

ABSTRAK

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

**PERUBAHAN SEKITARAN DI SELAT MELAKA SEMENJAK GLASIER
MAKSIMUM TERAKHIR****ABDULLAH BIN SULAIMAN****2023****Penyelia Utama : Profesor Madya Hasrizal bin Shaari, Ph.D****Penyelia Bersama : Profesor Aidy @ Mohamed Shawal bin Muslim, Ph.D****Pusat Pengajian : Institut Oseanografi dan Sekitaran**

Perubahan paras laut semenjak Glasier Maksimum Terakhir (LGM) merupakan peristiwa paling penting dalam pembentukan sekitaran pelantar benua masa kini. Memahami keadaan perubahan kenaikan paras laut semasa LGM-Holosen serta kesan ke atas pembentukan ciri-ciri dasar laut dan pantai menjadi asas yang penting untuk memahami serta meramalkan kenaikan paras laut pada masa hadapan. Kajian ini kritikal terutamanya dalam menangani kenaikan paras laut pada masa hadapan dan kesannya kepada sumber pantai dan marin. Tujuan kajian ini adalah untuk mentafsir dan membina semula perubahan persekitaran paleo di Selat Melaka menggunakan teras sedimen dengan pentarikan radiokarbon AMS dan potensi penggunaannya dalam menentukan titik indeks paras laut dan membina keluk paras laut relatif (RSL) baharu sejak LGM. Sebanyak lima belas (15) sampel teras sedimen di Selat Melaka telah dipilih bagi analisis pentarikan radiokarbon (^{14}C) dan tujuh (7) daripadanya telah dianalisis untuk saiz butiran, kandungan karbonat dan organik, unsur geokimia (major, minor, surih dan REE). Hasil kajian menunjukkan kadar pemendapan sedimen di luar pesisir Perlis adalah 0.33 mm/tahun-0.50 mm/tahun, di luar pesisir Kedah dan Pulau Pinang adalah 0.01 mm/tahun-2.00 mm/tahun dan di luar pesisir Perak dan Selangor lebih tinggi iaitu 0.50 mm/tahun-6.96 mm/tahun semasa zaman Pleistosen Akhir hingga Holosen. Berdasarkan taburan ciri-ciri sedimen seperti saiz butiran,

kandungan organik dan karbonat menunjukkan bahawa ciri-ciri pengangkutan sedimen di Selat Melaka bergantung kepada sumber sedimen, pergerakan arus dan kadar kenaikan paras laut. Taburan unsur utama, minor, surih dan REE juga menunjukkan corak yang berbeza dengan korelasi yang kuat menunjukkan jenis dan litologi sedimen di persekitaran yang berbeza. Kadar relatif kenaikan paras laut di Selat Melaka di antara 15,470 hingga 6,985 tahun lampau adalah di antara 2.10 mm / tahun hingga 25.95 mm / tahun semasa zaman Pleistosen Akhir ke Holosen. Kesimpulannya, hasil kajian ini, khususnya kadar kenaikan paras laut kuno di Selat Melaka, adalah penting untuk digunakan sebagai data asas bagi meramal dan membuat permodelan kadar kenaikan paras laut masa hadapan serta implikasinya terhadap Malaysia.

ABSTRACT

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the Degree of Doctor of Philosophy

**ENVIRONMENTAL CHANGES IN THE STRAITS OF MALACCA SINCE
THE LAST GLACIAL MAXIMUM**

ABDULLAH BIN SULAIMAN

2023

Main Supervisor : Associate Professor Hasrizal bin Shaari, Ph.D
Co-Supervisor : Professor Aidy @ Mohamed Shawal bin Muslim, Ph.D
Institute : Institute of Oceanography and Environment

The sea level changes is the most important event in shaping the present-day continental shelves environment since the Last Glacial Maximum (LGM). Understanding how LGM sea level behaves and its subsequent effects on the development of seabed and coastal landforms constitute the basis for understanding and forecasting future sea level trends. The study is critical especially in addressing the future sea level rise and its impact to coastal and marine resources. This study aims to reconstruct the paleo-environmental changes in the Straits of Malacca using sediment cores with AMS radiocarbon dating and their potential use in establishing the sea level index points and constructing a new relative sea level (RSL) curve since the LGM. A total of fifteen (15) sediment cores from the Straits of Malacca were selected and analysed for AMS radiocarbon dating (^{14}C) where seven (7) were analysed for grain size, carbonate and organic contents, geochemical elements (major, minor, trace, and REEs). The results indicated the sedimentation rates in the Perlis offshore was 0.33 mm/year-0.50 mm/year, the Kedah and Penang offshore at 0.01 mm/year-2.00 mm/year, and the Perak and Selangor offshore with higher rate at 0.50 mm/year-6.96 mm/year during late Pleistocene to Holocene epoch. The distribution of sediment characteristics such as grain size, organic and carbonate contents showed that sediments transportation in the Straits of Malacca and their behaviour were dependent

to the source of sediment, current circulations, and rate of sea level rise. The distribution of major, minor, trace, and REEs showed different patterns with strong correlations, indicating different types of sediment lithologies were deposited in different environment. The rates of relative sea level rise (RSLR) were identified in this study, indicating that between 15,470 cal year BP to 6,985 cal year BP, the Straits of Malacca was inundated with the rate of sea level rise between 2.10 mm/year to 25.95 mm/year during late Pleistocene to Holocene period. In conclusion, given the importance of the Straits of Malacca as a far-field region, the proposed paleo sea level rate could serve as a strong baseline data for future sea level forecasting and modeling, and its implications on Malaysia.