

**CURRENT CIRCULATION AND PHYSICAL CHARACTERISTICS
ALONG PAHANG BOASTS**

NUR HIDAYAH ROSELI

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

2010

**LP
21
FMSM
1
2010**

8556

1100088950



LP 21 FMSM 1 2010



1100088950

Current circulation and physical characteristics along Pahang
coasts / Nur Hidayah Roseli.

PUSAT PEMBELAJARAN DIGITAL SULTANAH NUR ZAHIRAH
UNIVERSITI MALAYSIA TERENGGANU (UMT)
21030 KUALA TERENGGANU

1100088950		

Lihat Sebelah

HAK MILIK
PUSAT PEMBELAJARAN DIGITAL SULTANAH NUR ZAHIRAH

**CURRENT CIRCULATION AND PHYSICAL CHARACTERISTICS ALONG
PAHANG COASTS**

By

Nur Hidayah Roseli

**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**

2010

This project report should be cited as:

Nur Hidayah Roseli, 2010. Current Circulation and Physical Characteristics along Pahang Coasts. Undergraduate thesis, Bachelor of Science (Marine Science), Faculty of Maritime Studies and Marine Science, Univeristi Malaysia Terengganu.

No part of this project report may be reproduced by any mechanical, photographic, or electronic process, or in the form of phonographic recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public and private use, without written permission from the author and the supervisor of the project.

21
11/11/10
DTC



**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:

Current Circulation and Physical Characteristics along Pahang Coasts by **Nur Hidayah Roseli**, Matrics no. **UK16179** 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 of Science (Marine Science)**, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

Verified by:

Principal Supervisor

Name: Dr Mohd. Fadzil Bin Mohd. Akhir

Official stamp: **DR. MOHD FADZIL MOHD AKHIR**
Pensyarah
Jabatan Sains Marin
Fakulti Pengajian Maritim dan Sains Marin
Universiti Malaysia Terengganu (UMT)
21030 Kuala Terengganu.

Date: 8/4/2010

Second Supervisor

Name: Mr. Yong Jaw Chuen

Official stamp:

YONG JAW CHUEN
Lecturer
Department of Marine Science
Faculty of Maritime Studies and Marine Science
Universiti Malaysia Terengganu (UMT)
21030 Kuala Terengganu.

Date: 8/4/2010

Head of Department of Marine Science

Name: Dr. Razak Bin Zakariya

Official stamp:

Date: 8/4/10

DR. RAZAK ZAKARIYA
Ketua Jabatan Sains Marin
Fakulti Pengajian Maritim dan Sains Marin
Universiti Malaysia Terengganu
(UMT)

ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah s.w.t. for blessing me and gave a good health for me to finish this study and writing the thesis very well. Here, I also would like to appreciate my supervisors Dr. Mohd Fadzil bin Mohd Akhir and Mr. Yong Jaw Chuen for their guidance and patience in supervised me from the beginning of this study until the thesis finish. I would not successfully finish this thesis without your supports. Thank you so much for your help that gave me a lot information and inspiration in order to give a good report in this study.

Besides, I would like to thank my beloved family, my father, Encik Roseli Yeop Shahidan, my mother, Puan Azizah Dumo and all my siblings that supported and understand my condition in finishing this thesis. For all my best friends, Hajar, Ika, Ida, Fana and Nad, thank you so much for your help and support during finishing this thesis. Thank you for always being with me in happiness and hardship in these several months doing this thesis.

Last but not least, I am submitted my fully thanks to the lecturers of Marine Science Department, Faculty of Maritime Study and Marine Science that hardly cooperated to help us from the beginning until the end of this project.

Thank you so much. May Allah bless all of you.

TABLE OF CONTENTS

CONTENT	PAGE
DECLARATION AND VERIFICATION REPORT	ii
ACKNOWLEDGEMENT	iii
LIST OF TABLES	vii
LIST OF FIGURES	viii
ABBREVIATIONS	x
LIST OF APPENDICES	xi
ABSTRACT	xii
ABSTRAK	xiii
CHAPTER 1: INTRODUCTION	1
1.1 Problem Justification	3
1.2 Objectives	4
CHAPTER 2: LITERATURE REVIEW	
2.1 General overview of local setting	
2.1.1 South China Sea	5
2.1.2 Pahang area (Peninsular Malaysia)	7
2.2 Ocean current	8
2.3 Winds (monsoons)	9
2.3.1 Current circulation caused by wind stress	10

2.3.2	Monsoon transitional months	13
2.4	Physical properties	
2.4.1	Temperature and Salinity	14
2.4.2	Dissolved Oxygen	15
2.5	MATLAB Software	16

CHAPTER 3: METHODOLOGY

3.1	Study area	17
3.2	Materials and method	
3.2.1	Current circulation analysis	18
3.2.2	Physical properties analysis	20

CHAPTER 4: RESULTS

4.1	Current circulation	22
4.1.1	Current circulation on October 2003	23
4.1.2	Current circulation on April 2004	24
4.2	Physical properties	
4.2.1	Temperature distributions	26
4.2.2	Salinity distributions	28
4.2.3	T-S Diagram	31
4.2.4	Dissolved Oxygen (DO) distributions	32

