaster mitigation in Japan is an early warning system consisting of

monitoring by the Japan Meteorological Agency and volcano alert levels, but the system is quite different from other countries, such as Italy, USA and Indonesia. The first difference is that the volcano alert level is linked to the disaster prevention action to be taken, the second is that observation data by JMA alone is not sufficient for volcano monitoring, and a number of research institutions including universities provide various observation data, and the third is that JMA, which is in charge of volcanic monitoring, has few volcanologists.

There are similar alert levels in other countries, but they are strictly related to volcanic activity and do not correspond to disaster prevention actions. This difference is due to the fact that in other countries, volcanic disaster mitigation is dealt with by a dual system of monitoring surveys by research institute and crisis management organization which provides advice on evacuation actions, while Japan does not have a specialized organization for crisis management. Therefore, JMA, which is primarily responsible for volcano monitoring, needs to be involved in disaster mitigation activities.

The biggest problem is that JMA, which is in charge of monitoring volcanoes, seldom recruits volcanologists and, even if they adopt volcanologists, seldom treats them as experts on volcanoes. For this reason, there is Coordinating Committee for Prediction of Volcanic Eruptions; however this is a temporary and voluntary involvement, and the problem has not been solved.

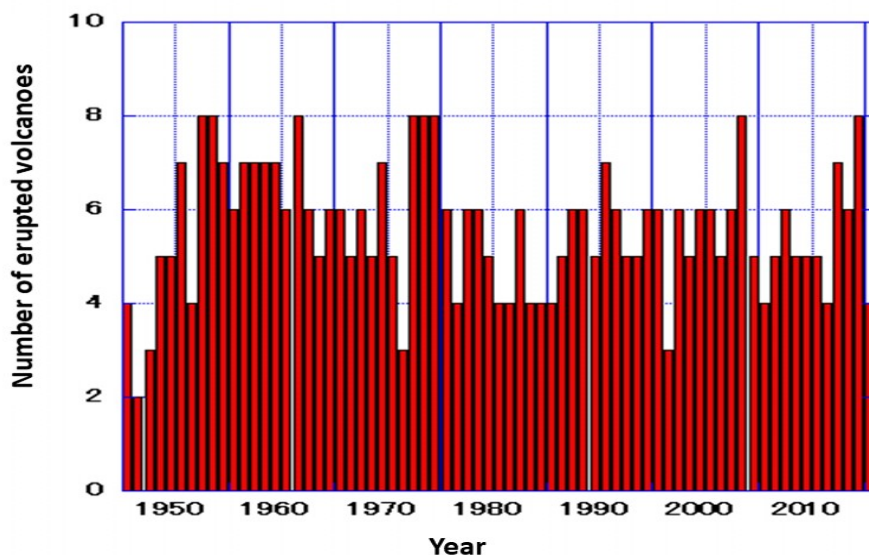


Fig1. Variation of annual number of erupted volcanoes in Japan