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INSTITUT OSEANOGRAFI DAN SEKITARAN
INSTITUTE OF OCEANOGRAPHY AND ENVIRONMENT
Higher Institution Centre of Excellence (HICoE) in Marine Science

Our Ref.:UMT/INOS/TOMSY2022/Secretariat/100-54/1 (53)
Date : 2 October 2022

Dear Prof./Assoc. Prof./Dr./Sir./Mr./Mrs./Miss,

MUHAMMAD MAZMIRUL ABD RAHMAN
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

CONFIRMATION OF PARTICIPATION IN THE TROPICAL OCEAN AND MARINE SCIENCES INTERNATIONAL SYMPOSIUM (TOMSY2022) ON 6-7 NOVEMBER 2022

Thank you very much for your support and interest in joining TOMSY2022. We are pleased to inform that your registration and participation in TOMSY2022 has been confirmed. The abstract below has been accepted to be presented during the Symposium.

Title	Type of presentation
SENSITIVITY ANALYSIS AND APPLICATION OF XBEACH AT CHEROK PALOH BEACH, PAHANG, MALAYSIA	**ORAL**

Please submit your proof of payment via email to **inos.tomsy@gmail.com**. Please be advised that the Symposium's fee should be paid before **20 October 2022** to ensure your abstract being published in the abstract book.

Further information regarding tentative program and presentation schedule will be announced later through email and in the Symposium website. Please be free to visit our website for latest announcement (http://tomsy.umt.edu.my).

Thank you again for your support.

Yours sincerely,

PROF GS. TS. DR. AIDY @ MOHAMED SHAWAL BIN M MUSLIM
Chairman for TOMSY2022
Universiti Malaysia Terengganu (UMT)

4	NURAIN NAZIRATUL AKMA BINTI MOHAMAD DAUD	MS	A PRELIMINARY STUDY ON FEEDING FREQUENCY OF CLOWNFISH (AMPHIPRION OCELLARIS) USING ARTIFICIAL FOOD	NATIONAL UNIVERSITY OF MALAYSIA	p105355@siswa.ukm.edu.my	MB_FISH4
5	MOHAMMAD FAIZ AHMAD	MR.	FISH COMMUNITY STRUCTURE AT RIG-TO-REEF (R2R) ARTIFICIAL REEF OFF PULAU KAPAS, SOUTH CHINA SEA.	UMT	mfaizahmad27566@gmail.com	MB_FISH5
6	SITI TAFZILMERIAM BINTI SHEIKH ABDUL KADIR	DR.	LENGTH-WEIGHT RELATIONSHIP OF 30 MOST ABUNDANT FISH SPECIES IN THE SETIU WETLANDS, TERENGGANU, MALAYSIA	INOS, UMT	sititafzil@umt.edu.my	MB_FISH6
7	MUHAMMAD AIMAN BIN MAS'UD	MR.	DO DEPTH OF DEPLOYING ARTISANAL FISH TRAPS AFFECT BYCATCH DISTRIBUTION IN BIDONG ARCHIPELAGO?	UNIVERSITI MALAYSIA TERENGGANU	aiman.masud6395@gmail.com	MB_FISH7
8	SAIFULLAH ARIFIN JAAMAN	ASSOCIATE PROF. DR.	CETACEANS OF THE LUCONIA SHOALS NATIONAL PARK (LSNP), OFFSHORE SARAWAK, MALAYSIA	INOS, UMT	saifullahaj@umt.edu.my	MB_FISH8
SESSION 1C (Marine Engineering and Technolog)						
1	SITI AYISHAH THAMINAH	MS	NUMERICAL MODELLING ON THE PERFORMANCE OF SUBMERGED BREAKWATER USING THE SPH-BASED DUALSPHYSICS MODEL	INSTITUTE OF OCEANOGRAPHY AND MARITIME STUDIES (INOCEM), INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA,KAMPUNG CHEROK PALOH, , KUANTAN, PAHANG, 26610	thaminah1997@gmail.com	MET1
2	NOOR ASIAH MOHAMAD	MRS	THE EFFECT OF ROCK ARMOUR THICKNESS ON WAVE OVERTOPPING PERFORMANCE AT COASTAL REVETMENTS	UNIVERSITI PUTRA MALAYSIA	gs59282@student.upm.edu.my	MET2
3	MD NIZAM BIN ISMAIL	MR.	SEABED MAPPING OF PULAU SONGSONG AND TUKUN TERENDAK, YAN, KEDAH	FISHERIES RESEARCH INSTITUTE (FRI) BATU MAUNG, BATU MAUNG, PULAU PINANG, 11960	nizam7402@gmail.com	MET3
4	WAN NUR KHAIRUNNISA WAN MAT NOR	MS	MARINE LANDSCAPE MAPPING USING 3D PHOTOGRAMMETRY AT KARANG TENGAH	INOS, UMT	p4503@pps.umt.edu.my	MET4
5	MUHAMMAD MAZMIRUL ABD RAHMAN	MR.	SENSITIVITY ANALYSIS AND APPLICATION OF XBEACH AT CHEROK PALOH BEACH, PAHANG, MALAYSIA	KULLIYAH OF SCIENCE, INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA, KUANTAN, PAHANG, 25300	mazmirul.94@gmail.com	MET5
6	MUHAMMAD ABDUL HAKIM MUHAMAD	MR.	IMPLEMENTATION OF TILTED MULTIBEAM ECHOSOUNDER DATA AND RANDOM FOREST FOR SHALLOW WATER MARINE HABITAT MAPPING	UNIVERSITI TEKNOLOGI MALAYSIA	hakim1991@graduate.utm.my	MET6
7	BRYAN YONG	MR.	LARGE-SCALE CORAL REEF HABITAT SUITABILITY MODEL USING MARINE LANDSCAPE MAPPING TO SUPPORT EFFECTIVE ECOSYSTEM-BASED MARINE MANAGEMENT	UMT	bryanyong@live.com.my	MET7
SESSION 2A (Satellite Oceanography)						
1	MOHAMMAD SHAWKAT HOSSAIN	DR.	ANNUAL, MONTHLY AND SEASONAL PROBABILITIES OF ACQUIRING CLOUD-FREE AND LOW-TIDE LANDSAT OBSERVATIONS FOR MAPPING SALTMARSH LAND COVER OVER SOUTH-EASTERN BANGLADESH FROM 1980 TO 2019	INOS, UMT	shawkat@umt.edu.my	SAT1
2	MUHAMMAD IZUAN NADZRI	MR.	EVALUATION OF TRMM AND GPM PRECIPITATION PRODUCT FROM HIGHLAND TO COASTAL AREA IN MALAYSIA	INOS, UMT	izuan.nadzri@umt.edu.my	SAT2
3	IDHAM KHALIL	MR.	MODELLING AND FORECASTING THE EFFECTS OF INCREASING SEA SURFACE TEMPERATURE ON CORAL BLEACHING IN THE INDO-PACIFIC REGION	FACULTY OF SCIENCE AND MARINE ENVIRONMENT, UMT	idham@umt.edu.my	SAT3

Sensitivity Analysis and Application of XBeach at Cherok Paloh Beach, Pahang, Malaysia

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[2]Institute of Oceanography and Maritime Studies (INOCEM), International Islamic University Malaysia, Kampung Cherok Paloh, 26060, Kuantan, Pahang, Malaysia.
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**Corresponding author: mzbr@iium.edu.my*

Abstract: XBeach, a coastal response numerical model, developed to stimulate the nearshore and coastal processes. It is 2HD open-source process-based which includes short wave propagation, sediment transport, flow and bathymetry changes from difference wave spectral and flow boundary conditions. The mode is focus on horizontal circulations and effects of coastal evolution due to anthropogenic measures. In this case, the application of XBeach was used at Cherok Paloh Beach located in Pahang, Malaysia. The model stimulated an extreme storm event during Typhoon Rai, 11 to 21 December 2021. The case of the event was tested using 1D beach erosion test during the storm conditions. The evaluation of the sensitivity analysis for the profile (morphological changes) was compared and determine using an error indicator (Brier Skill Score) proposed by van Rijn et al., (2003). The sensitivity was tested using different morphological influenced parameters (facua, wetslp and dryslp) and been compared with the final beach profile to calculate the BSS. Based on the BSS, the validated value obtained then replicated to other 1D profile around Cherok Paloh Beach. Based on stimulated the default parameters tested shows overestimated erosion volume. The result obtained from the BSS, it revealed that the best model was obtained by changing the calibration parameter facua and wetslp.

