

Gravity survey on and around Adatarata volcano, northeastern Japan

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Adatarata volcano is a group of andesitic stratovolcanoes, consisting of Mts. Osho (1602 m), Adatarata (1700 m), Minowa (1718 m) etc. Although the disaster by the 1900 eruption and recent geothermal activities are well known, no study has been done on the subsurface structure of the volcano.

We carried out gravity measurements at 192 stations using a Scintrex CG-3M. By applying corrections for the scale factor and daily drifts of the meter, gravity data with accuracy better than 0.1 mgal were obtained. The 3-D coordinates of each station were determined by a quick-static GPS survey. Using the data obtained above and the data from the gravity database of GSJ, we studied the Bouguer anomaly distribution over the area 37.50-37.75N by 140.125-140.50E. The values of Bouguer anomaly at 904 stations were calculated by using the DEM with 50-m or 10-m interval for terrain correction, which improved the accuracy of correction by 0.5 mgal or more at many stations.

The Bouguer anomaly map obtained assuming the density to be 2300 kg/m³ indicates that there exists only a weak high anomaly with the max. of 4 mgal at the southern and central parts of Adatarata volcano. No other significant anomaly is observed. Based on the Bouguer anomaly map, we tried to reveal 2-D density distributions up to a depth of 5 km along several vertical sections. The target section was divided into small blocks and the densities at the blocks were iteratively searched. The obtained density models indicate that 1) the density of volcanic edifices is relatively low (ca 2100 kg/m³), 2) the shallow parts just beneath Mts. Osho and Adatarata are filled with heavier material (2300 kg/m³), and 3) the deeper parts at the depths of 2-5 km beneath Mt. Osho are also occupied with heavier material (2600 kg/m³) compared to the surroundings. The vertical distributions of high density materials found beneath Mts. Osho and Adatarata may indicate the traces of magma feeding systems.