

Shallow geological structure in the northern part of the western marginal faults of the Kitakami Lowland, Japan

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The western marginal faults of the Kitakami Lowland are comprised of subparallel active faults along the eastern rim of the Ou Back-bone Range, northeast Honshu, Japan. The hanging wall of their most western fault includes basement rocks and lower Miocene. To the east of the faults, the lower Miocene is found 1000 m deep in boring cores (Okami et al., 1988), so the vertical displacement of the faults is more than 1000 m. We modeled two dimensional shallow geological structure across the faults mainly based on gravity survey.

The gravity survey was conducted with a G-type gravity meter (G497; LaCoste and Romberg Inc.) along two E-W survey lines, one of which is ca. 6 km long, across the faults (line 1), and the other of which is ca. 5.3 km long (line 2). Along line 1, a rock body of Pliocene andesite is distributed.

Each interval of observation sites is about 200 m. The elevation of observation sites was surveyed with a total station. Error of elevation is up to 40 mm. Acquired gravity data was processed to obtain Bouguer anomaly mostly according to the methodology of Geological Survey of Japan, AIST (2004). We assumed that the density for Bouguer and terrain corrections were 2100 kg/m³.

The Bouguer anomaly in line 2 monotonically decreases from east to west. The anomaly in line 1 similarly decreases 20 mgal to the east, and increases near the andesite body. It then decreases around the faults and increases to the west in the Ou Back-bone Range. After trend correction using the anomaly along line 2, we assume three layers in our model, which have densities of 2650 kg/m³ (layer 1), 2500 kg/m³ (layer 2) and 2100 kg/m³ (layer 3), respectively.

The Interpretation of the model is as follows. (1) Layer 1 is correlated to the basement rocks and the lower Miocene distributed in the hanging wall. (2) Layer 2 is to Pliocene sedimentary rocks. And (3) Layer 3 includes middle Miocene andesitic pyroclastic rocks and Pliocene andesite. We will discuss the shallow structure across the faults in detail.

References

Geological Survey of Japan, AIST, 2004, Gravity CD-ROM of Japan.

Okami et al., 1988, J. Geol. Soc. Japan, 94, 141-143.

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