Keywords: Geomorphology; Storm Surge; Numerical; XBeach; Typhoon Rai

AN INTERNATIONAL AWARD-WINNING INSTITUTION FOR SUSTAINABILITY

3RD TROPICAL OCEAN AND MARINE SCIENCES SYMPOSIUM 2022

SENSITIVITY ANALYSIS AND APPLICATION OF XBEACH AT CHEROK PALOH BEACH, PAHANG, MALAYSIA

MR. MUHAMMAD MAZMIRUL BIN ABD RAHMAN, IIUM
DR. MUHAMMAD ZAHIR BIN RAMLI, INOCEM, IIUM
DR. MOHD SHAHRIZAL BIN AB RAZAK, UPM

CONTENT

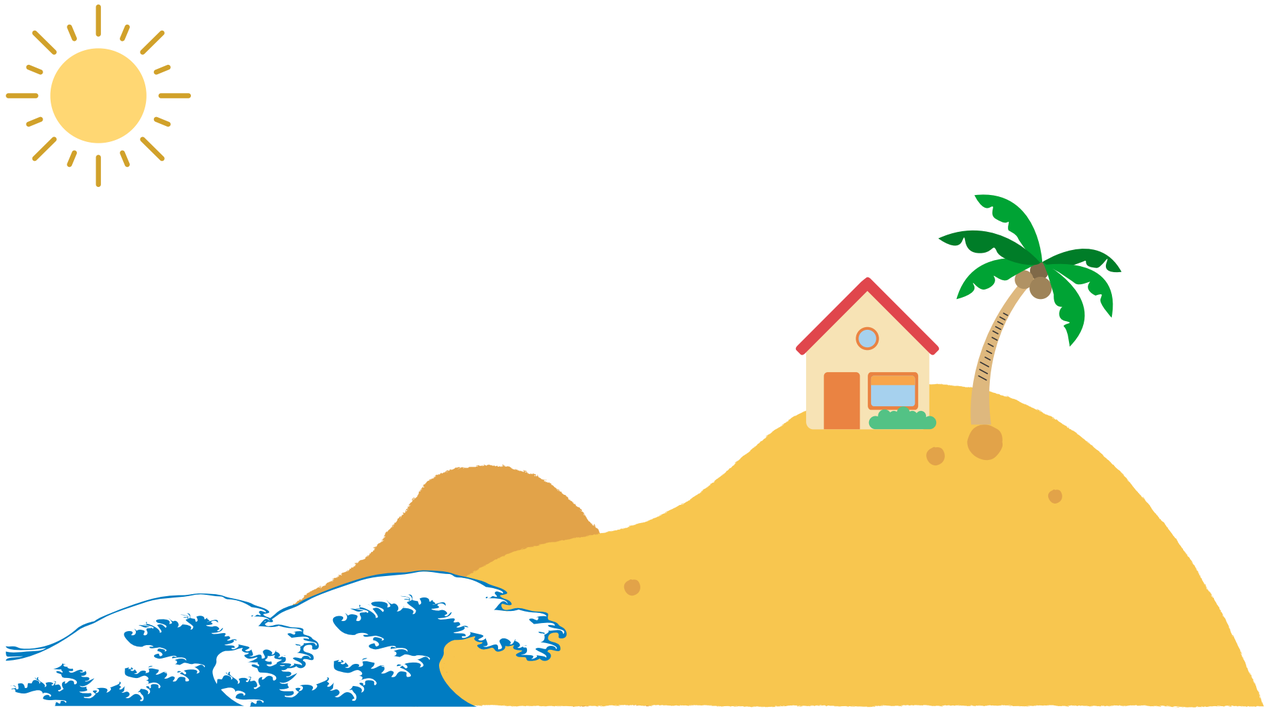
INTRODUCTION

XBeach is an open-source numerical model to simulate the **hydrodynamic** and **morphodynamic** processes and the impact on sandy beaches.

2DH-based model solution for wave propagation, long wave and mean flow, sediment transport, and **morphological changes nearshore**, beaches, and **dunes** due to **storms**.

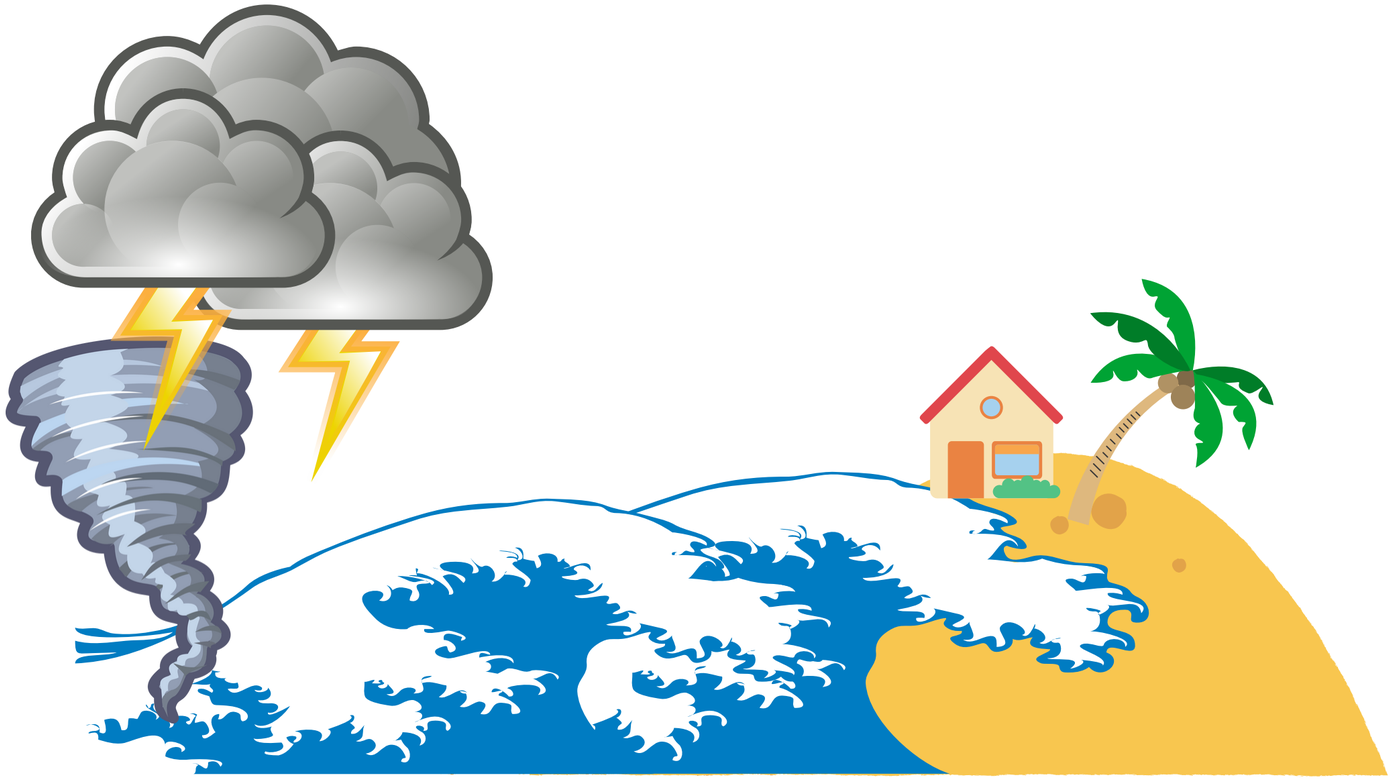
Developed by **Delft University of Technology** and University of Miami

