Recovery processes of the thermal and stress fields after 1995 eruption of Kuju volcano,central Kyushu,Japan

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Kuju volcano in central Kyushu began to erupt on 11 October, 1995 and the volcanic gas discharge from the new craters is still large even about five years after the eruption. Both before and after the eruption we have been conducting seismic and geothermal observations in and around the fumarolic field and the new craters. As a result, it became clear that the trends in seismic and geothermal activities have changed between before and after the eruption. This means that the thermal and stress states of the volcano are recovering after the eruption.

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(A)Seimic activity

Microseismic observations(Tripartite net) were conducted around the active fumarolic field. An active seismic zone was detected just beneath the active fumarolic field down to about 1.5km depth. The origin of such anomalous microearthquake activity may be high pore pressure due to rising hot fluids. Until the middle of 1980s, the micoseismic activity was active and the daily frequency was about ten. However, the microseismic activity decreased quickly(about two events/day) in 1988 and it continued until just before the eruption. After the eruption, the microseismic activity increased gradually up to eight events/day in 2000. The shallower microseismic activity increased after the eruption.

(B)Fumarolic temperatures

The temperatures of the new craters and the pre-existing fumarolic field were monitored by a thermal imagery apparatus, an infrared radiation thermometer and thermistor thermometers.

(1)Temperature changes before the eruption

The fumarolic temperatures were so high in 1960 at the pre-existing fumarolic field(A, B and C-regions), but the temperatures began to decrease gradually after that. However, in the middle of 1980s, the temperatures began to increase until before the eruption(The maximum temperatures are 300 degree C at A-region, 200 degree C at B-region and 300 degree C at C-region, respectively).

(2)Temperature changes of the pre-existing fumarolic field after the eruption

The temperatures at B-region decreased gradually just after the first eruption. However, it did not change after the second eruption. And it began to increase gradually after the summer of 1997. However, after that it began to decrease again. The temperature at C-region decreased quickly just after the first eruption and it became below 100 degree C about two years after the first eruption. The temperature was affected by the first eruption. However, it did not change at the second eruption.

(3)Temperature changes of the new craters after the eruption

The crater temperatures increased quickly just after the first eruption but it decreased rapidly just after the second eruption. The it began to increase gradually. After that it began to decrease again gradually. The patterns of temperature change at the pe-existing fumarolic field and at the new craters are very similar each other after the summer of 1997. This shows that the paths of uprising magmatic gases for the pre-existing fumarolic field and for the new craters may be combined about two years after the second eruption.

The both trends of temporal changes in seismic activity and fumarolic temperature changed after the eruption. This means that the thermal and stress state of the volcano are recovering after the eruption.