Distribution of heat flow in the Wakamiko crater of Kagoshima Bay

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The Wakamiko crater in Kagoshima Bay is one of the active submarine volcanos, which is located adjacent to the active volcano Sakurajima. In the Wakamiko crater fluid emanation from a small sediment mound has been found associated with the well known submarine fumarolic bubble emissions which is called as 'Tagiri'. In this area, evidence of high-temperature hydrothermal activity such as authigenic pyrite and hydrothermal petroleum occurrence was reported. On the NT05-13 Cruise, in August, 2005, we measured thermal gradients at 19 points within the Wakamiko crater by an unmanned submersible, 'Hyperdolphine'. Among these points, the highest value (2.7∗10ˆ2K/m) was obtained from the site adjacent (within 1m) to the sediment mount emitting hydrothermal fluid, which is located in the central part of the crater. And the lowest value (0.1K/m) was obtained at a point 1.5km far from the site where the maximum value was observed. The temperature gradients tend to decrease from the central part of crater toward the rim. Based on these results we drew a contour map of the thermal gradients. The high temperature gradients over 1.0 K/m are distributed in the central area of about 1 km in diameter within the crater. Although the ambient water temperature fluctuation was as large as 0.1K in half a day due to shallow water depth (about 200m), the observed thermal gradients are large enough to exceed the ambient temperature variation. Moreover, the temperature gradients at two observation points near the hydrothermal mound show the convex profiles, which suggest upward hydrothermal fluid migration. The sea floor in the Kagoshima bay is considered to be covered with thick volcaniclastic sediment, mainly pumice fragment, because of the repeated volcanic activity around area, and, therefore, the sedimentary layer is more permeable than muddy deposits. Thus an active hydrothermal circulation could be expected to develop in this area. We will also show the result of heat flow observations planned during KT06-2 Tansei-maru Cruise from February to March, 2006.