[EE] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-TT Technology & Techniques

[M-TT35]HIGH-DEFINITION TOPOGRAPHY AND GEOPHYSICAL DATA ANALYSIS

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High-definition, or high-resolution data of earth surface topography and geophysical properties have become widely available for better understandings of the earth surface processes and dynamics. Here in this session, we accept discussions on high-definition topographic and geophysical data, including its theory, acquisition, archiving, processing, modeling and analysis. The approaches may include applications of, but not limited to, laser scanning, SfM-MVS photogrammetry, GNSS positioning, SAR interferometry, multi-beam sonar, geomagnetics and electromagnetics sensors based on terrestrial (fixed or mobile) and aerial (UAV or manned airborne) platforms.

[MTT35-P03]Estimation of strike-slip fault location by means of gravity gradient tensor

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In general, it is difficult to detect a pure strike-slip fault location using gravity anomalies, because the pure strike-slip fault motion does not make a structural boundary with conspicuous density contrast. In this study, we suggest a new method to estimate the location of the strike-slip fault using gravity gradient tensor.

Because if there is a fault under the surface, gravity anomalies change at that location, gravity survey has been employed well to estimate the fault location. In order to clarify the spatial changes of these gravity anomalies, their horizontal gravity gradient and vertical gravity gradients have often been employed. Structural sudden change such as fault structure is called edge, and the horizontal gravity gradient and the vertical gravity gradient which extract the location of the edge are called edge emphasis method. In recent years, more sensitive edge emphasis techniques such as TDX, ILP, CLP and THVH have been researched and developed (e.g., Cooper and Cowan, 2006; Ma, 2013; Li et al., 2014; Zhang et al., 2014). However, since these are aimed at extracting structural boundaries with density contrast, they will not be suitable for estimating the location of a strike-slip fault. It will be difficult to estimate its location by an independent use of them at least.

In this study, we first estimate the gravity anomaly and each component of gravity gradient tensor due to the strike-slip fault motion by dislocation modeling and tried to develop an extraction method of the location of the strike-slip fault by combining existing edge emphasis method. We assumed that gravity anomaly and each component of the tensor are formed by an accumulation of the gravity and gravity gradient changes due to fault motions. As is well known, effects of height change and density change due to faulting contribute in the gravity change. Since the effect of height change is corrected as the free-air correction when we obtain gravity anomaly and gravity gradient data, we can consider that observed gravity anomaly and each component of the tensor are results of accumulation of density change due to the fault motion. The effect of density change due to the fault motion has been formulated already by Okubo (1992). We employed Okubo's formula to obtain the theoretical gravity anomaly caused by the strike-slip faulting. Each component of the gravity gradient tensor was obtained from the theoretical gravity anomaly by Mickus and Hinojosa's method (Mickus and Hinojosa, 2001).

We used these data and attempted to suggest a new method to estimate the location of the strike-slip fault. As a result, it was found that the location of the strike-slip fault will be detectable by combining TDX and horizontal gravity gradient.

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