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Effect of the difference between surface and terrain models on gravity field related quantities

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Topographic masses have a strong impact on the medium and short wavelength components of the gravitational signal generated by the mass of the Earth, thus digital terrain models (DTM) are routinely involved in gravity field modelling. In this study the verification of the Shuttle Radar Topographic Mission (SRTM) and the Advanced Spaceborne Thermal Emission and Reflection Radiometer Global Digital Elevation Model (ASTER GDEM) which is a joint product of METI (Ministry of Economy, Trade and Industry of Japan) and NASA has been done by comparing them to the points of the horizontal and vertical control networks of Hungary. SRTM data fit better to geodetic ground control points than ASTER GDEM, since some artefacts have been found in ASTER elevation set which impede further use of the latter without any pre-processing. Since SRTM is an "unclassified" surface model including all those points which reflected the scanning radar signal thus tree canopy height has been compared to the differences of SRTM and DTM elevations in a hilly test area in Hungary where a local and accurate DTM having 20 m $\times$ 20 m horizontal resolution was available. Considerable agreement was indicated between forest height and model differences. Model differences were evaluated to determine their effect synthetically on gravity related quantities. Their influence on geoid height is insignificant, but the change of the investigated second derivatives of the potential is considerable.