Geophysical Research Abstracts, Vol. 8, 06398, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06398

Gravity gradiometry: enhanced methods for enhanced data.

G. Pajot (1), V. Mikhailov (1,2), M.-F. LeQuentrec-Lalancette (3), M. Diament (1)

1. Institut de Physique du Globe de Paris, Paris, France, (2) Institute of physics of the Earth RAS, Moscow, Russia, (3) EPSHOM, Brest, France (pajot@ipgp.jussieu.fr / Fax : +33 144277340)

Thanks to the recent rebirth of gravity gradiometry in geophysical prospecting and with the future ESA's GOCE mission, measurements of the full tensor of gravity gradients (FTGG) with high accuracy are now available for geophysical studies. We present some new tools for dealing with these new data to take full benefit of these measurements.

Simultaneous use of all FTGG components permits the development of more powerful denoising procedures. We suggested a method, based on equivalent sources approximation that analyses simultaneously five independent components of the tensor and measured gravity field. A physical criterion of compatibility between these six measurements is used to remove from the measurements the components which do not satisfy the Laplace equation. This method is applied to gravity gradiometry data from the North Sea provided by Bell Geospace.

Besides the gravity field recovery, FTGG themselves can be used to study anomalous bodies. First, an analogue to the Euler deconvolution for the tensor components, called tensor deconvolution, will be presented. It provides a solution in every measuring point, not using a sliding window; determines structural index automatically and uses all components of full gradient tensor and measured gravity field, thus reducing level of noise. The method is based on tensor invariants and thus is not sensitive to orientation errors of the measurement device. For solution selection we used simple routine criteria and clustering. Second, we will show the results of a new pseudo Monte-Carlo inversion method designed for the processing of both gravity and gravity gradiometry data.

The results we obtained demonstrate that gravity gradient measurements significantly enhance gravimetric interpretations.