

## Interpretation of gravity surveys in Fukuoka city, southwestern Japan

# Hakim Saibi[1]; Jun Nishijima[1]; Yasuhiro Fujimitsu[1]; Sachio Ehara[1]

[1] Earth Resources Eng., Kyushu Univ.

Fukuoka area is located in the southwestern part of Japan, between latitudes  $33.5^{\circ}$ - $33.75^{\circ}$ N and longitudes  $130.25^{\circ}$ - $130.5^{\circ}$ E. This area has some low-temperature geothermal systems. Fukuoka area was covered by gravity surveys using Scintrex CG-3 and CG-3M gravimeters during the period 1996-2007. The total number of gravity stations is 1590 over the survey area covering approximately  $300 \text{ km}^2$ . The average spacing between gravity stations is 50 m to 2 km. The Bouguer gravity data has been analyzed using some integrated gradient interpretation techniques such as: horizontal gradient (HG), tilt derivative (TDR), Euler deconvolution method, and filtering methods. The combination of the three methods will enhance the structural definition of the study area. The TDR has the advantage of responding well to both shallow and deep sources and the map of TDR recognizes the horizontal location and extent of sources. The location of the maximum HG may be used as an indicator of the location of edges of the source. The Euler solutions give the depths of sources. The aim of this study is to delineate the subsurface structure of Fukuoka area.

Fukuoka city is characterized by two specifications: 1) existence of some low-temperature geothermal systems localized in the southern part of Fukuoka city, exactly in Yokote-Ijiri area and 2) existence of the Kego fault, one of the main active faults in Fukuoka area. The studied area was struck by a strong earthquake on March 20, 2005 ( $M_{JMA}7.0$ ) at depth (9 km<sub>JMA</sub>) and a  $M_{JMA}5.8$  aftershock on April 20. From previous geosciences studies, the earthquake occurred along the extension of Kego fault under the sea of Genkai, running from the northwest to southeast. This study also delineated the Kego fault, which is a new improvement for the people working on seismology of the area. The results of this study helped to lead the good understanding of the relation between the interpreted faults and the location of the low-temperature geothermal systems and possible future geothermal exploration in the area.

There are four major faults patterns (N-S, E-W, NE-SW, NW-SE) characterizing the study area. The results showed a relation between the structural pattern and locations of the hot springs at Fukuoka area. The hot spring waters emerge along fault lineaments within Fukuoka area. Fukuoka area is dissected by major faults striking in the E-W, and NW-SE direction. The depth of these faults calculated by Euler deconvolution was less than 500 m. From the statistical analysis of the interpreted faults, some important information about the tectonic setting of the study area were obtained:

1-The lineaments in NW-SE direction are of high length (2420 m), while the lineaments in E-W direction are of short length. From the cross-cutting relationships, the lineaments in NW-SE direction are newer (geological time) than the lineaments in E-W direction.

2-In the NW-SE direction, many faults in this direction with 10 degrees of shift toward the north or to the west due to the tectonic reactivation were observed.

3-The faults in the NW-SE direction were tectonically reactivated. It can be seen in recent earthquakes happening in this area, caused mainly by the Kego fault (NW-SE direction).

The obtained structural map is suitable for planning of geothermal research in Fukuoka area.