

FROM TIDE GAUGES TO THE GEOID: MALAYSIA'S JOURNEY TOWARDS A UNIFIED VERTICAL DATUM

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Abstract

Measuring height above sea level may seem simple, but ensuring that heights share a consistent reference across Malaysia remains a geodetic challenge. This presentation traces Malaysia's vertical datum development, from tide-gauge references and precise levelling to geoid modelling and Global Navigation Satellite System (GNSS) heighting. The journey begins with the Land Survey Datum 1912 and the subsequent establishment of the Peninsular Malaysia Geodetic Vertical Datum using mean sea level observations at Port Klang. Separately developed height references in Sabah and Sarawak highlight the difficulties of harmonising regional networks with different datum origins and observation periods. The presentation then explores the development of MyGeoid, from the airborne gravity surveys of 2002–2003 to the expanded offshore gravity coverage supporting MyGeoid 2022. It highlights how terrestrial and airborne gravity data, global gravity field models and terrain information support geoid determination, enabling GNSS ellipsoidal heights to be converted into orthometric heights for practical applications. Looking ahead, key considerations include compatibility with existing datums, benchmark reliability, differences between gravimetric and locally fitted geoid models, and changes in sea level and land elevation over time. Malaysia's experience provides practical lessons for advancing a unified vertical reference, supporting reliable surveying, infrastructure development, coastal management and the integration of land and marine geospatial information.

Keywords: Vertical Datum Modernisation; Mygeoid; Tide Gauges; Gravimetric Geoid; GNSS Heighting; Vertical Datum Unification.