

Gravity anomaly on the Mashu Caldera

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<http://terra.riko.shimane-u.ac.jp/komuro/index.html>

The Mashu caldera was produced about 7,000 years ago after the catastrophic eruption of pumice flow from a pre-caldera basaltic to andesitic stratovolcano in the eastern Hokkaido. The steep caldera rims embrace Lake Mashu with a diameter of 5*7 km and 210 m deep.

Bouguer gravity anomaly observed on frozen lake surface in winter shows low gravity anomaly well fitting the caldera. The value of the proximal gravity anomaly is 12 mgal lower than that of the distal anomaly of the caldera. Although the terrain correction was calculated by 50 m grid DEM (GSI, 1999) which does not include water depth data of lakes. However, the water volume of the lake may be too large to be replaced with mean density rock, because the maximum depth of the lake reaches 210 m.

I made a 10 m grid DEM digitized from the water depth map of Lake Mashu on a scale of 1/10,000 for the estimation of water gravitation. The Bouguer gravity anomaly after modification of the effect of the water gravitation exhibits no anomaly on the Mashu caldera.

This result suggests that caldera fills are neither pyroclastic flows nor fall backs but water of the caldera lake. Namely, the Mashu caldera is an 'empty' caldera.