

THE GEOGRAPHICAL INFLUENCE TOWARDS CURRENT CIRCULATION  
AND PHYSICAL CHARACTERISTICS OF BIDONG ISLAND

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**THE GEOGRAPHICAL INFLUENCE TOWARDS CURRENT CIRCULATION AND  
PHYSICAL CHARACTERISTICS OF BIDONG ISLAND**

**By**

**Nur Afiqah Bte Samat**

**Research Report submitted in partial fulfillment  
of the requirement for the degree of  
Bachelor of Science (Marine Science)**

**Department of Marine Science  
Faculty of Maritime Studies and Marine Science  
UNIVERSITI MALAYSIA TERENGGANU  
2012**

This project report should be cited as:

Samat, N. A. 2012. The Geographical Influence towards Current Circulation And Physical Characteristics of Bidong. Undergraduate thesis, Bachelor of Science in (Marine Science), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu. 50p.

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**DEPARTMENT OF MARINE SCIENCE  
 FACULTY OF MARITIME STUDIES AND MARINE SCIENCE  
 UNIVERSITI MALAYSIA TERENGGANU**

**DECLARATION AND VERIFICATION REPORT  
 FINAL YEAR RESEARCH PROJECT**

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

**The Geographical Influence towards Current Circulation and Physical Characteristics of Bidong Island by Nur Afiqah Bte Samat, Matrix No. UK20169** has 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 Bachelor of Science (Marine Science), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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## ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful

Alhamdulillah, all praises to Allah for the strengths and His blessing in completing this thesis. First and foremost I offer my sincerest gratitude to my supervisor, Dr. Mohd Fadzil bin Mohd Akhir, who has supported me throughout my thesis with his patience and knowledge. One simply could not wish for a better supervisor. Thanks a bunch for helping me and supervised me from the beginning until end of thesis. Thank you so much for your help that gave me lots of information.

In my daily work I have been blessed with a friendly and cheerful group of fellow students. Nur Hidayah binti Roseli and Nur Zurairah binti Zakaria, as well as giving MATLAB information, has provided good arguments about Physics theory. Norfadzilah binti Shafie was a good companion while doing thesis. Aril Sharwin Hasan had provided an experienced ear for my doubts about writing a thesis. In many ways I have learnt much from all of them. Thanks also to all staff in Remote Sensing and GIS had given support in kind of conducive place and personal computer while doing data analysis. Thanks go to the other (million or so) to The Department of Marine Science has provided the support and equipment I have needed to produce and complete my thesis.

Last but not least, my deepest gratitude goes to my beloved parents; Samat bin Tasrib and Ungku Rozanna Ungku Khalid and also to my sister for their endless love, prayers and encouragement. I will also not forgetting my brothers for their love and care. To those who indirectly contributed in this research, your kindness means a lot to me. Thank you very much.

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## ABBREVIATIONS

ADCP	Acoustic Doppler Current Profiler
ENSO	El Nino and Southern Oscillation
m	meter
ms <sup>-1</sup>	meter per second
psu	practical salinity unit
ppt	parts per thousand (‰)
SSCS	Southern South China Sea
SSS	Sea Surface Salinity
SST	Sea Surface Temperature
°	degree
°C	degree Celcius

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## ABSTRACT

This study was conducted to analyze and determine current circulation pattern and physical characteristics of Bidong Island water from data collected on June 2011. The in-situ data was collected by using Hydrolab Quanta and Acoustic Doppler Current Profiler (ADCP). The data was analyzed by using MATLAB software and Microsoft Excel. The data were grouped into Group A, Group B, Group C and Group D in order to determine the geographical influence towards current circulation pattern, temperature and salinity. From the result obtained, temperature values were from 25.56 to 29.84 °C. Group B recorded lower temperature while temperature distributions of Group D were highest. Salinity in Bidong Island was from 32.49 to 33.52 ppt. Distributions of salinity were almost constant except for Group B. Results showed stratification layer at Bidong Island. Current circulation profile was almost constant in directions and speeds from surface to 5 m. Currents move in mix direction, suspected to be result of deflection and recirculation. Most of currents were directed to northwest and southwest. Currents at upper side of Bidong Island which was Group A and Group C were more consistent in direction than Group B and Group D. Inconsistent of current circulation area were surrounded near Karah Island in which below Bidong Island. It is suspected that there is geographical influenced between the islands.

