Comparison among Gravimetric, Astrogravimetric and Astrogeodetic Geoids: Case Study for Austria

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It is used to state that all geoid determination techniques should yield to the same geoid if the indirect effect is properly taken into account (Heiskanen and Moritz, 1967). The current study compares different geoid determination techniques for Austria. The used techniques are the gravimetric, astrogravimetric and astrogeodetic geoid determination techniques. The available data sets (gravity, deflections of the vertical, height, GPS) are described. The window remove-restore technique (Abd-Elmotaal and Kuehtreiber, 2003) has been used. The available gravity anomalies and the deflections of the vertical have been topographically-isostatically reduced using the Airy isostatic hypothesis. The reduced deflections have been used to interpolate deflections on a relatively dense grid covering the data window. These gridded reduced deflections have been used to compute an astrogeodetic geoid for Austria using least-squares collocation technique within the remove-restore scheme. The Vening Meinesz formula has been used to compute an astrogravimetric geoid for Austria. Another gravimetric geoid for Austria has been determined in the framework of the window remove-restore technique using Stokes integral with modified Stokes kernel. All computed geoids have been validated using GNSS/levelling derived geoid. A wide comparison among the derived geoids computed within the current investigation has been carried out.