

REMOTE ESTIMATION OF SEA SURFACE
SALINITY (SSS) FROM SATELLITE-DERIVED
CDOM IN COASTAL WATER OF TERENGGANU

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2017

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**REMOTE ESTIMATION OF SEA SURFACE SALINITY (SSS) FROM
SATELLITE-DERIVED CDOM IN COASTAL WATER OF TERENGGANU**

By

Nur Farhana binti Md Zahair

**Research Report submitted in partially fulfilment of
requirements for the degree of
Bachelor of Science (Marine Science)**

**School of Marine and Environmental Sciences
UNIVERSITI MALAYSIA TERENGGANU**

2017

This project should be cited as:

Nur Farhana, M.Z. (2017) Remote Estimation of Sea Surface Salinity (SSS) From Satellite-Derived Cdom in Coastal Water of Terengganu. Undergraduate thesis, Bachelor of Science (Marine Science), School of Marine and Environmental Sciences, Universiti Malaysia Terengganu, pp 43.

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FINAL YEAR PROJECT REPORT VERIFICATION

PENGAKUAN DAN PENGESAHAN LAPORAN

It is hereby declared and verified that this project report titled **Remote Estimation of Sea Surface Salinity (SSS) from Satellite-Derived CDOM in Coastal Water of Terengganu** by **Nur Farhana binti Md Zahair UK 35040** have been examined and all errors identified have been corrected. This report is submitted to the School of Marine and Environmental Sciences as partial fulfillment towards obtaining the degree of **Bachelor of Science (Marine Science)** from School of Marine and Environmental Sciences, Universiti Malaysia Terengganu.

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DECLARATION

I hereby declare that this dissertation **Remote Estimation of Sea Surface Salinity (SSS) from Satellite-Derived CDOM in Coastal Water of Terengganu** is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at UMT or other institutions. This report is submitted to the School of Marine and Environmental Sciences as partial fulfillment towards obtaining the **Bachelor of Science (Marine Science)** from School of Marine and Environmental Sciences, Universiti Malaysia Terengganu.

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ACKNOWLEDGEMENTS

This appreciation must go to my close association with many people. I would like to extend my sincere gratitude to my research supervisor, Dr. Md Suffian bin Idris and for his dedicated help, advice, inspiration, encouragement and continuous support throughout my research carried out. Next, my appreciation would go to my dearly parents, Mr. Md Zahair and Mrs. Rafeah for unconditional love and financially and mentally supports. Not to forget my siblings that were always there toughen up my mind whenever I felt like giving up.

My heartfelt thanks to my senior who is doing her PhD, Nur Hafiza binti Ramli. She willingly help me by giving an idea of how to do laboratory lab as the project I did was an archived data. She also helped me out when I got difficulties regarding data analysis. My special thanks to fellow friends, Nadhrah, Mimie, Syazana, Fatin, Junainah, Nadia and Yasmin for always standing by my side and sharing a great companionship. I will always cherish the warmth they gave to me.

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LIST OF ABBREVIATIONS

abs	-	absorbance
CDOM	-	Colour Dissolved Organic Matter
SPM	-	Suspended Particulate Matter

REMOTE ESTIMATION OF SEA SURFACE SALINITY (SSS) FROM SATELLITE-DERIVED CDOM IN COASTAL WATER OF TERENGGANU

ABSTRACT

This study focuses on empirical closure to the estimation of sea surface salinity (SSS) by using remote sensing of ocean colour. There are two types of important relationship of water optical properties. The first includes the understanding of characteristics of coloured dissolved organic matter (CDOM) along the conservative mixing in salinity gradient. The second one is the relationship between CDOM and water-leaving radiance (upwelling and downwelling radiance). Based on the analysis that we have conducted using statistical analysis, the best CDOM absorption in ultra-violet wavelength such as 350nm and 380nm can be estimated using blue green ratio as $R_{rs}(412/547)$ with value of $R^2 = 0.9018$. Next, the seasonal dynamic of salinity in coastal water area is determined from satellite ocean colour. During wet and well-mixed season (Northeast Monsoon) CDOM was almost mixing up well with salinity but acted vice versa during the dry season (Southwest Monsoon). With these results, CDOM and salinity can be estimated by satellite ocean colour as well. With RMS error of 0.04 m^{-1} and 0.47 respectively, CDOM and salinity were tested during validation using independent datasets and proven to perform well. Monthly satellite data were mapped (January, April, July and October) in year of 2014 and 2016. These two displayed significant differences throughout the year. Overall results has found that in year 2014 has lower CDOM rate in offshore area compared to in year 2016. On the other hand, salinity rate is found higher in year 2014 compared to in year 2016.

**KEMASINAN PERMUKAAN LAUT ANGGARAN DARI JAUH DARI CDOM
YANG DIPEROLEHI DARIPADA SATELIT DI PERAIRAN PANTAI
TERENGGANU**

ABSTRAK

Kajian ini menumpukan kepada pendekatan secara eksperimental terhadap jangkaan kemasinan permukaan air laut. Terdapat dua jenis kepentingan hubungan mengenai ciri-ciri bio-optik air. Pertama adalah kefahaman ciri-ciri CDOM sepanjang pencampuran konservatif dalam kecerunan kemasinan. Manakala yang kedua, hubungan antara CDOM dan pengaliratasan serta pengalirbawahan radian. Berdasarkan analisis yang telah dijalankan menggunakan analisis statistical, jarak gelombang cahaya ultra lembayung penyerapan CDOM yang terbaik merupakan 350nm dan 380nm dan dapat dijangka menggunakan nisbah hijaubiru seperti $R_{rs}(412/547)$ dengan nilai $R^2 = 0.9018$. Semasa musim hujan (Northeast Monsoon), CDOM hampir bergabung dengan saliniti dan sebaliknya semasa musim kering (Southwest Monsoon). Seterusnya CDOM dan kemasinan air laut diuji menggunakan dataset tidak bergantung dan terbukti hubungannya. Data satelit bulanan dipetakan pada tahun 2014 dan 2016. Terdapat beberapa perbezaan ketara yang dapat dilihat di antara kedua-dua tahun tersebut. Secara keseluruhan, pada tahun 2014, kawasan laut lepas mempunyai kadar CDOM yang rendah berbanding pada tahun 2016. Sementara itu, kadar saliniti adalah tinggi pada tahun 2014 berbanding pada tahun 2016.