

NW-SE trending graben structure and crater row on Teishi Knoll, off Izu Peninsula

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Teishi knoll, located 4 km off eastern Izu Peninsula, is submarine volcano of the Higashi-Izu monogenetic volcano group. Hydrographic and Oceanographic Department of Japan Coast Guard (JHOD) monitors and surveys the maritime and submarine volcanoes in Japan and we conducted bathymetric survey of Teishi knoll with survey vessel and autonomous underwater vehicle (AUV). Though intensive bathymetric surveys were done after the 1989 eruption by JHOD (Oshima et al., 1991), the resolution of used echo sounder was lower than the latest one and the detailed morphology was not mapped. Our survey revealed that NW-SE trending graben structure formed on the Teishi knoll. In addition, four small craters were aligned with same NW-SE trending as graben. These surface deformations such as graben and crater row indicate behavior of magma in the subsurface.

1. Method

The survey was conducted in December 2014. Multibeam echo sounder EM302 installed on S/V Kaiyo and interferometric sonar GeoSwath Plus on AUV GondouS were used.

2. Result

The graben formed just southeast of the main crater. The length is 120 m, width 70 m and 1.5 m deep. The four small craters formed inside the main crater associated with 1989 eruption. The craters are aligned in the NW-SE direction and each crater has 20?50 m in diameter. NW-SE trending linear topographic high also formed between the graben and craters.

3. Interpretation

Yamamoto et al 1991 concluded that magma intrusion into the sediment blanket caused the eruption, vapor explosion. Okada and Yamamoto 1991 concluded that the tensile fault, N125E strike (?NW-SE) caused the magma intrusion to sedimentary layers. The relationship between magma intrusion and surface deformation and the depth of the top of the dike is approximately equal to half the width of graben (Mastin and Pollard 1988; Chadwick and Embley 1998). The relationship was applied to our result in the Teishi knoll. The graben width 70 m implies that the top of the dike beneath the graben was at about 35 m depth. There are no direct evidences that the graben formed associated with 1989 eruption. Considering that the crater row is aligning in same NW-SE direction, same width 70 m and lying on the same line as graben, the graben might be formed in the identical environment, that is 1989 eruption with dike intrusion.

Keywords: Higashi-Izu monogenetic volcano group, bathymetry, multibeam echo sounder, graben, crater row, dike

