The Australian Height Datum 1971 (AHD) is the basis for all physical heights in Australia, but has never been revised, despite its problems. These problems cause the AHD to be inconsistent with heights derived from Global Navigation Satellite Systems (GNSS) and gravimetric geoid models, but also inadequate for testing global geoid models and unification with any future world height system. A full investigation of AHD errors has recently been completed, which has focused on: the quality of the Australian National Levelling Network (ANLN) through a loop-based assessment; using modelled sea surface topography (SSTop) to test the influence of SSTop on the AHD’s north-south slope; the effect of height systems in Australia using EGM2008-derived surface gravity; and a combined least-squares adjustment (CLSA) of the ANLN constrained by SSTop at tide-gauges and GNSS-geoid across Australia.

The ANLN was found to contain numerous above-tolerance loop misclosures and in need of an upgrade. The north-south AHD slope is effectively removed by applying modelled SSTop at tide-gauges as a correction. Differences between Helmert orthometric and normal-orthometric heights (used for the AHD) were up to 0.44 m, but differences between normal and normal-orthometric heights were less than 0.17 m. The CLSA had an accuracy of about 0.10 m with respect to the gravimetric component of AUSGeoid09, which is a 50 per cent improvement over the AHD.