



Impact of the spatial distribution of GOCE SST data on the recovery of the Earth gravity field

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On the basis of GOCE SST data simulated along a 30-day perturbed orbit, we have estimated numerically two sources of errors contaminating the results of Earth gravity field determination. These are polar gaps in the data caused by the orbital inclination of GOCE and the uneven distribution of the data over altitude caused by the orbital eccentricity. The gravity models recovered from the almost noise-free GOCE positions have demonstrated that (1) up to 90% of the total geoid errors are concentrated in polar areas. This seems to be a natural consequence of the polar gaps. (2) The magnitude of the geoid errors can differ 2-3 times in opposite polar areas due to the uneven distribution of GOCE observations over altitude. (3) A combined effect of the mentioned irregularities in the GOCE data distribution can produce errors in harmonic coefficients of very first orders which are responsible for more than 95% of the total geoid errors over the Earth's surface. Besides using measured data from polar regions – the most natural way to suppress these errors – they can be reduced to a large extent by an appropriate weighting of the GOCE SST data. We have examined possible approaches for such a weighting.