COMPARISON OF TOPSAR POLARIZED ALGORITHMS FOR MAPPING SHORELINE CHANGE

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COMPARISON OF TOPSAR POLARIZED ALGORITHMS FOR MAPPING SHORELINE CHANGE

By

Ting Ching Hui

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PENGAKUAN DAN PENGESAHAN LAPORAN PROJEK PENYELIDIKAN I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:
Comparison of TOPSAR Polarized Algorithms for Mapping Shoreline Change oleh **Ting Ching Hui**, No. Matrik: **UK 5861** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Samudera sebagai memenuhi sebahagian daripada keperluan memperolehi Ijazah **Sarjana Muda (Sains Samudera)**, Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

GIS	-	Global Information System
SAR	-	Synthetic Aperture Radar
AIRSAR	-	Airborne Synthetic Aperture Radar
TOPSAR	-	Topographic Synthetic Aperture Radar
SPOT	-	Satellite Pour l' Observation de la Terre
Topomap	-	Topography Map
IRS-IA	-	Indian Remote Sensing Satellite
ERS-1	-	European Remote Sensing satellite
GCPs	-	Ground Control Points
RMS	-	Root Mean Square
HH	-	horizontally transmit, horizontally receive
VV	-	vertically transmit, vertically receive
HV	-	horizontally transmit, vertically receive
VH	-	vertically transmit, horizontally receive
C-VV	-	C-band VV polarization
L-VV	-	L-band VV polarization
L-HH	-	L-band HH polarization

RGB	-	Red, Green, Blue
cm	-	centimeter
m	-	Meter
km	-	kilometer
m/yr	-	meter per year
m^3/yr	-	cubic meter per year
pix	-	pixels
m/pix	-	meter per pixel
%	-	percentage
MHz	-	Mega hertz
GHz	-	Giga hertz
R^2	-	Correlation Coefficient
E	-	East
N	-	North

LIST OF APPENDICES

ABSTRAK

Kajian ini bertujuan untuk menentukan jaluran berkutub TOPSAR (L-HH, L-VV dan C-VV) yang mana paling sesuai digunakan untuk memetakan hakisan pantai. Penapis Lee dan gabungan kontras linear, Gaussian, serta keseimbangan histogram digunakan untuk menguatkan kualiti imej. Garisan pantai pada setiap imej digariskan pada lapisan vektor. Ujian-t dilakukan untuk menentukan kewujudan perbezaan di antara jalur-C dan jalur-L. Pembandingan dengan imej SPOT dan data lapangan dijalankan untuk menentukan jaluran TOPSAR yang paling sesuai digunakan dalam kajian perubahan hakisan pantai. Ujian regreasi telah menunjukkan bahawa jalur-C yang paling sesuai digunakan untuk pemetaan perubahan garisan pantai. Ujian-t menunjukkan bahawa jalur-L adalah berbeza dengan jalur-C. Kajian ini mendapati bahawa hakisan pantai berlaku di kawasan Batu Rakit dengan kadar – 1.1 m/tahun dan sedimentasi maksimum berlaku di kawasan pantai berdekatan KUSTEM dengan kadar 2.5 m/tahun.

ABSTRACT

This study aims to determine the suitable polarized TOPSAR band for mapping shoreline change, using the L-HH, L-VV and C-VV band. Lee algorithm and combination of linear contrast, Gaussian and histogram equalization enhancement was used to determine the shoreline edge morphology. The manual vector layer digitizing was applied to extract the shoreline for the different bands. The statistical analysis, t-test was used to find the significant difference between the different bands. Comparison with SPOT and ground truth data was conducted to determine the best algorithms for TOPSAR shoreline change mapping. The regression model shows that C-band VV polarization is more suitable for shoreline change detection compared to others band. The t-test shows that there is a significant difference between L- band and C-band. The study showed that erosion occurred at Batu Rakit area at a rate of -1.1 m/year. The maximum accretion occurred at KUSTEM beach by 2.5 m/year.