

# Multi-Layer Optimisation Technique (M-Lot) for Shallow Water Hydrographic Survey Mapping Using Satellite-Derived Bathymetry Application

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## SUMMARY

Satellite-Derived Bathymetry (SDB), a new method which derives bathymetric data from multi-spectral satellite imagery, has yet to be recognised as a new acquisition method for shallow water hydrographic survey mapping. Currently, SDB has received substantial attention from researchers worldwide, but most of the studies primarily focused on remote sensing environments. The questions about precision and accuracy are always the subject of interest in the surveying field but went unreported in most of the studies. Therefore, the objective of this study is to develop an improved SDB algorithm model which is capable of delivering better accuracy for shallow water hydrographic survey mapping application in a tropical environment. High resolution multi-spectral satellite imageries from the Sentinel-2A, Pleiades and WorldView-2 of Tawau Port, Sabah and Pulau Kuraman, Labuan were derived. Both places have diverse seabed topography parameters. A conceptual model of Multi-Layer Optimisation Technique (M-LOT) was developed based on Stumpf derivation model. Accuracy assessment of M-LOT was carried out against derivation models of Lyzenga and Stumpf. The findings showed M-LOT model managed to achieve up to 1.800m and 1.854m Standard Deviation accuracy for Tawau Port and Pulau Kuraman respectively. In addition, M-LOT has shown a better derivation compared to Stumpf's, where a total of 13.1% more depth samples meeting the IHO minimum standard for Tawau Port. Furthermore, M-LOT has generated an extensive increment up to 46.1% depths samples meeting the IHO minimum standard for Pulau Kuraman. In conclusion, M-LOT has significantly shown improved accuracy compared to Stumpf, which can offer a solution for SDB method in shallow-water hydrographic survey mapping application.

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