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Investigation of the use of deflections of vertical measured by DIADEM camera in the GSVS11 Survey

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The Geoid Slope Validation Survey 2011 (GSVS11) was conducted at 218 benchmarks located on a line between Corpus Christi and Austin, Texas. In the survey, long session GPS positioning of the benchmarks provides the ellipsoidal height with relative accuracy of $\pm$4 mm and the precise leveling and gravity survey provide the orthometric height with relative accuracy of $\pm$16 mm for the line length of 300 km. In addition, the astrogeodetic deflections of the vertical (DoV) are measured by the DIADEM camera with accuracy of $\pm$0.1 arcsecond that can be converted into a geoid profile with the similar accuracy, consequently providing another data set for geoid validation. The treatment of the topographic effect in the profile computation is discussed. In addition, ellipsoidal height differences between benchmarks along the line are computed from DoV and leveled height differences as a test of the DoV accuracy. Finally, all data are integrated to produce an accurate and reliable geoid profile for gravity field verification and validation.