INTRODUCTION

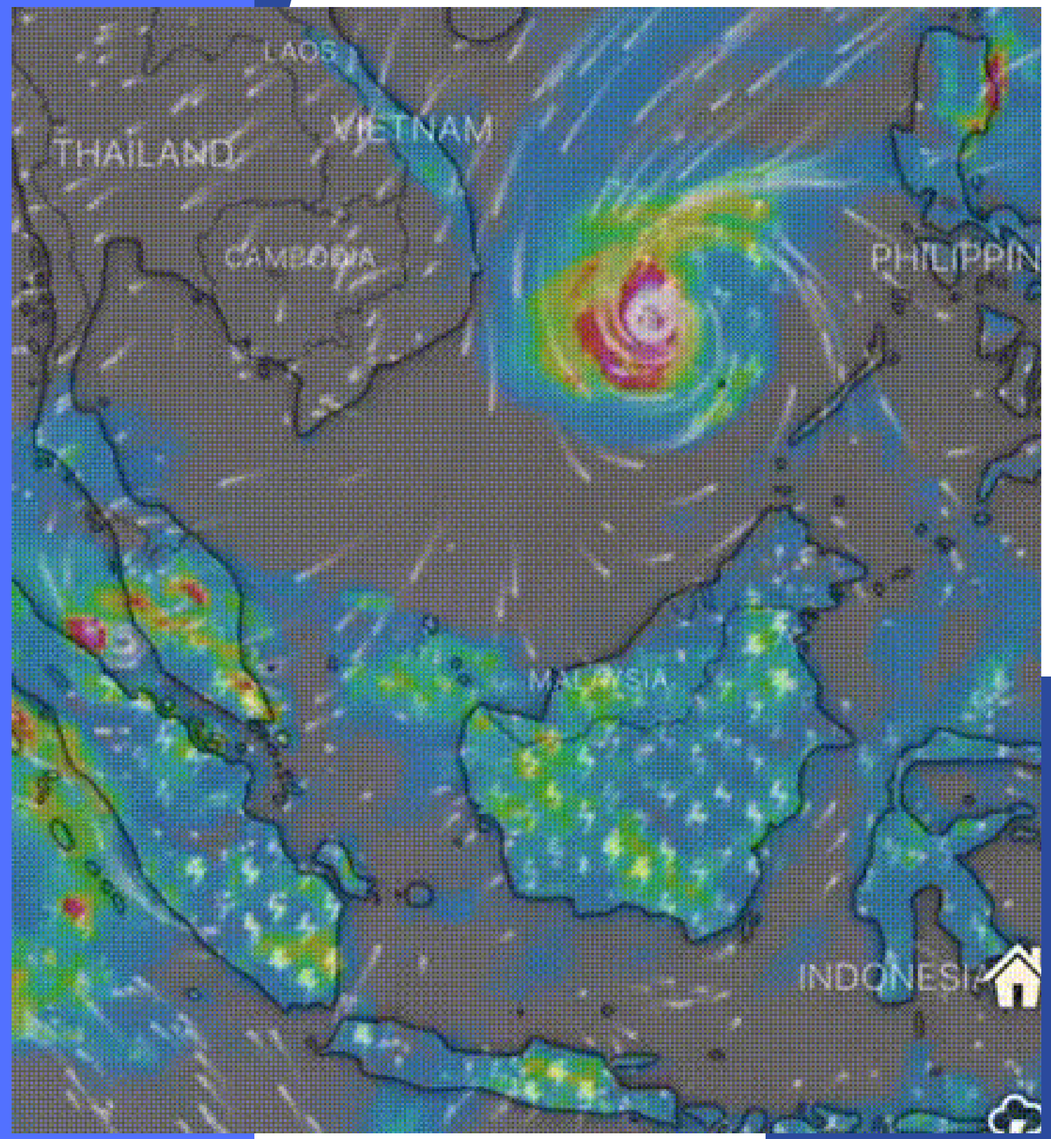


Storm surge is an **abnormal rise of water** generated by a **storm**, over and above the **predicted astronomical tide**.

INTRODUCTION



Storm surge is caused primarily by the **strong winds** in a **hurricane** or **tropical storm**.



PROBLEM STATEMENT

SUPER TYPHOON RAI
(ODETTE)

11 DEC 2021 - 21 DEC 2021
(16 DEC 2021)

- Wind Speed : 267km/h
- Diameter: 185km/h
- Eye: 56km
- Air pressure : below 915mbar
- Saffir-Simpson scale : Cat 5

PROBLEM STATEMENT

1 **TROPICAL DEPRESSION 29**

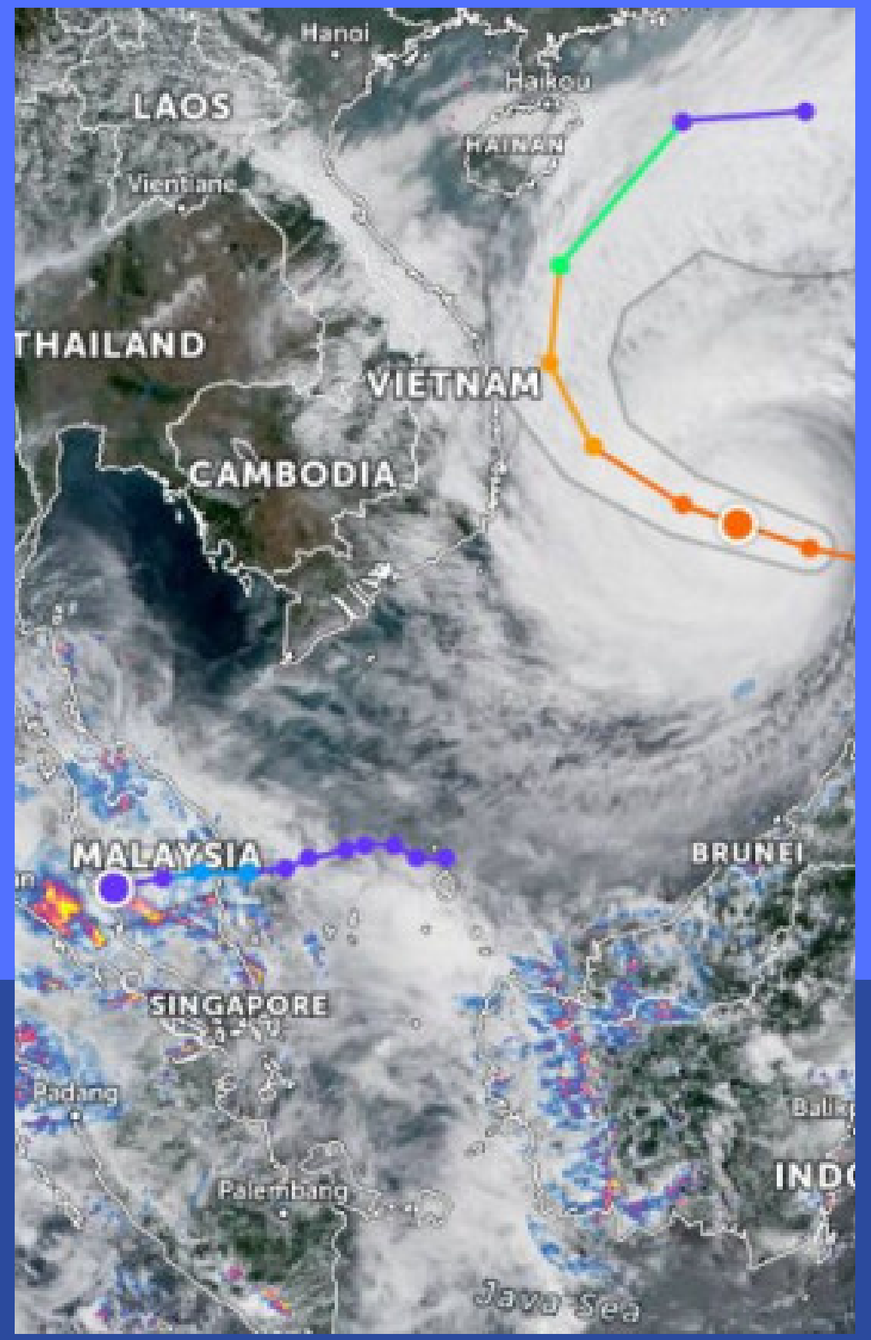
*Categorized as a **rapidly rotating storm** system commonly referred to as a **tropical cyclone***

