

**SEDIMENT AND SELECTED SEDIMENT OXIDES
DISTRIBUTION IN THE NEARSHORE AND BEACH
AREAS OF PAHANG JORR DURING PRE-
AND POST-NORTHEAST MONSOON**

LAU PEI KIM

**MASTER OF SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
MALAYSIA**

2008

7209
1100071219

Perpustakaan Sultanah Nur Zahirah
Universiti Malaysia Terengganu (UMT)



tesis
GC 380.2 .G3 L3 2009



1100071219
Sediment and selected sediment oxides distribution in the
nearshore and beach areas of Pahang-Johor during pre and post
northeast monsoon / Lau Pei Kim.

SULTANAH NUR ZAHIRAH
UNIVERSITI MALAYSIA TERENGGANU (UMT)
PERPUSTAKAAN SULTANAH NUR ZAHIRAH

0071219

Lihat sambutan

HAK MILIK
PERPUSTAKAAN SULTANAH NUR ZAHIRAH UMT

**SEDIMENT AND SELECTED SEDIMENT OXIDES DISTRIBUTION
IN THE NEARSHORE AND BEACH AREAS OF PAHANG-JOHOR
DURING PRE- AND POST-NORTHEAST MONSOON**

Thesis submitted

for the award of

Master of Science (FMSM)

Prof. Dr. Noor Azher B. Ahmad, SSc., PhD
Prof. Dr. Mohd. Taib bin Mohd. Salim

Faculty of Maritime Studies and Marine Science (FMSM)

LAU PEI KIM

In this study, sediment distribution, sediment chemistry and sedimentary oxides (SiO_2 , Al_2O_3 , Fe_2O_3 , TiO_2 , MnO , K_2O , Na_2O , CaO , and MgO) were determined before Northeast Monsoon and after Northeast Monsoon, in Pahang-Johor nearshore and beach areas.

Results showed that monsoon conditions affected the sediment distribution and sedimentary oxides. Before Northeast Monsoon, sediment distribution was ranged from 0.00 to 0.50 m depth, while after Northeast Monsoon, sediment distribution was ranged from 0.00 to 0.25 m depth. In the monsoon area, total sedimentary oxides ($\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3 + \text{TiO}_2 + \text{MnO}$) decreased from 64.5% to 54.5%. Both measured elements (SiO_2 and Al_2O_3) increased and Fe_2O_3 decreased in the monsoon area. Total monsoon sedimentary oxides ($\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3 + \text{TiO}_2 + \text{MnO}$) decreased by 10.0%, which resulted at 21.6 ± 7.2%.

**Thesis Submitted in Fulfilment of the Requirements for the Degree of Master of
Science in the Faculty of Maritime Studies and Marine Science (FMSM)
Universiti Malaysia Terengganu**

February 2009

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirements for the Degree of Master Science

**SEDIMENT AND SELECTED SEDIMENT OXIDES DISTRIBUTION
IN THE NEARSHORE AND BEACH AREAS OF PAHANG-JOHOR
DURING PRE- AND POST-NORTHEAST MONSOON**

LAU PEI KIM

2009

Chairman : Assoc. Prof. Dr. Rosnan B. Yaacob, Ph.D.
Member : Prof. Dr. Noor Azhar B. Mohd. Shazilli, Ph.D.
Prof. Dr. Mohd. Lokman B. Husain, Ph.D.
Faculty : Faculty of Maritime Studies and Marine Science (FMSM)

In this study, sediment distribution (mean size, sorting and skewness) and sediment oxides (SiO_2 , Al_2O_3 , Fe_2O_3 , TiO_2 , MgO , K_2O , Na_2O , CaO , and MnO) were examined before Northeast Monsoon and after Northeast Monsoon, in Pahang-Johor nearshore and beach areas.

Before the Northeast Monsoon, nearshore sediments were ranged from $0.26 \varnothing$ (coarse sand) to $6.64 \varnothing$ (very fine silt) in the nearshore area and became finer after Northeast Monsoon (ranged from 0.53 to $6.45 \varnothing$). Both monsoon sediments were poorly sorted and very positively skewed in this study. While, both monsoon sediments of beach area were categorized as fine sand, which consist of $2.15 \pm 0.72 \varnothing$ and $2.36 \pm 1.43 \varnothing$ in pre- and post-Northeast Monsoon seasons, respectively. The beach sediment was moderately well sorted ($0.64 \pm 0.25 \varnothing$) before Northeast

Monsoon and tended to moderately sorted ($0.80 \pm 0.42 \sigma$) after Northeast Monsoon.

