GRAVTool, a Package to Compute Geoid Model by Remove-Compute-Restore Technique

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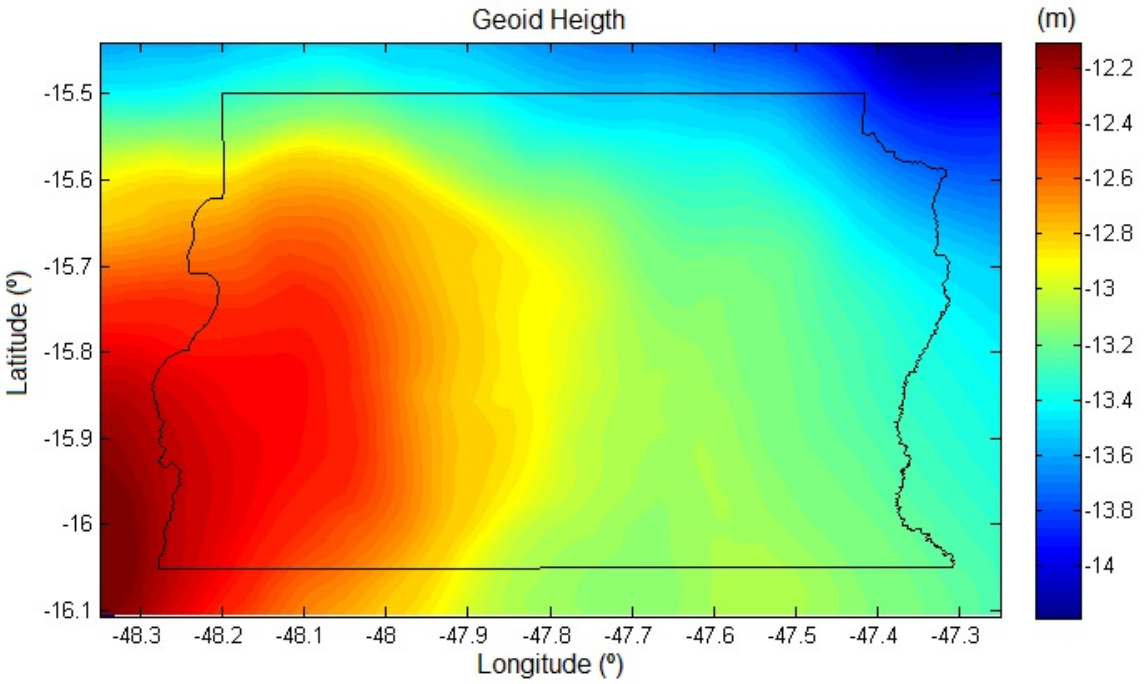
ABSTRACT

Tuesday, 15 December 2015
13:40 - 18:00
Moscone South - Poster Hall

Currently, there are several methods to determine geoid models. They can be based on terrestrial gravity data, geopotential coefficients, astro-geodetic data or a combination of them. Among the techniques to compute a precise geoid model, the Remove-Compute-Restore (RCR) has been widely applied. It considers short, medium and long wavelengths derived from altitude data provided by Digital Terrain Models (DTM), terrestrial gravity data and global geopotential coefficients, respectively. In order to apply this technique, it is necessary to create procedures that compute gravity anomalies and geoid models, by the integration of different wavelengths, and that adjust these models to one local vertical datum. This research presents a developed package called GRAVTool based on MATLAB software to compute local geoid models by RCR technique and its application in a study area. The studied area comprehends the federal district of Brazil, with ~6000 km², wavy relief, heights varying from 600 m to 1340 m, located between the coordinates 48.25ºW, 15.45ºS and 47.33ºW, 16.06ºS. The results of the numerical example on the studied area show the local geoid model computed by the GRAVTool package (Figure), using 1377 terrestrial gravity data, SRTM data with 3 arc second of resolution, and geopotential coefficients of the EIGEN-6C4 model to degree 360. The accuracy of the computed model (σ = ± 0.071 m, RMS = 0.069 m, maximum = 0.178 m and minimum = -0.123 m) matches the uncertainty (σ =± 0.073) of 21 points randomly spaced where the geoid was computed by geometrical leveling technique supported by positioning GNSS. The results were also better than those achieved by Brazilian official regional geoid model (σ = ± 0.099 m, RMS = 0.208 m, maximum = 0.419 m and minimum = -0.040 m).



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