2 **WIND**

*Sustains between **50km/h to 60 km/h***

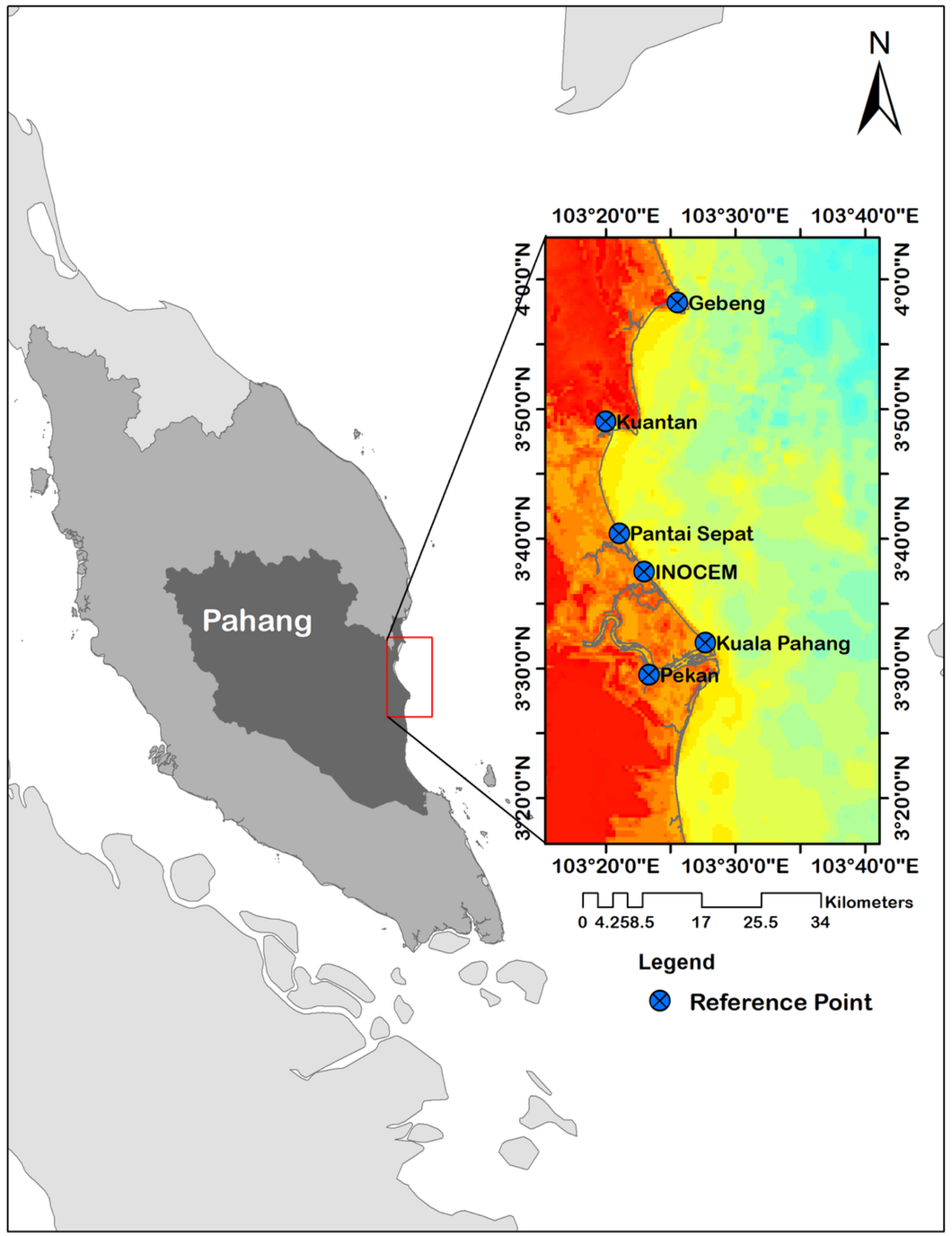
3 **PATHWAYS**

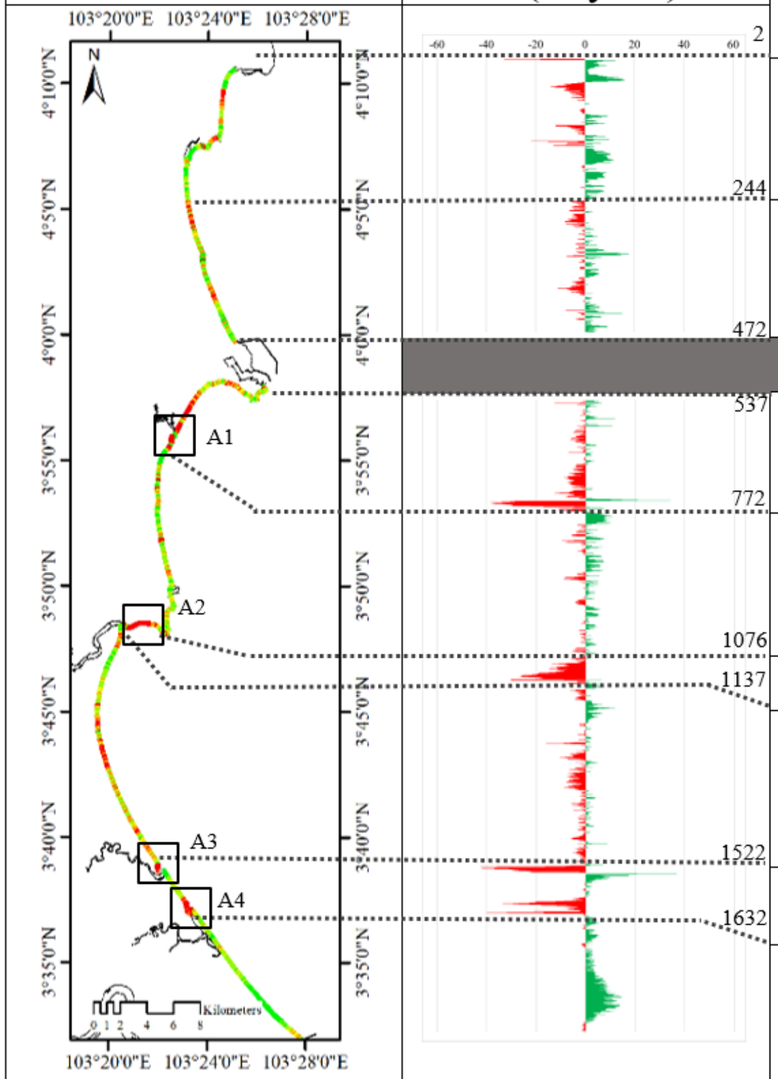
*Make landfall at **Terengganu coast** and move to Straits of Malacca*



STUDY AREA

CHEROK PALOH
20 KM SOUTH OF KUANTAN
LOCATION OF INOCEM



Northern sector	Rate of change, LRR (m/year) Tr#	Zone & (shoreline length, km)	LRR (m/ year) mean	Remark
		N1 (12.10)	+1.53	Action required
		N2 (11.40)	+0.27	Stable
				Kuantan Port
		N3 (11.75)	-1.24	Action required
		N4 (15.15)	-0.16	Stable
		N5 (2.90)	-10.39	Action required
		N6 (19.25)	-0.75	Stable
		N7 (5.40)	-5.97	Action required
		N8 (12.20)	+4.05	Dredging required

DSAS
DIGITAL SHORELINE ANALYSIS SYSTEM

- Preliminary erosion study using DSAS

METHODOLOGY

Field Observation

Bathymetic Survey

5 Dec 2021

- Echo sounder

Pre-Storm profile

6 Dec 2021

Post-Storm Profile

21 Dec 2021

- Total station

Numerical Modelling

SWAN - XBeach Coupling Model

- Secondary data (Copernicus Marine)
- Bed level data (Field sampling)

