

CHEMICAL OCEANOGRAPHY STUDY IN PAHANG COASTAL
WATER OF MALAYSIA DURING PRE AND POST
NORTHEAST MONSOON SEASONS

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MALAYSIA DURING PRE AND POST NORTHEAST MONSOON SEASONS**

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Institute : Institute of Oceanography

Chemical oceanography study on the nutrients such as organic and inorganic nitrogen, phosphorus and carbon, as well as total suspended solid, chlorophyll-a and petroleum hydrocarbons in water and sediment during pre and post Northeast Monsoon seasons in coastal water of Pahang, South China Sea were conducted from October 2003 until April 2004. A total of 26 sampling stations was established for the study. All the parameters showed lower concentration during post NE monsoon season except ammonium, organic phosphorus and total suspended solid (TSS) in water. Low level of orthophosphate, nitrite and nitrate were detected during pre and post monsoon with mean value $0.15 \pm 0.03 \mu\text{M}$ and $0.16 \pm 0.05 \mu\text{M}$; $0.05 \pm 0.02 \mu\text{M}$ and $0.05 \pm 0.02 \mu\text{M}$; and $0.09 \pm 0.02 \mu\text{M}$ and $0.06 \pm 0.02 \mu\text{M}$ respectively. The mean level of ammonium, dissolved organic nitrogen and dissolved organic phosphorus in water was $0.23 \pm 0.18 \mu\text{M}$ and $0.65 \pm 0.29 \mu\text{M}$; $4.74 \pm 0.99 \mu\text{M}$ and $4.12 \pm 1.71 \mu\text{M}$; and $0.70 \pm 0.20 \mu\text{M}$ and $1.25 \pm 0.43 \mu\text{M}$ respectively. The DON and DOP are the dominant species of nitrogen and phosphorus respectively in coastal water of Pahang. The N:P ratio is 6.02:1 and 3.47:1 during pre and post NE Monsoon

respectively. The result indicated that nitrogen is limiting factor in the study area. The level of petroleum hydrocarbons and total organic carbon (TOC) in water and sediment was decreased from $91.20 \pm 14.89 \mu\text{g/L}$ to $75.72 \pm 20.76 \mu\text{g/L}$; from $102.40 \pm 39.14 \text{ mg/kg}$ to $64.15 \pm 23.92 \text{ mg/kg}$; from $2.15 \pm 0.39 \text{ mg C/L}$ to $1.34 \pm 0.45 \text{ mg C/L}$; and from $0.17 \pm 0.12 \%$ to $0.14 \pm 0.09 \%$ respectively. Chlorophyll-a in surface water was decreased but TSS level was increased during Northeast monsoon season. The Chlorophyll-a and TSS level detected in the pre and post monsoon seasons were $0.67 \pm 0.35 \text{ mg/m}^3$ and $0.12 \pm 0.10 \text{ mg/m}^3$; and $8.14 \pm 1.68 \text{ mg/L}$ and $9.08 \pm 1.14 \text{ mg/L}$ respectively. The heavy water discharge of Pahang River mixed with the strong onshore current seems to have a strong effluence on the chlorophyll-a and other nutrients distribution in the study area during the Northeast Monsoon season.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu
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**PENGAJIAN OSEANOGRAFI KIMIA DI PESISIRAN PANTAI DI
PAHANG, MALAYSIA PADA SEBELUM DAN SELEPAS MUSIM
MONSUN TIMURLAUT**

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Pengajian oseanografi kimia pada nutrien seperti organik dan inorganik nitrogen, fosforus dan karbon, serta jumlah pepejal terapung, klorofil-a dan petroleum hidrokarbon di dalam air dan sedimen semasa sebelum dan selepas monsun Timurlaut di persisiran pantai Pahang, Laut Cina Selatan telah dikaji bermula dari Oktober 2003 sehingga April 2004. Keseluruhannya, kajian telah dijalankan pada 26 stesen persampelan. Kesemua parameter dalam sample air kajian menunjukkan kepekatan yang rendah pada masa selepas monsun Timurlaut melainkan ammonium, fosforus organik serta jumlah pepejal terapung. Tahap orthofosfat, nitrit dan nitrat sebelum dan selepas musim monsun adalah rendah dengan bacaan min adalah $0.15 \pm 0.03 \mu\text{M}$ dan $0.16 \pm 0.05 \mu\text{M}$; $0.05 \pm 0.02 \mu\text{M}$ dan $0.05 \pm 0.02 \mu\text{M}$; serta $0.09 \pm 0.02 \mu\text{M}$ dan $0.06 \pm 0.02 \mu\text{M}$ masing-masing. Manakala tahap yang telah didapati dalam air bagi ammonium, organik nitrogen terlarut berserta fosforus organik adalah $0.23 \pm 0.18 \mu\text{M}$ and $0.65 \pm 0.29 \mu\text{M}$; $4.74 \pm 0.99 \mu\text{M}$ and $4.12 \pm 1.71 \mu\text{M}$; and $0.70 \pm 0.20 \mu\text{M}$ and $1.25 \pm 0.43 \mu\text{M}$ masing-masing. DON dan DOP masing-masing adalah spesis yang mendominasi nitrogen dan fosforus dalam perairan

Pahang. Pecahan N:P adalah sebanyak 6.02:1 dan 3.47:1 pada sebelum dan selepas Monsun Timurlaut. Keputusan ini menunjukkan nitrogen adalah faktor terhad dalam kawasan kajian. Tahap hidrokarbon petroleum dan jumlah organik karbon dalam air dan sedimen telah berkurangan dari $91.20 \pm 14.89 \mu\text{g/L}$ kepada $75.72 \pm 20.76 \mu\text{g/L}$; dari $102.40 \pm 39.14 \text{ mg/kg}$ kepada $64.15 \pm 23.92 \text{ mg/kg}$; dari $2.15 \pm 0.39 \text{ mg C/L}$ kepada $1.34 \pm 0.45 \text{ mg C/L}$; dan dari $0.17 \pm 0.12 \%$ to $0.14 \pm 0.09 \%$ masing-masing. Dalam musim monsun Timurlaut, didapati Klorofil-a telah berkurangan manakala tahap TSS pula semakin meningkat. Klorofil-a dan TSS telah dapat ditentukan pada sebelum dan selepas Monsun Timurlaut adalah $0.67 \pm 0.35 \text{ mg/m}^3$ dan $0.12 \pm 0.10 \text{ mg/m}^3$; serta $8.14 \pm 1.68 \text{ mg/L}$ dan $9.08 \pm 1.14 \text{ mg/L}$ masing-masing. Percampuran arus laut menuju ke upantai yang kuat dengan air pengeluaran yang banyak dari Sungai Pahang nampaknya mempunyai pengaruh yang amat ketara terhadap taburan klorofil-a serta nutrien di kawasan kajian ini semasa musim Monsun Timurlaut.