

SPATIAL VARIABILITY OF SEA SURFACE
TEMPERATURE IN TERENGGANU WATERS FROM
MODIS

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**Spatial Variability of Sea Surface Temperature in Terengganu Waters from
MODIS**

By

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**Research Report submitted in partial fulfillment of
The requirements for the degree of
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**DEPARTMENT OF MARINE SCIENCE
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DECLARATION AND VERIFICATION REPORT

FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled:

Spatial Variability of Sea Surface Temperature in Terengganu Waters from MODIS by NIK SHAMSOL BIN MOHAMED, Matric No. UK 15355 have been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfillment towards obtaining the Degree of Bachelor Science (Marine Science), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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LIST OF ABBREVIATIONS

AVHRR	: Advanced Very High Resolution Radiometer
CO ₂	: Carbon Dioxide
CZCS	: Costal Zone Color Scanner
Diff	: Different
MODIS	: Moderate Resolution Imaging Spectroradiometer
GPS	: Global Positioning System
Km	: Kilometer
Nm	: Nautical mile
NASA	: National Aeronautics and Space Administration
SST	: Sea Surface Temperature
UTM	: Universal Transverse Mercator System
WGS84	: World Geodetic System 1984
°C	: Degree Celcius
µm	: Micrometer
IR	: Infrared

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ABSTRACT

Remote sensing is a practical and cost-effective tool for synoptically monitoring water-surface quality of Terengganu waters at constructive temporal intervals and large spatial scale. Measuring Sea Surface Temperature (SST) using conventional technique is time consuming. While long-term regional and global satellite SST products do exist, they are often limited in terms of spatial resolution and consistency due to uneven sensor performance. The objectives of this study are to determine the sea surface temperature of Terengganu coastal and offshore waters and to find the relationships between *in situ* and MODIS sea surface temperature. Two categories of data used were *in situ* SST measurement and satellite images data from MODIS. MODIS datasets that covers Level 2 and 3, were obtained from NASA and were georeferenced to Terengganu region using EPOC module. This study revealed a low variability between SST values in coastal and offshore waters. The range of SST in coastal waters is 29.21 °C to 31.57 °C while offshore waters SST is 28.89 °C to 31.61°C when comparison were done coastal water are found to be warmer than the offshore water. MODIS data and *in situ* data shows a good match with average different of 0.59 °C. This study demonstrated that MODIS Level 2 and Level 3 data can successfully be used to obtain SST in Terengganu coastal and offshore waters.

Kajian Perbezaan Ruang Suhu Permukaan Laut Di Perairan Terengganu oleh MODIS

ABSTRAK

Penderiaan jarak jauh adalah sangat praktikal dan berkesan untuk pemantauan suhu permukaan laut di kawasan Terengganu. Kaedah ini menjimatkan masa dan kos untuk pemantauan ruangan pada skala yang besar. Walaupun produk suhu permukaan laut ini telah wujud, namun ianya terhad dari segi resolusi dan juga tahap kemampuan sensor. Objektif daripada kajian adalah untuk menentukan suhu permukaan laut di kawasan pantai dan luar pantai di Terengganu dan juga untuk mengetahui hubungan diantara data *in situ* dan data MODIS. Dalam kajian ini, terdapat dua data yang digunakan iaitu data *in situ* yang diperolehi daripada kerja lapangan dan data daripada MODIS terdiri daripada tahap 2 dan 3. Imej suhu permukaan laut telah diperolehi daripada NASA dan ianya telah diproses menggunakan modul EPOC. Kajian ini telah menunjukkan nilai kepelbagaian yang rendah antara suhu permukaan laut di kawasan perairan pantai dan kawasan luar pantai. Julat suhu permukaan laut bagi kawasan pantai ialah 29.21 °C hingga 31.57 °C manakala julat suhu permukaan laut bagi kawasan luar pantai ialah 28.89 °C hingga 31.61°C. Setelah perbandingan dilakukan, kawasan pinggir pantai dilihat lebih panas berbanding kawasan luar pantai. Data MODIS dan data *in situ* menunjukkan perhubungan yang baik diantara satu sama lain dengan nilai purata ialah 0.59 °C. Kajian ini menunjukkan bahawa data MODIS tahap 2 dan 3 boleh digunakan untuk memperoleh suhu permukaan laut di perairan pantai maupun luar pantai Terengganu.