SWAN – XBeach Coupling Model

SWAN

Wave & Wind

Copernicus Marine Service

Water Level

Bathymetry

Secondary Data

Delft-Flow
Delft-Wave

Delft-3D

Validation

In-Situ Data

XBeach

Topography

Bathymetry

Output

Wave Height
Wave Direction
Wave Period

XBeach

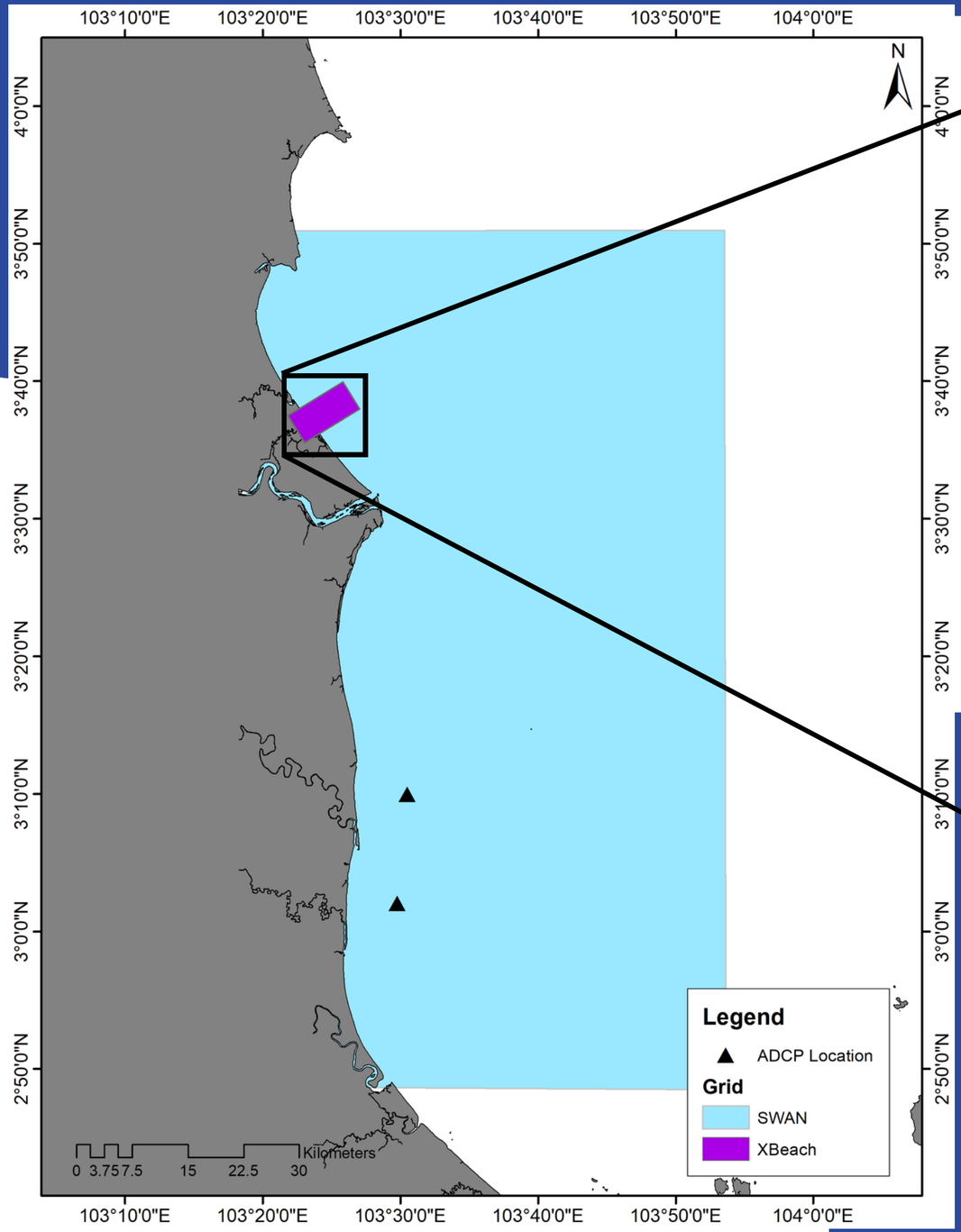
