

Estimating Thermal structure of under Wakamiko Crater in Aira Caldera

Keiko Fujino[1]; Sachio Ehara[1]; Toshiro Yamanaka[2]

[1] Earth Resources Eng., Kyushu Univ.; [2] Fac. Sci., Okayama Univ.

Shallow submarine hydrothermal activities have been confirmed in Wakamiko Crater in Kagoshima bay, south Kyushu, Japan. It is thought that Wakamiko Crater is one of the craters formed by the past eruption of Aira volcano. In this area, we carried out heat flow investigation during 2005 to 2008 by the research cruises of JAMSTEC (Japan Agency for Marine Earth Science and Technology).

In these cruises, we got the 92 points of thermal gradient and 13 points of thermal conductivity. The bottom part of Wakamiko Crater has characteristic areas where the big spear type instrument (about 800kg, 4.5m) for heat flow measurement could not penetrate the seafloor. By the submersible research, we found complicated structures of small mound and depression. In the western part of the seafloor, there are many white patches and many small depressions (about tens of cm) like craters. In the central part of Wakamiko Crater, hydrothermal mound changed after the last visit in 2005. We assume that the change in the structure occurred with the volcanic activity of Wakamiko Crater. This area has extremely high heat flow values higher than 1000mW/m^2 (21 points). There is a trend that heat flow values suddenly decrease toward the surrounding area.

These observed heat flow values may be affected bottom sea water temperature variations because this area is very shallow. Therefore the temperature variation influence is up to about 200mW/m^2 (. However, we observed many higher heat flow values than 1000mW/m^2 .

We used HYDROTHERM Version 2.2 for numerical simulation to understand the thermal structure of Aira Caldera. Our simulation results could not explain the surface high heat flow only from the magma chamber at 10km depth. These extremely high heat flow values could be explained by introducing the high permeability structure.