



## **The tree canopy effect in high-frequency gravity forward modelling**

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SRTM DEMs and their respective smoothed reference surface are often used as upper and lower boundaries in gravity forward modelling based on the residual terrain modelling (RTM) technique. However, over vegetated areas, elevations provided by SRTM DEMs do not represent bare-ground heights, instead they contain a tree height bias due to the radar measurement. This effect will introduce errors in the computation of the RTM gravity field, and in turn, in global or regional gravity field determination.

In this study, we use the new MERIT-DEM representing bare-ground elevations, to evaluate the canopy height in the SRTM V4.1 and study its effect on the determination of RTM modelled gravity disturbance. Forest areas with tree height offsets of more than 5 m are classified and studied in terms of six main categories according to land cover map GlobCover 2009. Over test areas in South America and Australia, depending on the height of canopy and terrain type, unwanted RMS signals produced by the tree canopy account for about 2 % to 13 % of RTM modeled gravity disturbances. The largest errors of about 2 mGal were found at vegetation boundaries, e.g., of the Amazon tropical forest. Validation using ground gravity observations were performed over the Australian Alps, Tasmania, and Canadian Rocky Mountains. All validation experiments show that the bare-ground elevation model MERIT-DEM performs better than SRTM V4.1 in terms of reduction of the discrepancies between modelled and observed gravity values.