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Comparison between Astrogravimetric and Astrogeodetic Geoids for Austria

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It is believed that the astrogeodetic geoid determination technique gives the best geoid accuracy if well distributed deflections of the vertical sufficiently representing the gravity field feature of the area of interest are available. Such a sufficient condition is not generally achieved in practice, or at least it is rather in doubt. Alternatively, the astrogravimetric geoid determination technique can do the job if a sufficient gravity data set is available beside the deflections data set. The latter case is a more realistic scenario in practice. The aim of this paper is to compare between the astrogeodetic and astrogravimetric techniques for geoid determination in Austria. 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 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. For the sake of comparison, an astrogeodetic geoid has been computed using the original deflections of the vertical data without densification (interpolation on a denser grid). All computed geoids have been fitted to the GPS/levelling derived geoid. A wide comparison among the derived geoids computed within the current investigation has been carried out.