Geoid Based Height System for East Malaysia

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SUMMARY

The current height reference system, the Peninsular Malaysia Geodetic Vertical Datum (PMGVD) and East Malaysia Geodetic Vertical Datum (EMGVD) was constructed using classical levelling technique by the Department of Surveying and Mapping Malaysia (DSMM). In terms of accuracy and accessibility, the EMGVD does not satisfy today's users' needs for precise height determination. Furthermore, it pre-empts the use of modern and efficient space-based positioning technologies for both precise height determination and maintenance of the vertical reference frame. This paper describes the development of a new geoid-based vertical datum from airborne gravity data on land and in the South China Sea out of the coast of East Malaysia region, covering an area of about 610,000 square kilometre by DSMM. More than 107,000 km flight line of airborne gravity data over land and marine areas of East Malaysia has been combined to provide a seamless land-to-sea gravity field coverage; with an estimated accuracy of better than 2.0 mGal. The accuracy of the geoid based height system is estimated to be 3 to 5 cm across most of East Malaysia. The new height datum will not change the heights assigned to benchmarks as the geoid datum has been fitted to levelling datum at selected tide gauge stations across East Malaysia. Furthermore, there are no significant differences across East Malaysia levelling height datums at Kuching, Bintulu, Miri and Kota Kinabalu. A seamless land/sea geoid based-height system also will further enhance the development and management of the marine environment.