Insitu Depth Data

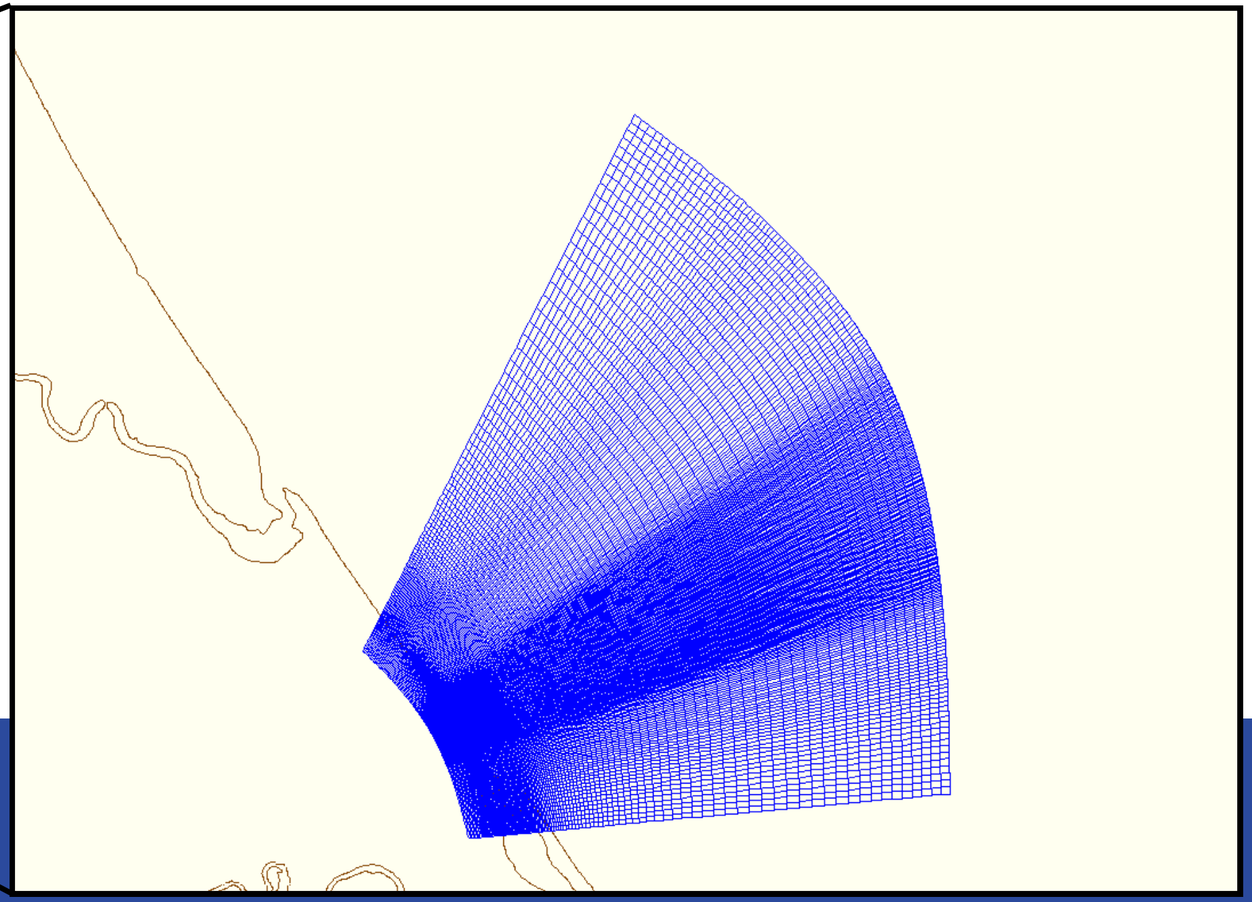
Morphological Output

WAVE VALIDATION

RMSE =0.08m

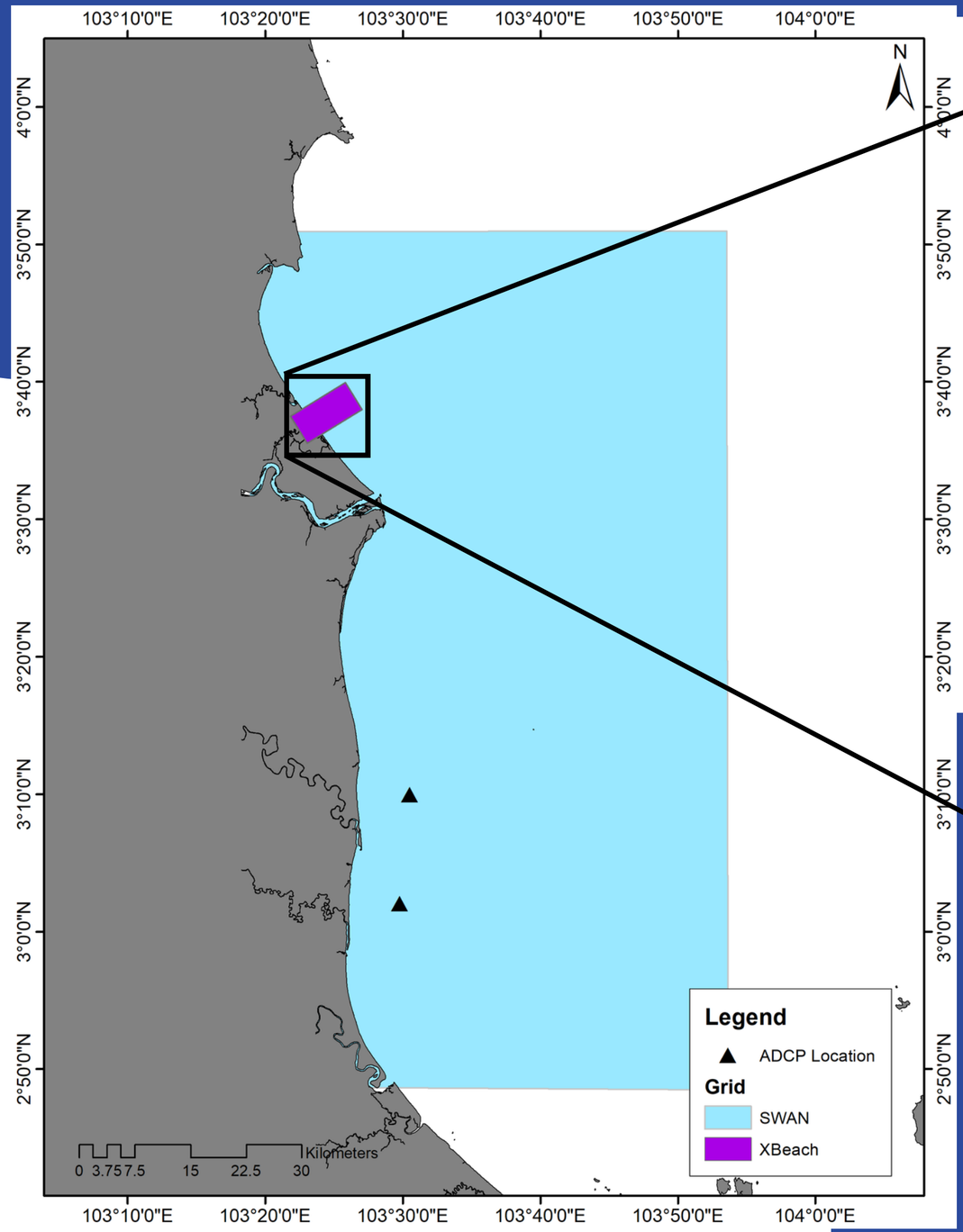
Index of agreement = 0.86

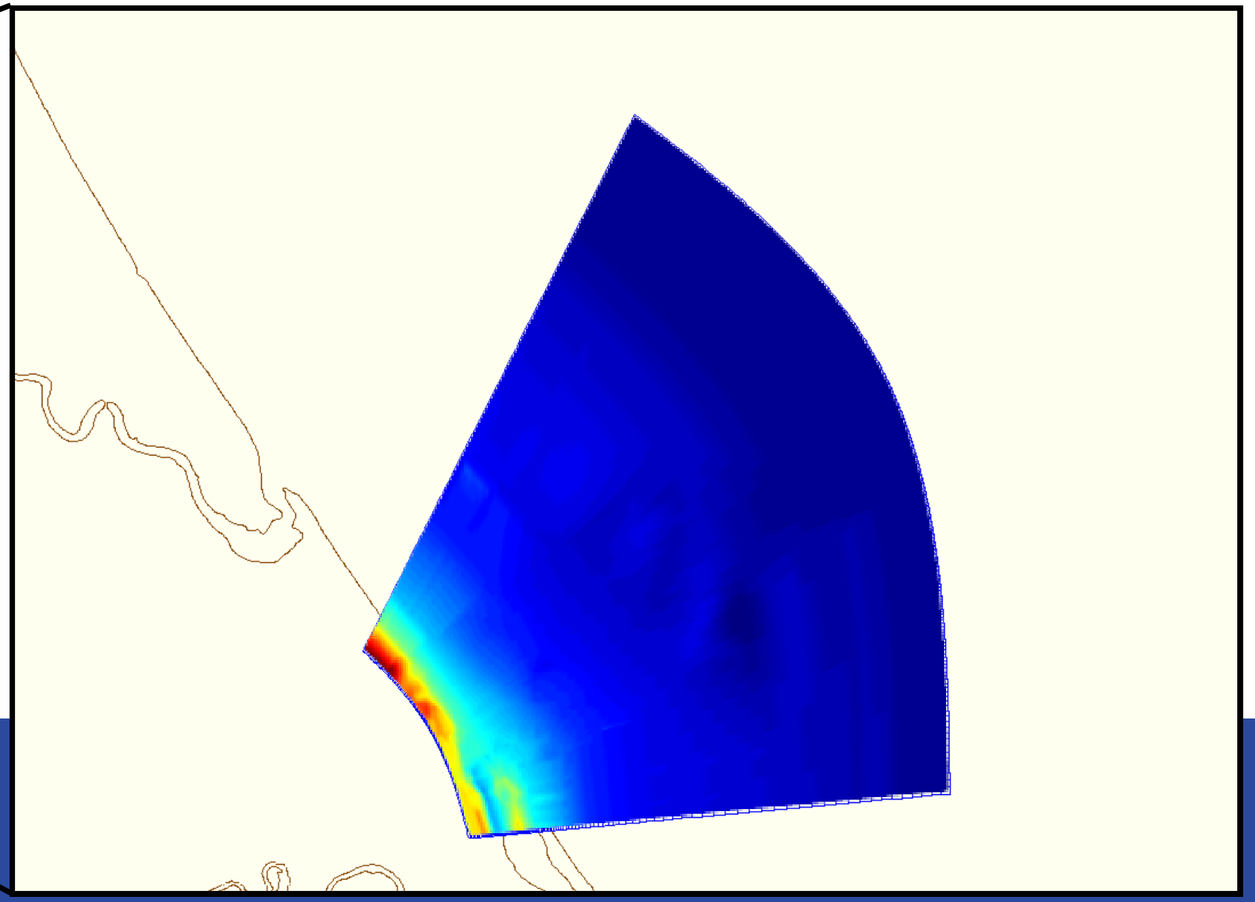




XBeach Grid

- Grid Size varying (5m to 100 m)
- Finer at the study area.





