

## Topographic-isostatic gravity effects on observables at aeroplane and satellite altitudes

A. A. Makhloof and K.H. Ilk

Institute of Theoretical Geodesy  
University Bonn  
Nussallee 17  
D-53115 Bonn  
Germany  
phone: +49 228 732629  
fax: +49 228 733029

It is well-known that the downward continuation of gravity field observations as SGG data at satellite altitude, as well as aero gravimetry data at aeroplane altitude is improperly posed. To prevent the results at geoid altitude from strong oscillations caused by observation noise it is helpful to remove those high frequent gravity field information from the observations which can be properly modelled. The subsequent regularization step dampens only the observation noise so that the downward continuation of the gravity signals can be performed in a stable manner. The high frequent gravity field can be restored in a final step. The proposal presented here is based on the modelling of topographic/isostatic effects at the Earth's surface. These effects are upward continued and transformed into SGG observables as well as aero gravimetry observations.

The topographic-isostatic masses are expanded into a series of spherical harmonics up to an upper degree of 2000. Based on the potential coefficients, the observation effects are calculated. An alternative procedure has been applied by numerical integration. The results from the direct integral method and the spherical harmonic model are compared. Different topographic-isostatic models are applied in this investigation such as Airy-Heiskanen, Pratt-Hayford and Helmert's condensation models.