Geophysical Research Abstracts
Vol. 18, EGU2016-14220, 2016
EGU General Assembly 2016

GTE: a new FFT based software to compute terrain correction on airborne gravity surveys in spherical approximation.

Martina Capponi (1,2), Daniele Sampietro (3), Fernando Sansò (1,3)

(1) DICA, Politecnico di Milano, Milano, Italy , (2) DICEA, Università di Roma La Sapienza, Roma, Italy , (3) Geomatics Research & Development, Lomazzo, Italy

The computation of the vertical attraction due to the topographic masses (Terrain Correction) is still a matter of study both in geodetic as well as in geophysical applications. In fact it is required in high precision geoid estimation by the remove-restore technique and it is used to isolate the gravitational effect of anomalous masses in geophysical exploration. This topographical effect can be evaluated from the knowledge of a Digital Terrain Model in different ways: e.g. by means of numerical integration, by prisms, tesseroids, polyedra or Fast Fourier Transform (FFT) techniques.
The increasing resolution of recently developed digital terrain models, the increasing number of observation points due to extensive use of airborne gravimetry and the increasing accuracy of gravity data represents nowadays major issues for the terrain correction computation. Classical methods such as prism or point masses approximations are indeed too slow while Fourier based techniques are usually too approximate for the required accuracy.

In this work a new software, called Gravity Terrain Effects (GTE), developed in order to guarantee high accuracy and fast computation of terrain corrections is presented. GTE has been thought expressly for geophysical applications allowing the computation not only of the effect of topographic and bathymetric masses but also those due to sedimentary layers or to the Earth crust-mantle discontinuity (the so called Moho).

In the present contribution we summarize the basic theory of the software and its practical implementation. Basically the GTE software is based on a new algorithm which, by exploiting the properties of the Fast Fourier Transform, allows to quickly compute the terrain correction, in spherical approximation, at ground or airborne level.

Some tests to prove its performances are also described showing GTE capability to compute high accurate terrain corrections in a very short time. Results obtained for a real airborne survey with GTE ranges between few hours and few minutes, according to the GTE profile used, with differences with respect to both planar and spherical computations (performed by prisms and tesseroids respectively) of the order of 0.02 mGal even when using fastest profiles.