XBeach Bedlevel

- Bedlevel (7m to -11m)
- Water depth at boundary required more than 10 m

METHODOLOGY

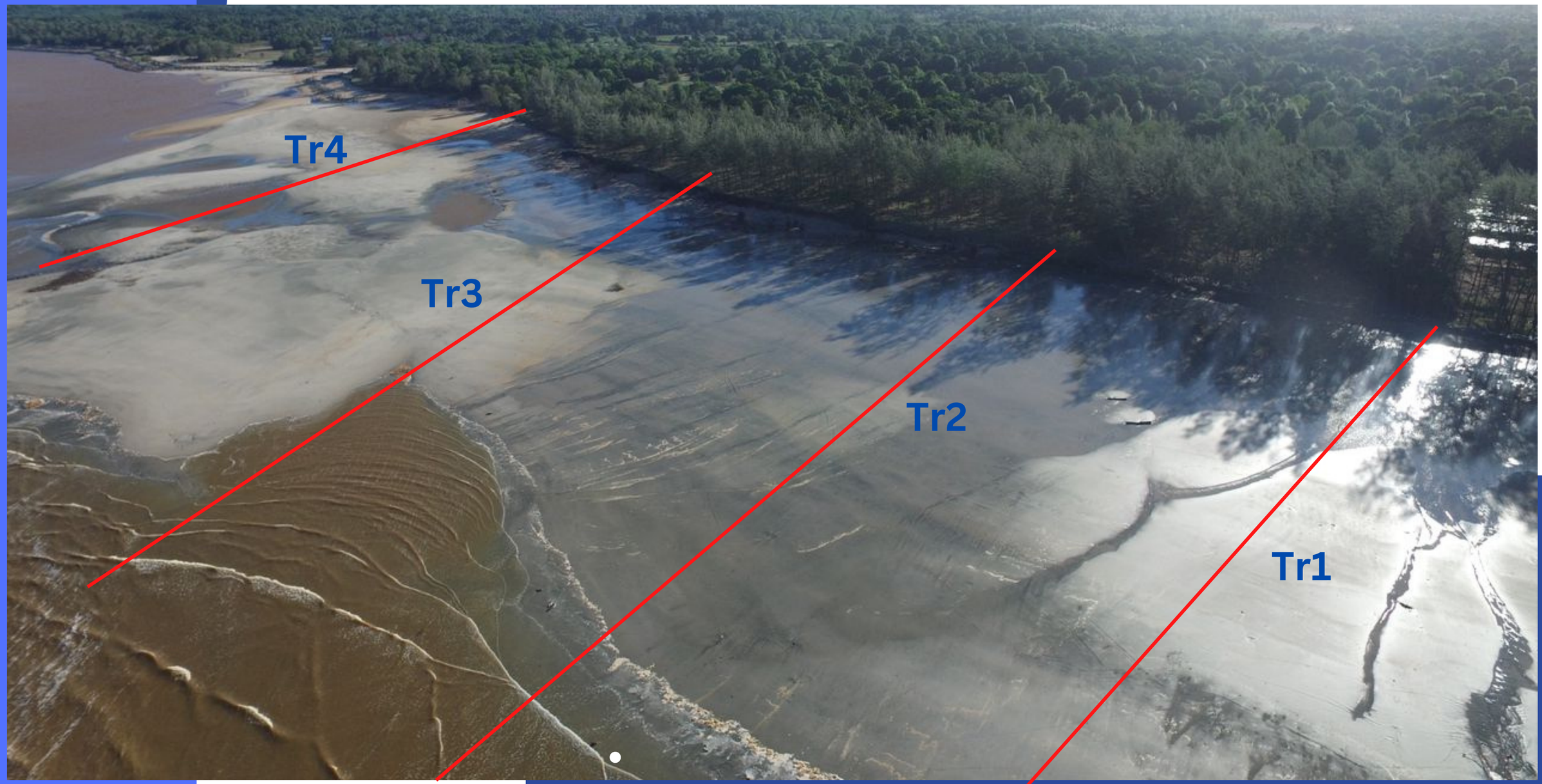
1 D

- Calibration of XBeach numerical model
- Calibrated parameter are analised using Brier Skill Scoring Analysis

$$BSS = 1 - \frac{\sum(S_f - XB_f)^2}{\sum(S_f)^2}$$

Geomorphology Parameter

Parameters	Description	Default Value	Range Value	Used Value
Dryslope	Critical avalanching slope above water	1.0	0.1 – 2.0	0.9
Wetslope	Critical avalanching slope under water	0.3	0.1 – 1.0	0.4
Facua	Calibration factor time averaged flows due to wave skewness and asymmetry	0.1	0.0 – 1.0	0.2

