MUHAMMAD SYAMIL YUSRI BACHELOR OF SURVEYING SCIENCE AND GEOMATICS (HONOURS) AUGUST 2023

FEASIBILITY OF USING MBES BATHYMETRY DATA ONLY FOR SEDIMENT CLASSIFICATION AT HIGH DYNAMIC ENVIRONMENT

MUHAMMAD SYAMIL BIN YUSRI
2020879148

COLLEGE OF BUILT ENVIRONMENT
UNIVERSITI TEKNOLOGI MARA
PERLIS

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MUHAMMAD SYAMIL BIN YUSRI

2020879148

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under - Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Muhammad Syamil Bin Yusri
Student I.D. No.	:	2020879148
Programme	:	Bachelors in Surveying Science and Geomatics – AP220
Faculty	:	College of Built Environment, CBE
Thesis Title	:	Feasibility of Using MBES Bathymetry Data Only for Sediment Classification at High Dynamic Environment
Signature of Student	:	……..
Date	:	August 2023

ABSTRACT

The efficacy of Multibeam Echosounder (MBES) systems for seabed mapping and sediment classification has been substantially evidenced over time. In general, both bathymetric and backscatter data generated by MBES are jointly utilized for seabed mapping. However, this research, conducted at the busy shipping channel of Port Klang, Selangor, employs a novel approach. Herein, this study exclusively focuses on the potential of bathymetry data, collected in 2021, for sediment classification. The significant sediment accumulation in this area, which alters the seabed's elevation, served as the primary motivation for this approach. The overarching aim of this research was to explore the efficiency of various bathymetry derivatives in the classification of MBES data. Utilizing specialized software such as QPS Qimera, FMGT, and ArcGIS, Principal Component Analysis (PCA) was performed a to select the most potent layer among bathymetry derivatives. The PCA generated four principal components, collectively accounting for 96.42% of the total variance, with Rugosity (PCA1 - 39.40%), Aspect (PCA1 - 39.40%), Eastness (PCA2 - 69.21%), and Northness (PCA3 - 96.42%) being the primary contributors. To validate these findings, signal based method which using the Angular Range Analysis (ARA) were used as a reference. Interestingly, result of accuracy assessment, based on the kappa coefficient, revealed that the sediment classification map created by combining bathymetry and the PCA-determined derivative layers slightly outperformed the traditional method utilizing both bathymetry and backscatter data (kappa = 0.173524 vs. 0.16338). This observation signifies that the inclusion of bathymetry derivatives identified via PCA into the classification process could enhance the accuracy of seabed sediment classification. Consequently, this research provides a new direction for seabed mapping methodologies, emphasizing the potential of bathymetry data alone in classifying MBES data.

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