# **PENGARUH GEOGRAFI TERHADAP PEREDARAN ARUS DAN CIRI-CIRI FIZIKAL DI PERAIRAN PULAU BIDONG**

## **ABSTRAK**

Kajian ini dijalankan untuk menganalisis dan mengenalpasti corak pergerakan arus dan ciri-ciri fizikal di perairan Pulau Bidong pada Jun 2011. Data in-situ telah diambil menggunakan Hydrolab Quanta dan Acoustic Doppler Current Profiler (ADCP). Data tersebut dianalisis menggunakan MATLAB dan Microsoft Excel. Data dikategorikan Kumpulan A, Kumpulan B, Kumpulan C dan Kumpulan D adalah berfungsi untuk mengenalpasti pengaruh geografi terhadap corak pergerakan arus, suhu dan salinity. Berdasarkan keputusan diperolehi, nilai suhu adalah di antara 25.56 sehingga 29.84 °C. Kumpulan B mencatatkan nilai suhu yang rendah dan taburan suhu Kumpulan D adalah paling tinggi. Saliniti di perairan Pulau Bidong adalah di antara 32.49 sehingga 33.52 ppt. Kumpulan B mempunyai perbezaan salinity yang tinggi berbanding kumpulan yang lain. Dari permukaan ke 3 m, nilai suhu dan salinity ditakrifkan sebagai lapisan yang sehati. Terdapat lapisan stratifikasi di mana dijelaskan sebagai thermocline yang kecil dan halocline yang kecil. Corak pergerakan arus boleh dikatakan sama arah dan kelajuan pada lapisan permukaan sehingga 5 m. Arus yang bergerak pelbagai arah dijangkakan hasil pemesongan dan pengedaran semula. Kebanyakan arus bergerak menghala barat laut dan barat daya. Arah arus di bahagian atas Pulau Bidong yang terdiri daripada Kumpulan Group A dan Kumpulan C adalah lebih teratur berbanding dengan Kumpulan B dan Kumpulan D. Kawasan arus tidak teratur terletak di sekeliling pulau Karah yang terletak di bahagian bawah Pulau Bidong. Dijangkakan bahawa terdapat pengaruh geografi di antara pulau-pulau tersebut.

## CHAPTER 1

### INTRODUCTION

An ocean current is continuous, directed movement of ocean water (Garrison, 2005). Currents are the rising and sinking of warmer and colder water which contribute tropical heat worldwide. Ocean currents are created by a complicated mix of processes, and their direction and temperature is dependent on a number of factors. The main inputs are energy from the sun and the rotation of the Earth, but the shape of land masses and the sea floor also have a major influence in shaping the direction of the flow. Direct observation showed that heat from the atmosphere was absorbed quickly by the upper few meters of sea water surface and the heat penetrated slowly into the cold bulk of the oceans. Factors that influence ocean current also influence in climate. Since wind, temperature and landmass differ around the world, the currents and the climates also differ. Besides, current circulation helps to distribute nutrients and scatter organism. They have contributed to the spread of humanity to remote islands and they are important factors in maritime commerce (Garrison, 2007).

The physical properties of the water such as temperature and salinity play an important role in creating water movement, which together with other factors such as winds; induce circulation in the sea water (Mahmood *et al.*, 1996). Temperature-salinity relationship has been widely used in the analysis of oceanographic data, especially in reconstructing the history of sea waters. A current is defined as a large mass of