Both monsoon sediments were negatively skewed in this study.

Mean size, sorting and sediment oxides on the nearshore and beach areas were not significantly different in their distribution during pre- and post-Northeast Monsoon seasons. However, a few of the sediment oxides were significantly different in their contents, such as aO, MgO and K₂O at nearshore area, and MgO and Al₂O₃ at beach area.

In this study, SiO₂ at nearshore area were mostly derived from the coastal zone that originates from granite. Al₂O₃ content was well-correlated with CaO. This maybe related to CaO as it is being mostly associated with aluminosilicate. In the nearshore area, the CaO and MgO contents were significantly higher; however K₂O content was significantly lower in post-Northeast Monsoon sediments.

In the beach area, the abundance of SiO₂ content was correlated with low CaO and MgO contents. The abundance of SiO₂ may be due to the contribution of the granite and consequently lack of CaO and MgO in this area. The condition appeared opposite to the location which was supplied with input from limestone. The MgO and Na₂O contents were significantly higher, and Al₂O₃ and MnO contents were significantly lower in post-Northeast Monsoon sediments.

Generally, types of sediment located at the nearby riverbank, the great rainfall during Northeast Monsoon and the constant of littoral drift must take in account in

reconstructing the sediment distribution to this study area. The content of oxides in the sediments was influenced by the presence of granite, limestone and volcanic rocks on the mainland. Besides, the Northeast Monsoon found affected the input of MgO and hence significantly changing the MgO content in the nearshore environment.

Pengaruh

Prof. Dr. Syaiful Rizal Bin Yusoff, Ph.D.

Pada

Prof. Dr. Mohd. Achir bin Mohd. Shamsi, Ph.D.

Prof. Dr. Mohd. Lokman Bin Yusoff, Ph.D.

Pada

Fakultas Pengabdian Masyarakat dan Sains Matematika (FPMKM)

Jakarta

1000

Dalam bagian ini, faktor-faktor (sediment dan kepercayaan) yang berpengaruh pada sedimen (Fe₂O₃, Al₂O₃, TiO₂, P₂O₅, MgO, K₂O, Na₂O, CaO, dan MnO) adalah dan faktor-faktor (Tirai-Tirai laut, air laut, kelembaban, penutupan pantai, Polong-Polong, dan

laut).

1000

Sedimen di kawasan Timor laut, sedimen laut yang paling mendekati pantai (0-30 m) seperti pasir halus (pasir halus) dan pasir halus (pasir halus). Sedimen laut yang mendekati pantai (0-30 m) memiliki tingkat pasir halus (pasir halus) dan pasir halus (pasir halus) yang berpengaruh terhadap kualitas air laut.

1000

Mengikuti analisis di kawasan pantai dipercaya bahwa faktor-faktor yang berpengaruh pada sedimen laut (Fe₂O₃, Al₂O₃, TiO₂, P₂O₅, MgO, K₂O, Na₂O, CaO, dan MnO) adalah dan faktor-faktor (Tirai-Tirai laut, air laut, kelembaban, penutupan pantai, Polong-Polong, dan

laut).

1000

Abstrak tesis yang dikemukakan kepada Senat of Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Master Sains.

**TABURAN SEDIMEN DAN OXIDA SEDIMEN TERPILIH
DI KAWASAN PERAIRAN DAN PANTAI DI PAHANG-JOHOR SEBELUM
DAN SELEPAS MONSUN TIMUR LAUT**

LAU PEI KIM

2009

Pengerusi : Prof. Madya Dr. Rosnan Bin Yaacob, Ph.D.

Ahli : Prof. Dr. Noor Azhar Bin Mohd. Shazilli, Ph.D.
Prof. Dr. Mohd. Lokman Bin Husain, Ph.D.

