

Erimo Project: Absolute/precise gravity survey and continuous GPS measurement

Taka'aki Taira[1], Junji Koyama[1], Ryou Honda[1], Tokumitsu Maekawa[2], Hiromitsu Oshima[3], Masamitsu Takada[4]

[1] Earth and Planetary Sci., Hokkaido Univ., [2] Inst. Seismology and Volcanology, Hokkaido Univ., [3] Usu Volcano Observatory, Hokkaido Univ, [4] Inst. Seismology and Volvanology, Hokkaido Univ.

We have conducted absolute/precise gravity survey and continuous GPS measurements in the vicinity of Erimo Peninsula, Hokkaido. High-speed sampling GPS observations have been made since 1998 at the Kazenoyakata located at the point of Erimo Peninsula and at the Tide-gauge station, Port of Erimo. Precise gravity surveys have been made since 2000 at twelve sites (2001 at thirteen), where two of our continuous GPS stations, two GEONET stations and eight temporal sites on triangulation points, Geographical Survey Institute of Japan. The absolute gravity measurement has been done on September 2001, at Erimo Geophysical Observatory, Hokkaido University (ERM1). Our continuous and parallel measurement of gravity and crustal deformation by GPS would provide the insight into the dynamic tectonic activity in this area.

Absolute gravity measurement by FG5-L (Micro-g Solutions, 2000) was made in the ERM1. One session of 100 times measurements at 20 sec interval gave the standard deviation of about 10 μ gal. Twenty sessions made a one-day file of the measurement and the precision of about 2 μ gal has been estimated. This would enable us to detect about 1 cm elevation change in one day by this kind of the absolute gravity measurement. The absolute value of 980327789 μ gal is obtained in this measurement.

Repeat measurements of precise gravity in 2000 and 2001 reveal spatial pattern of gravity changes in this area, which is positive change in the western side and negative change in the eastern side of the peninsula as much as 42 μ gal.

There still remain some ambiguities in the vertical deformations, however, horizontal deformations at all observation sites about 2.0cm/yr are obtained in the North-Western direction. This is consistent with the deformation vector using the triangulation by Geographical Survey Institute of Japan (Tada and Kimura, 1987).

In order to estimate the pseudo real-time crustal deformation due to the plate tectonics in this area, we are planning continuous absolute gravity measurement at ERM1 and continue more precise GPS observations in the vicinity of Erimo Peninsula.