



Error analysis of crustal thickness modelling using satellite gravity data

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In the last few years many studies have applied GOCE data for solid Earth applications. These studies varied in depth from basins through crustal thickness and down to deep mantle composition. The main differences between the crustal studies was on the used methodologies and, to some extent, GOCE data and models. Especially the different methodologies have been shown to result in large variations in crustal thickness even when using the same data as source.

It is, however, difficult to estimate what is a significant difference between such models since the inherent uncertainty of GOCE data for solid Earth applications is never calculated. With this study we will provide uncertainty boundaries for crustal modelling based on the GOCE TIM5 covariance matrix. Based on the TIM5 covariance matrix, different noise realizations have been calculated using a Monte Carlo simulation and added to the TIM5 model coefficients. Then each model has been processed in a similar way to retrieve crustal thickness. The resulting differences in crustal thickness are representative for the inherent uncertainty of GOCE data for crustal thickness modelling. The amplitude and spatial distribution of uncertainties will be compared to differences between various gravity derived crustal thickness models.