

SVC049-05

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## Conceptual and numerical models of the hydrothermal system at Unzen volcano

Sachio Ehara<sup>1\*</sup>, Hiroaki Koga<sup>1</sup>, Tatsuya Wakeyama<sup>1</sup>

<sup>1</sup>Kyushu University

There are three main active geothermal manifestations, that is, Obama hot springs (Natural heat discharge rate  $Q=50\text{MW}$ ), Unzen fumarolic field ( $Q=21\text{MW}$ ) and Shimabara hot springs ( $Q=0.4\text{MW}$ ) from west to east across Unzen volcano, western Kyushu, Japan. A geothermally altered zone is also found on the western flank of the volcano. There are no active geothermal activities at the surface but subsurface temperatures show higher than 240 degree C at a depth of 1000m.

Ohta(1972,1973) presented a comprehensive hydrothermal model based on the discharging of magmatic emanations from the deep magma reservoir beneath Tachibana Bay which is located west of Unzen volcano. The above three geothermal manifestations were generated by transfer of magmatic emanations from west to east and also by differentiation of magmatic emanations. Ohta(2006) presented a modified model later but the essential idea of geothermal fluid flow is the same as the previous model.

Ohsawa(2006) and Fujimitsu et al.(2006) pointed out contribution of lateral flows. Fujimitsu et al.(2006) constructed a numerical model to generate three main geothermal manifestations and a deep high temperature zone with two heat sources beneath the western flank of Unzen volcano. However, it was very difficult to simulate the observed natural heat discharge rates, especially in the Obama hot spring area.

Therefore we constructed new conceptual and numerical models with another heat source beneath Obama hot springs. The presented model well simulated the patterns of geothermal fluid flow and the observed heat discharge rates. The new model with three heat sources beneath the western flank generated all the four geothermal features on Unzen volcano.

Keywords: Unzen volcano, hydrothermal system, conceptual model, numerical model