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AUSGeoid09: Improved GNSS-Based Height Transfer in New South Wales, Australia

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In March 2011, Geoscience Australia released AUSGeoid09, providing an improved geoid model to relate GNSS-derived ellipsoidal heights to the Australian Height Datum (AHD71) and vice versa. We quantify the expected improvement of replacing the current geoid model, AUSGeoid98, with AUSGeoid09 in New South Wales (NSW). Four tests were performed to investigate how well these two geoid models fit known AHD71 heights, based on (1) more than 500 solutions of Geoscience Australia's online GNSS processing service (AUSPOS), (2) 38 sites of the State's continuously operating GNSS reference station network (CORSnet-NSW), (3) several GNSS-based adjustments incorporating different adjustment area sizes and various ranges in elevation, and (4) numerous height control points utilised in these adjustments. It was found that AUSGeoid09 provides a considerably improved fit to the AHD71 for GNSS-based height transfer in NSW when compared to its predecessor. The first two tests showed the root mean square (RMS) of residuals improved by factors of 2.7 and 4.1 respectively. It was shown that the magnitude of N values in NSW changes by up to 0.5 m when AUSGeoid09 is introduced. The adjustment tests confirmed these findings, evidenced by improved variance factors and reduced numbers of flagged residuals. The adjusted height control points showed an improved RMS of the residuals, generally by a factor of about 1.5 but reaching 4.6. In most cases the RMS of the AUSGeoid09-derived height results falls within the expected 0.05 m accuracy stated by Geoscience Australia.

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