

## Processes of supposed next eruptions and relevant observation systems at Kuju volcano, central Kyushu, Japan

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The phreatic eruption occurred on 11 October, 1995(erupted volume=20000m<sup>3</sup>) and the second phreatic eruption occurred in the middle of December, 1995(erupted volume=5000m<sup>3</sup>) at Kuju volcano. After that, the large steam discharge has been continuing without obvious changes of surface activities, although an earthquake swarm activity and a small inflation event of the central part of the volcano occurred from March to May, 1996. However, the steam discharge from the new craters ended almost by 2005.

At present, it is very important to consider the next eruptions. In this paper, we summarize the records of volcanic eruption in historic and geologic times and also discuss the possibilities of future eruptions at Kuju volcano and the relevant observation systems.

The volcanic eruptions at Kuju volcano are classified into three categories. The first is the pyroclastic eruptions which occurred three times since about 0.15Ma at intervals of about several tens of thousands years. The second is the dome formation eruptions which occurred many times since 0.02Ma at intervals of about 1500 years. The third is the historic phreatic eruptions at intervals of several tens to 100 years.

The former two types of eruption may occur in the geologically near future but it will be possible to predict such eruptions because the large magma will move in the shallow crust. Therefore it will be very important to predict the phreatic eruptions. Such phreatic eruptions may occur several tens later from simple statistics. The problem is whether we can detect precursors to predict eruptions or not. We think that this is possible from the recent study results which we experienced before and after the 1995 phreatic eruptions. The following precursors are expected to appear one after another.

- 1) Increase in fumarolic activity and decrease in seismic activity since about ten years before the eruption
- 2) deep earthquake swarm activity which shows the uprising magma (several months before the eruption)
- 3) Increase in volcanic steam discharge with the rise of magma
- 4) Inflation of the central part of the volcano
- 5) Decrease in hot spring water discharge and increase in magmatic component
- 6) demagnetization of the volcano
- 7) Increase in the shallow seismic activity beneath Kuju-iwoyama (about one month before the phreatic eruption)
- 8) Increase in fumarolic activity
- 9) Acceleration increase in fumarolic activity (just before the phreatic eruption)
- 10) Phreatic eruption

We believe that we can predict the next phreatic eruptions if we will continue several geophysical and geochemical observations such as thermal, seismic, magnetic, geodetic etc. as conducted at present.