

Shallow geologic structure around the northern part of the Futaba Fault, northeast Japan, based on gravity survey

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The Futaba Fault, bounding the eastern margin of the Abukuma Mountains, is known as a left lateral fault in the Cretaceous and Paleogene period with a remarkable fracture zone of a few hundreds meter width. It trends NNW-SSE and divides into two branches between which the Wareyama horst develops. During early to middle Miocene, E-W extensional stress field caused large normal displacement along the western fault to form a half graben filled with sediments including breccia. In late Miocene, it had been a right lateral fault. In present, the eastern fault is active, along which left lateral offsets with western upheaval ingredient are geo-morphologically observed. Thus the Futaba Fault has experienced the complicated history of development. In this study, we modeled two dimensional shallow geological structure across the faults mainly based on gravity survey. The gravity survey was conducted across the faults with a G-type gravity meter (G827; LaCoste and Romberg Inc.) along two E-W survey lines, one of which is ca. 12 km long, (line 1), and the other of which is ca. 13km long (line 2). Each interval of observation sites is about 200 m. The elevation of observation sites was surveyed with a electric level and a RTK-GPS. 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 2.2 g/cm³. In each survey line, Bouguer anomalies after trend correction show the highest value around the Wareyama horst consisting of pre-Paleogene basement rocks and a few maxima in the western side of the horst. We assume four layers in our model, which have densities of 2.00 g/cm³ (layer 1), 2.2 g/cm³ (layer 2), 2.55 g/cm³ (layer 3), and 2.67 g/cm³ (layer 4), respectively. The interpretation of the model is as follows. Layer 1 is correlated to the surface covers and Pliocene sedimentary rocks, layer 2 lower to middle Miocene sedimentary rocks, layer 3 Miocene breccia and layer 4 basement rocks. We will discuss the shallow structure across the faults in detail.

Keywords: Futaba fault, gravity anomaly, active fault