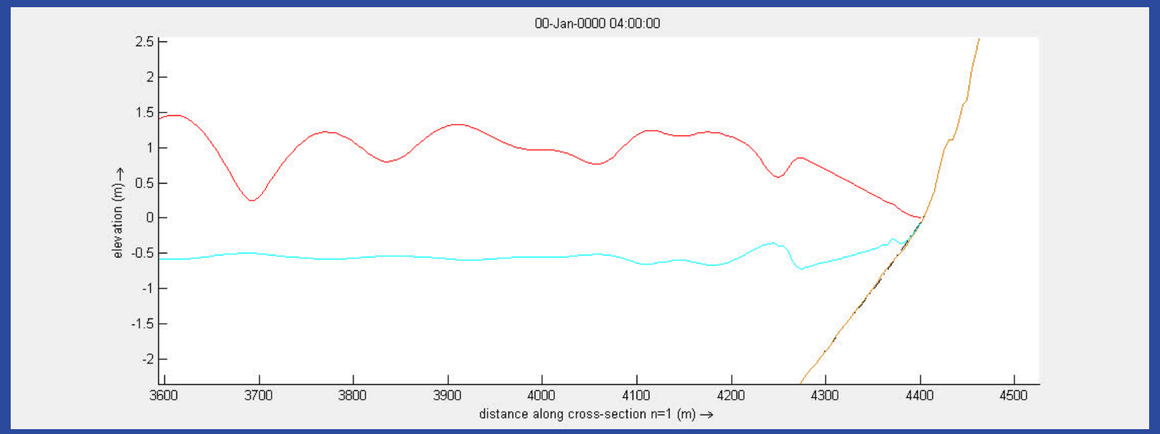


- Drone Imagery of Transect Location

RESULT

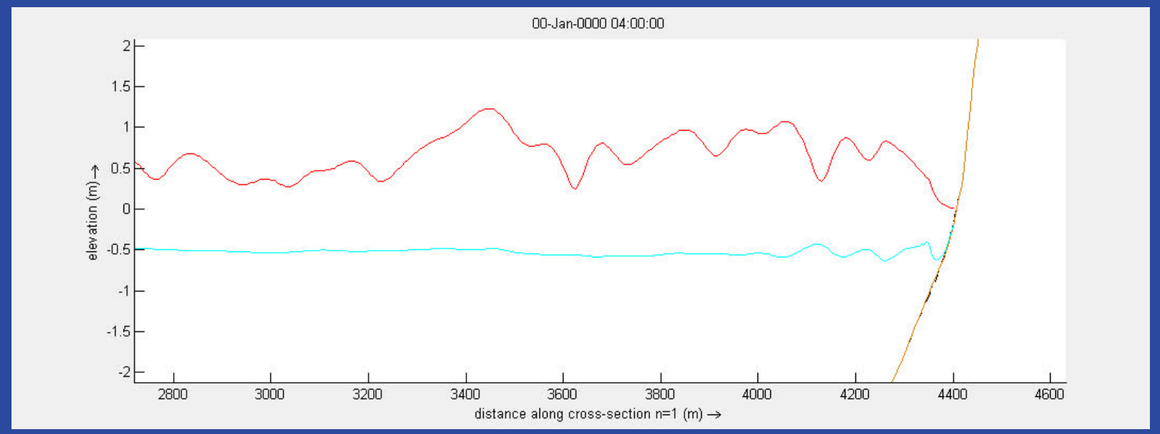
TR 1

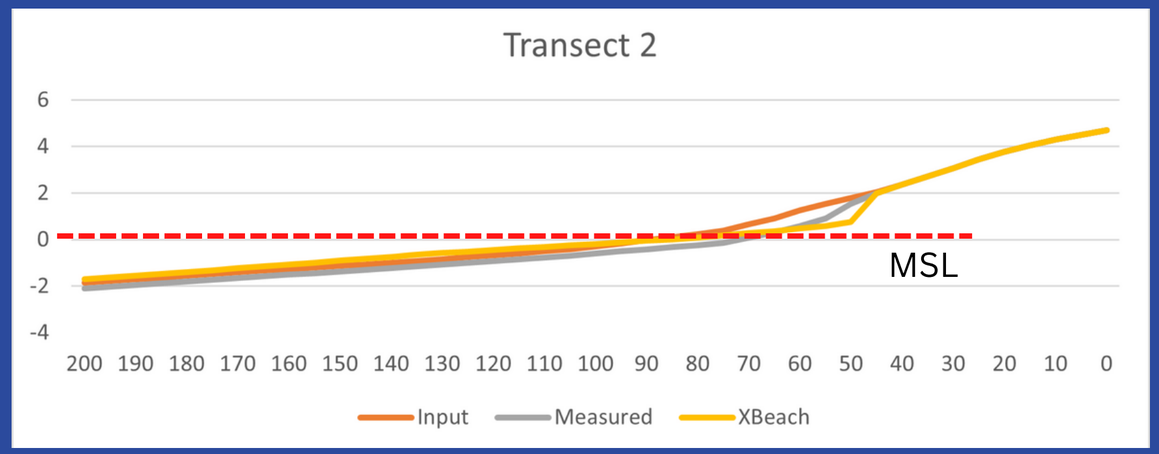
BSS = 0.976



TR 2

BSS = 0.968

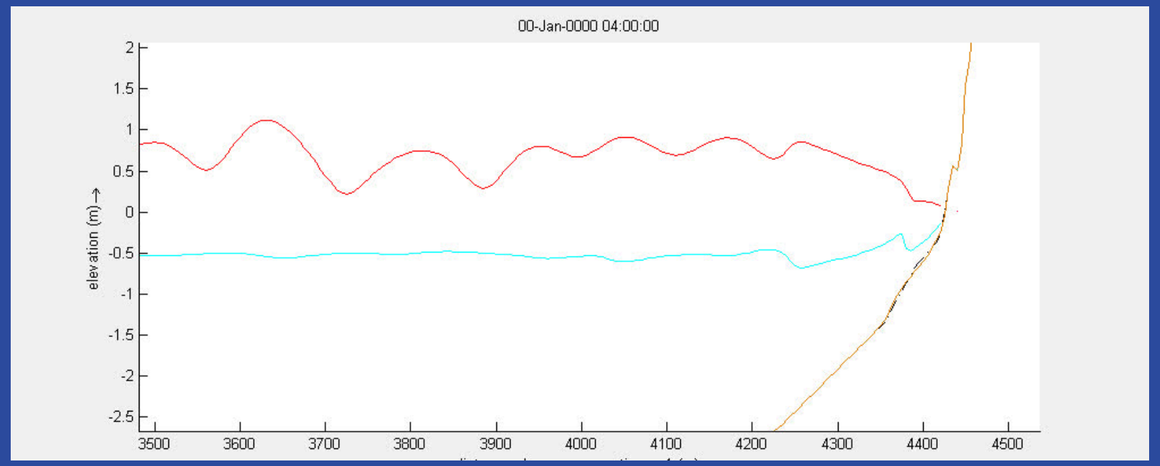


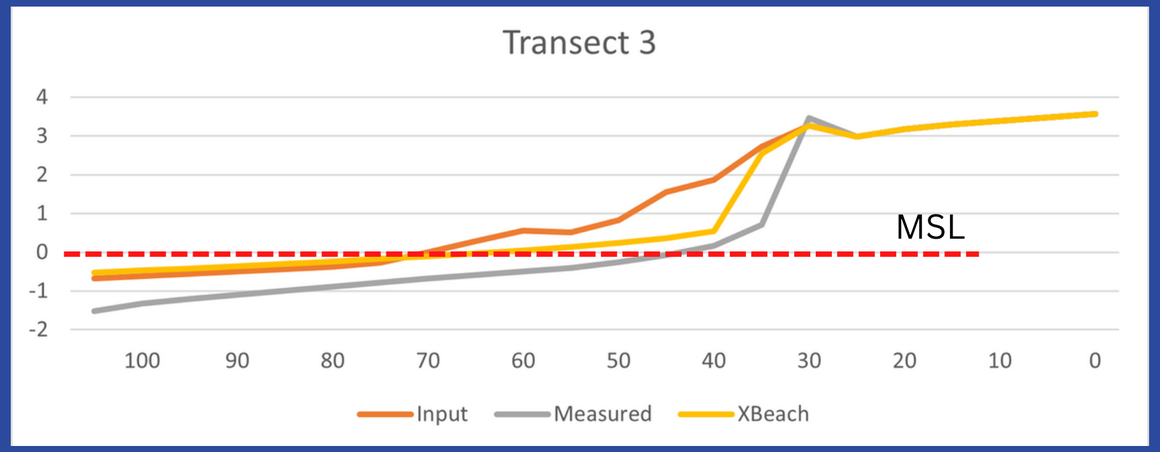


RESULT

TR 3

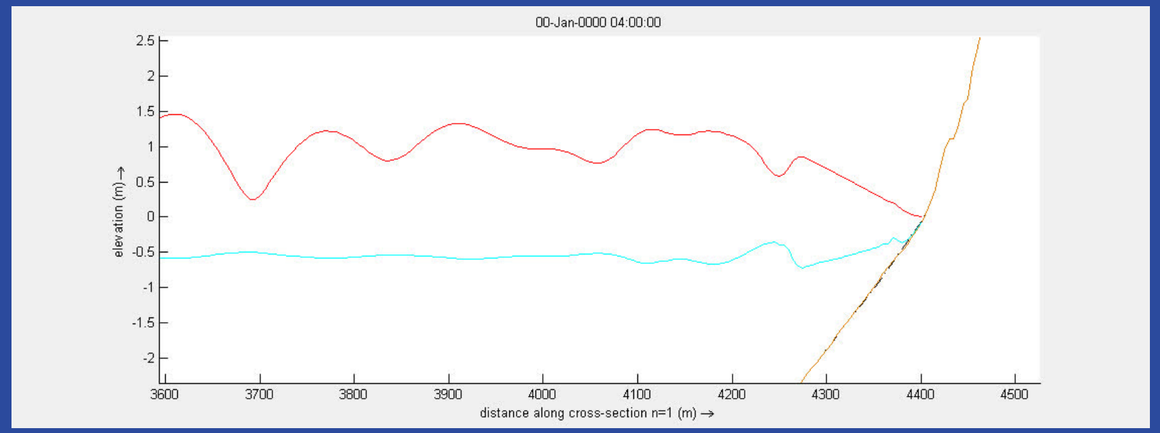
BSS = 0.825





TR 4

BSS = 0.968

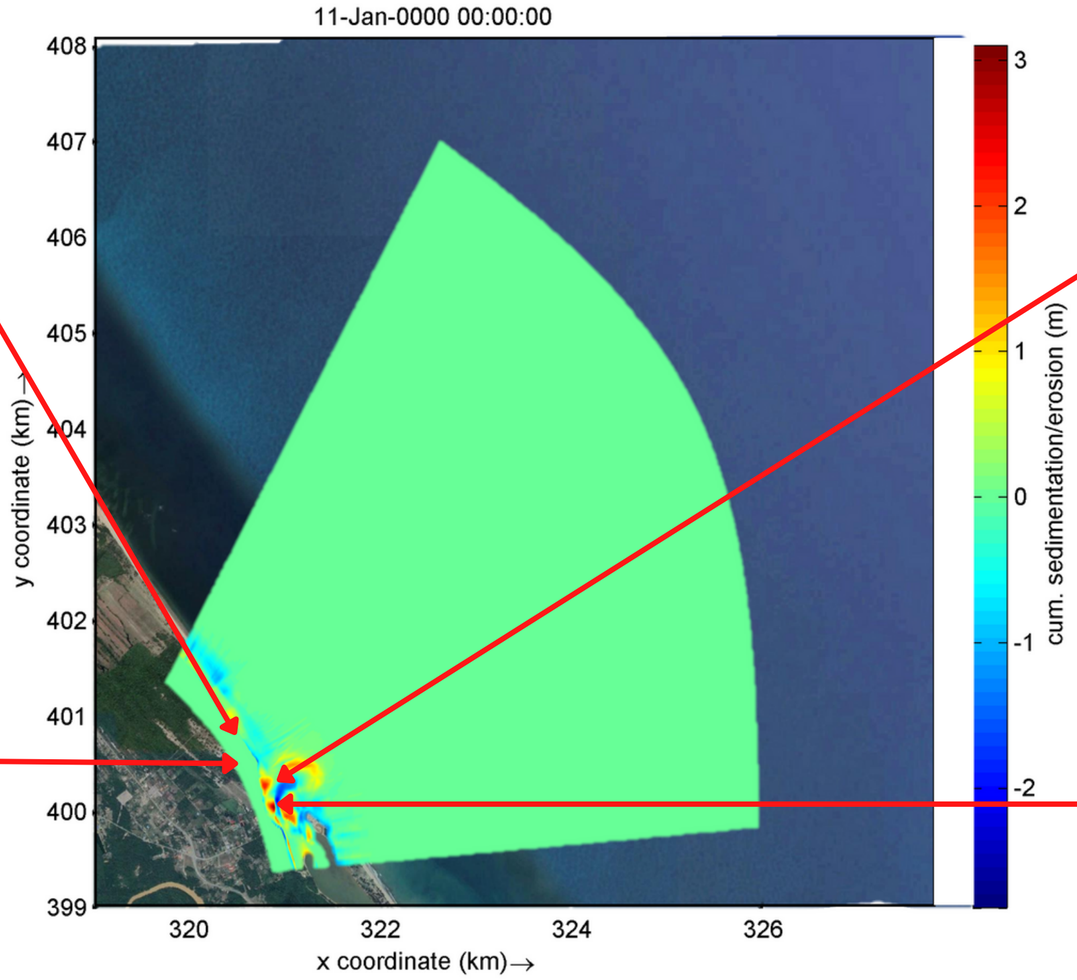


RESULT

EROSION STIMULATION

23 Dec 2021 TR 2

23 Dec 2021 TR 3



3 Jan 2022

3 Jan 2022

DISCUSSION

1 NUMERICAL MODEL

The Set up of XBeach for Cherok Paloh beach is calibrated accordingly and the BSS score signifys that is sufficient to be replicated onto other areas.

The Simulation is in line with the preliminary study that identifies the area to be experiencing coastal erosion with a rate of greater than 5 m.

2 RECOMENDATION

Required a wave calibration and validation for XBeach,

Mazmirul Abd Rahman