

Aeromagnetic Constraints on the Subsurface Structure of Unzen Volcano.

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Aeromagnetic analyses have been conducted in and around Unzen Volcano, Kyushu, Japan, in order to reveal the subsurface structure of the Unzen graben. First, we applied a magnetization intensity mapping method to analyze aeromagnetic anomalies of the central part of the Shimabara peninsula. Magnetization highs and lows correspond to Older and Younger Unzen, respectively. It becomes about 4.5 A/m in the area covered with Older Unzen volcanics (0.15-0.5 Ma), and about 1.0 A/m in Younger Unzen, however, Mayu-Yama volcano is exceptionally high (6 A/m). Moreover, it turns out that Pre-Unzen volcanics or localized hydrothermally altered areas shows magnetization lows (about 1 A/m). Next, the magnetic boundary analyses were performed, and the results show remarkable dislocations of the western part of Chijiwa fault and Fukae fault among the main faults which forming the Unzen graben. Third, magnetic models were constructed from aeromagnetic anomalies, drilling data and the result of magnetization intensity mapping. Finally, after these results are discussed from geological, tectonic and geothermal aspects, it clarified also from a viewpoint of magnetization structure as pointed out by the result of other geophysical data that Unzen graben has the feature of half-graben, which northern fault fallen in the western Unzen region and southern fault fallen in the eastern Unzen region.

Next, we conducted the more detailed magnetization intensity mapping around Fugen-Dake using the data in 2002. This map shows good agreement with the geologic features, especially the hydrothermal alteration zone and the collapsed pyroclastic deposits. In addition, even in the area covered by lavas, the magnetization intensities show various values corresponding to each eruption event. It may be considered that the differences in magnetic properties reflect different oxygen fugacity in rocks during their cooling time period. Local magnetization lows on Heisei-Shinzan suggest that the Heisei lava produced by the 1991-1995 eruption has not yet been cooled enough.