

Gravity structure of calderas around Lake Numazawa, Fukushima, northeast Japan

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1. Gravity anomalies

Some main features of Bouguer anomalies as follows: A major gravity low with about 8km diameter, accompanied by a steep gradient in the border zone, is found around Lake Numazawa. It is considered as a caldera, Uwaigusa caldera (Uw), with big-scale depression or basement-collapse caused by volcanic activities. A high anomaly area extends from Dogon Mountain to Takamori Mountain, which may correspond to the upheaval of basement, for example granite.

2. Residuals of gravity anomaly

Residuals of gravity anomaly is effective for comparing with shallow geological structure. Negative residuals area is found out in the northwestern part and it corresponds to the Uwaigusa caldera(Uw). The feature of depressed basement in the caldera is not flat, and it also turned out that it is rich in ups and downs. Furthermore, a northeast part also shows a negative area, and it corresponds to Sunagohara caldera (Sn). But there is not so characteristic feature in the southeastern part corresponding to Iriyamazawa caldera (Ir). The surface density around Lake Numazawa is estimated to be 2.4 g/cm³ according to the result of the surface density analysis. But its result appears to be a little big compared to dacite of Late Pleistocene, which distributes in the caldera, so it is estimated that high-density lava exists in the shallow place.

3. Gravity basement

A three-dimensional gravity basement was analyzed assuming a two-layer model composed of a surface layer with a density of 2.3g/cm³ and a basement with a density of 2.65g/cm³. The basement map, Fig.1, shows that the depth is often more than 2km in the central area of Uwaigusa caldera (Uw). It shows that pyroclastics or lake-deposit layer of low density is thickly deposited there. The shape of the basement of Uwaigusa caldera is rich in ups and downs, and the rim has a steep slope. It shows that the caldera was formed of a big basement collapse rather than a simple huge explosion crater.

