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Semi-automatic interpretation methods using gravity gradient tensor data obtained by airborne gravity gradient survey

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The importance and usefulness of gravity gradient tensor for the estimation of subsurface structures, especially to find structural boundaries, have been pointed out since the latter half of the 1930's. Presently, not only the classical methods, such as horizontal first derivative, vertical first derivative and vertical second derivative, are being used, but more advanced and complex techniques designed by combining the classical methods are being discussed and analyzed. These techniques reveal structural boundaries through a differential in the space domain of gravity anomalies caused by variations in subsurface structures; they are a kind of high-pass filters that emphasize the short wave length signals of gravity anomalies.

In general, the techniques that estimate subsurface structures from gravity anomaly without geological and geophysical constraint conditions are called semi-automatic interpretation methods. These methods not only employ high-pass filtering but also estimate causative sources by using eigenvalues and/or eigenvectors of gravity gradient tensor.

In this presentation, we will first review the filtering and semi-automatic interpretation methods that use gravity gradient tensor. Then, we will report the results obtained by applying these methods to the gravity gradient data acquired for the Kuju geothermal area of Kyushu district through FALCON (R) AGG. We will also discuss the characteristic features of these methods and improvements in their practical application.

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