Fakulti : Fakulti Pengajian Maritim dan Sains Marin (FMSM)

Dalam kajian ini, taburan sedimen (saiz, sisihan dan kepencongan) dan oxida sedimen (SiO_2 , Al_2O_3 , Fe_2O_3 , TiO_2 , MgO , K_2O , Na_2O , CaO , and MnO) sebelum dan selepas Monsun Timur Laut telah dikaji di kawasan perairan dan pantai Pahang-Johor.

Sebelum Monsun Timur Laut, sedimen kawasan perairan bertaburan dari $0.26 \varnothing$ (pasir kasar) ke $6.64 \varnothing$ (tanah liat) dan menjadi lebih halus selepas Monsun Timur Laut (dalam lingkungan 0.53 hingga $6.45 \varnothing$). Sedimen dalam kedua-dua monsun berada dalam sisihan tidak sempurna dan berpencongan positif dalam kajian ini. Manakala, saiz butiran di kawasan pantai dikategori sebagai pasir halus dengan $2.15 \pm 0.72 \varnothing$ dan $2.36 \pm 1.43 \varnothing$, sebelum dan selepas Monsun Timur Laut masing-masing. Sedimen di kawasan pantai bersisihan sederhana sempurna ($0.64 \pm 0.25 \varnothing$) sebelum Monsun Timur Laut dan beranjak ke sisihan sederhana ($0.80 \pm 0.42 \varnothing$)

selepas Monsun Timur Laut. Sedimen dalam kedua-dua monsun berpencongan negatif dalam kajian ini.

Min saiz, sisihan piawai dan oksida sedimen di kawasan perairan dan pantai tidak menunjukkan perubahan ketara sebelum dan selepas Monsun Timut Laut. Walaubagaimanapun, beberapa oxida sedimen mempunyai perubahan yang ketara dalam komposisinya seperti CaO, MgO dan K₂O di kawasan perairan, dan MgO dan Al₂O₃ di kawasan pantai.

Dalam kajian ini, kandungan SiO₂ di kawasan perairan kebanyakannya datang dari kawasan pantai yang bertaburan granit. Kandungan Al₂O₃ mempunyai korelasi yang baik dengan CaO dan ini kemungkinan CaO berkait rapat dengan aluminosilika. Di kawasan perairan, kandungan CaO dan MgO dalam sedimen bertambah; manakala kandungan K₂O berkurangan selepas Monsun Timur Laut.

Di kawasan pantai, kandungan SiO₂ yang tinggi berkorelasi songsang dengan kandungan CaO dan MgO yang rendah. Kandungan SiO₂ yang tinggi berkemungkinan disebabkan oleh granit dan sebaliknya kandungan CaO dan MgO disebabkan oleh batu kapur. Di kawasan pantai, kandungan MgO dan Na₂O bertambah dan kandungan Al₂O₃ dan MnO berkurangan selepas Monsun Timur Laut.

Secara keseluruhan, jenis sedimen yang berada di kawasan berdekatan dengan sungai, taburan hujan yang tinggi sewaktu Monsun Timur Laut dan arus litoral yang

konstan perlu diberi perhatian dalam membentuk semula taburan sedimen di kawasan kajian ini. Kandungan oxida sedimen pula dipengaruhi oleh granit, batuan kapur dan batuan volkanik dari kawasan daratan. Monsun Timur Laut didapati mempengaruhi kemasukkan kandungan MgO dan seterusnya mengubah kandungan MgO secara ketara di kawasan kajian ini.

Finally, with the final submission of my thesis, I would like to thank Professor Dr. Mohd. Zainal Abidin Md. Ali for his guidance, comments, suggestions in my study. Special acknowledgement goes to the Malaysian Ministry of Science Malaysia under the Long-term Research for Priority Areas (LTPA) for funding this study.

Special thanks to Mr. Nor Aljunie B. Komarudin from Technical and Service Department of Mineral and Geoscience Agency, JKT, Jakarta for his professional guidance, helpful and supportive. Thanks also go to the staff of Institute of Geosciences (IGOS) for their help and allowing me to use their laboratory. My special thanks to Dr. Mohamed Sharif, Miss Nurina and Mr. Azizul for their corrective advice and support in completion of my work.

Finally, I would like to thank my family members, friends and colleagues who help me during my writing. Last but not least, my special thanks to my beloved family for their continuous support and encouragement for me to do my best and succeed throughout during my research.