ESTIMATION OF SHALLOW WATER BATHYMETRY AT
TERENGGANU COASTAL USING SENTINEL-2 IMAGERY

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**Thesis submitted to the Universiti Teknologi MARA Malaysia
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DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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ABSTRACT

The precise determination of bathymetry is of greatest significance for fully aware coastal management and marine operations in the Terengganu coastal area of Malaysia. The field of bathymetry explores the undersea floor in terms of its depth and shape. Historically, bathymetry has been mapped by means of echo-sounding sounders, which can be quite demanding on resources and might not cover all areas. In order to conduct precise bathymetric assessments in the shallow water of Terengganu Coast, the use of Sentinel-2 imagery has been considered due to the necessity for affordable resolution alternatives. The objectives of these studies are to derive bathymetry using Sentinel-2 satellite imagery in 2023, to evaluate the depth of Terengganu Coastal by Sentinel-2 imagery and Nautical Chart, and to produce Satellite Derived Bathymetry (SDB) for Terengganu Coastal in the year 2023. High-resolution bathymetric data is obtained through the use of advanced image processing techniques, specifically Sentinel-2 imagery with 10-meter resolution throughout application of Stumpf ratio transform algorithm for the Terengganu Coastal region. Hence, with the derived of chart soundings from nautical chart, previous hydrographic data is placed in a geographical context, enabling the direct input of depth measurements as parameters for ratio algorithms. The accuracy of this estimated bathymetry is assessed using statistical measures such as Root Mean Square Error (RMSE), Mean Absolute Error (MAE) and the coefficient of determination ($R2$). The findings demonstrate an excellent statistical correlation ($R2 = 0.85$) between bathymetry data obtained from hydrographic chart soundings and satellite imagery. The (RMSE = 3.47) and Mean Absolute Error (MAE = 2.76) indicates that the estimation bathymetry values deviate from the actual values.

Keyword: Satellite derived bathymetry (SDB), Sentinel-2 L2A, shallow water, Empirical Approaches, Terengganu.

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