

Converting Digital Number into Bathymetric Depth: a Case Study over Coastal and Shallow Water of Langkawi Island, Malaysia

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SUMMARY

Over the years, hydrographic surveyors used lead lines, sounding pole, wire drag and sounding machine to collect the bathymetry data. To date, the vessel-based echo sounding surveys such as SBES and MBES are widely used in hydrographic surveying around the world. Nonetheless, these vessel-based acoustic sonar methods are constrained by limited ground coverage, difficulties to access shallow coastal water, labour intensive and high operating cost which significantly limits the frequent repetitions. The advancement of the satellite-derived bathymetry has brought in new revolution in hydrography. The paper highlights the application of state of the art latest remote sensing based technology in combination with geographical information system (GIS) for extraction of bathymetric information from the newly commenced Landsat 8 satellite imagery. In this study, the ratio transform attempt proposed by Stumpf et al. was applied on the newly commenced Landsat 8 image to convert the digital number (DN) over the coastal and shallow water area into bathymetry depth to produce a bathymetry map of Langkawi Island, Malaysia. The average uncertainties obtained was 1.521 m, where the highest RMSE recorded was of 3.758 m, while the lowest RMSE was of 0.024 m. Additionally, the correlation coefficient between the estimated depths and endorsed bathymetry data was 0.9054. The results indicated that satellite-derived bathymetry technique can be beneficial as a reconnaissance tool to the vessel-based echo sounding survey for shallow water and coastal bathymetric mapping. Bathymetric mapping from optical multispectral images for instance offers a fast, flexible, efficient and economically advantageous solution to map the seabed topography over broad areas.

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