CHAPTER 5: DISCUSSION

5.1	Current circulation	35
5.2	Temperature and salinity distributions	
5.2.1	Temperature profiles	37
5.2.2	Salinity profiles	40
5.2.3	Temperature and salinity	42
5.3	Dissolved Oxygen (DO) profiles	44
5.4	Influences of monsoons to the current patterns and physical characteristics	46

CHAPTER 6: CONCLUSION **47**

REFERENCES **48**

APPENDICES **52**

CURRICULUM VITAE **55**

LIST OF TABLES

Table		Page
4.1	Current speed for surface and subsurface layer on October 2003 and April 2004.	22
4.2	The range values for the temperature on October 2003 and April 2004 for all the lines (A, B, C and D)	26
4.3	The range values for the salinity on October 2003 and April 2004 for all lines (A, B, C and D).	29
4.4	The range values for the dissolve oxygen (DO) on October 2003 and April 2004 for all lines (A, B, C and D).	33

LIST OF FIGURES

Figure		Page
2.1	South China Sea (SCS) bathymetry.	6
2.2	Map of Pahang state, located at Peninsular Malaysia.	8
2.3	Current circulation pattern during Northeast monsoon at South China Sea by Wyrcki (1961), NAGA Report.	9
2.4	Current circulation pattern during Southwest monsoon at South China Sea by Wyrcki (1961), NAGA Report.	10
2.5	Wind stress pattern during Northeast monsoon at South China Sea by M.F. Akhir, 2008.	12
2.6	Wind stress pattern during Southwest monsoon at South China Sea by M.F. Akhir, 2008.	13
2.7	Mean sea surface temperature (SST) and mean sea surface salinity (SSS) in the SCS (NODC, 1998).	15
3.1	The study area along Pahang coast by INOS cruises, 2003 and 2004.	18
3.2	Location of the Transect 4, 5 and 6 for the current circulation analysis.	19
3.3	Location of line A, B, C and D on the sampling area for the physical analysis.	21
4.1	Surface current pattern for transect 4, 5 and 6 on October 2003	23
4.2	Subsurface current pattern for transect 4, 5 and 6 October	24

	2003.	
4.3	Surface current pattern for transect 4, 5 and 6 on April 2004.	25
4.4	Subsurface current pattern for transect 4, 5 and 6 April 2004.	25
4.5	Temperature profiles from lines A, B, C and D on October 2003 and April 2004.	27
4.6	Salinity profiles from line A, B, C and D on October 2003 and April 2004.	30
4.7	T-S diagram on October 2003 and April 2004.	32
4.8	Dissolved Oxygen (DO) profiles for line A, B, C and D on October 2003 and April 2004.	34
5.1	The temperature profile of line inshore (line A) and line offshore (line D) on October 2003 and April 2004.	39
5.2	Salinity profile at the inshore lines (line A and B) on April 2004.	41
5.3	T-S diagram during Northeast monsoon and Southwest monsoon in the study by Saadon and Camerlengo (1996).	43

ABBREVIATIONS/ SYMBOLS

°C	degree Celcius
m	meter
mg/l	milligram per liter
m/s	meter per second
ppt	parts per thousand (‰)
DO	dissolved oxygen
INOS	Institute of Oceanography
NODC	National Oceanographic Data Center
UMT	Universiti Malaysia Terengganu

LIST OF APPENDICES

APPENDIX A	Sampling sites coordinate for each station.	52
APPENDIX B (1)	The material that had been used in collecting the current data, current meter.	53
APPENDIX B (2)	The material that had been used in collecting the physical parameters data, hydrolab datasonde.	53
APPENDIX C(1)	MATLAB command for current data analysis.	54
APPENDIX C (2)	MATLAB command for plotting graph of physical parameters data.	54

ABSTRACT

This study was done in order to analyze and determine the current circulation pattern and physical characteristics of Pahang water from data collected on October 2003 and April 2004. The data was analyzed by using MATLAB software. From the result, the current direction on the subsurface layer showed that the current moved southward on October 2003 and moved northward on April 2004. Current speed for both years showed the same range, 0.1 m/s to 0.4 m/s. The temperature values on October 2003 were lower, ranged from 28.95 °C to 29.72 °C compared to the temperature values on April 2004 that ranged from 28.47 °C to 30.5 °C. The salinity values on October 2003 was lower, ranging from 30.45 ppt to 33.86 ppt compared to the salinity values on April 2004, 32.08 ppt to 35.06 ppt. The DO profiles below showed that the DO values on October 2003 were higher, ranging from 5.42mg/l to 6.48mg/l compared to the DO values on April 2004, ranging from 5.51mg/l to 6.2mg/l. According to the analysis, the current circulation and physical characteristics along Pahang water on October 2003 was influenced by early Northeast monsoon. On April 2004, the current circulation and physical characteristics was influenced by early Southwest monsoon.