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Date: 10 February 2022

Mr. MUHAMMAD MAZMIRUL BIN ABD. RAHMAN

Department of marine Science, Kulliyah of Science
International Islamic University Malaysia,
Kuantan, Pahang

Dear Ms.,

LETTER OF ACCEPTANCE - [VIRTUAL] INTERNATIONAL CONFERENCE ON MARINE SCIENCE & AQUACULTURE (vICOMSA), 8 – 10 MARCH 2022

We are pleased to inform you that the abstract of your paper entitled "**RELIABILITY OF SHORELINE DELINEATION BETWEEN SENTINEL-2 AND LANDSAT 8 IMAGERY IN DETERMINING SHORELINE EVOLUTION FOR DSAS METHOD: A CASE STUDY IN PAHANG COASTLINE.**" has been accepted for **POSTER** presentation at the vICOMSA 2022 with the theme '**The Ocean We Want Towards Sustainable Development.**'

Please complete the conference payment form <https://forms.gle/s3UNLYr9x8mtGUyQ8> and fees accordingly on or before **15 February 2022**.

Fees: RM 100

Rate: Student (Malaysia)

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Presenter is required to submit one (1) poster in **PDF Format, 1 Page; Portrait Orientation**; and the file size is **not more than 10 MB**. Please use your name as the filename.

Please submit the file to vICOMSA 2020 committee (icomsa@ums.edu.my) before or no later than **28 February 2022**.



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Kindly visit our conference website (<https://vicomsa2022.wixsite.com/icomsa>) and Facebook page **International Conference on Marine Science & Aquaculture** for more information and latest updates.

We look forward to your participation in vICOMSA 2022. Please do not hesitate to contact the Secretariat through e-mail: icomsa@ums.edu.my if you require additional information about the conference.

Thank you.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'J. Joseph', written over a horizontal line.

ASSOC. PROF. DR. JUANITA JOSEPH

Chairman

International Conference on Marine Science and Aquaculture (vICOMSA 2022) Borneo Marine Research Institute

c.c - vICOMSA 2022 Secretariat

DAY 1 (8TH MARCH 2022)
POSTER SESSION 3: MARINE BIODIVERSITY AND CONSERVATION; MARINE POLLUTION AND OCEAN HEALTH; CLIMATE CHANGE: MITIGATION AND ADAPTATION; REMOTE SENSING AND COASTAL OCEANOGRAPHY

Chairperson	Time	Code	Presenter	Title
Dr. Zarinah Waheed	1640-1645	PCCMA-1	Elisa Rumpang	Ecosystem Carbon and Nitrogen on Tropical Peatlands
	1645-1650	PMPOH-1	Héctor del Castillo	The Abandonment of End-Of-Life Tires (ELTS) on the Spanish Coast: Analysis of the Phenomenon and Identification of High Incidence Areas
	1650-1655	PMPOH-2	Thivialosini Siva	Preliminary Data of Physicochemical Changes Associated with Decomposition of Partially Submerged Cadaver Buried at Different Depth in Mangrove Soil
	1655-1700	PMPOH-3	Madihah Jafar-Sidik	The variation of environmental profiles during harmful algal bloom in Sepanggar Bay, Sabah, Malaysia
	1700-1705	PRSCO-1	Muhammad Mazmirul Bin Abd. Rahman	Reliability of Shoreline Delineation Between Sentinel-2 and Landsat 8 Imagery in Determining Shoreline Evolution for DSAS Method: A Case Study in Pahang Coastline
	1705-1710	PRSCO-2	Ashadi Arifin Nur	Numerical Model Around Small Island: Study Case of Kei Island, Indonesia
	1710-1715	PRSCO-3	Indrawan Fadhill Pratyaksa	Calculating The Shifting of Mangrove Area Utilizing Satellite Data in Mundu, Cirebon
	1715-1720	PRSCO-4	Rima Rachmayani	Indian Ocean's Sea Surface Temperature in The Simulated Freshwater Perturbation
	1720-1725	PRSCO-5	Mochamad Riam Badriana	Vertical Distribution of Ocean Parameter in Nusa Dua, Bali, Coastal Area

PRSCO-1 RELIABILITY OF SHORELINE DELINEATION BETWEEN SENTINEL-2 AND LANDSAT 8 IMAGERY IN DETERMINING SHORELINE EVOLUTION FOR DSAS METHOD: A CASE STUDY IN PAHANG COASTLINE

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ABSTRACT

Pahang consists of many beautiful beaches that facing the South China Sea, and most of these beaches are severely threatened by erosion. Coastal erosion can lead to permanent land loss in the coastal area, which surely impacts the livelihood of residential reside near the coastline. There are many methodologies in which one can determine coastline changes, and for this study multi spectral Landsat 8 and Sentinel-2 were compared to show the reliability of shoreline delineation extraction between the spectral imagery for the period from 2018 to 2021. The shortwave infrared 1 from Landsat 8 and Sentinel-2 imagery were downloaded and processed. The different in tidal influences were minimized to the greatest extent possible in which for Landsat 8 is $1.88 \text{ m} \pm 0.21 \text{ m}$ and Sentinel-2 is $2.1 \text{ m} \pm 0.18 \text{ m}$. The rate of net changes in shoreline positioning was statistically calculated using Linear Regression Rate (LRR). Analysing extracted shoreline from 2021 with ground control point from field visits to calculate the normalized RMSE revealed that Sentinel-2 produced more reliable results than Landsat 8, $\text{NRMSE} = 0.009$ and $\text{NRMSE} = 0.019$, respectively. In overall, Sentinel-2 and Landsat 8 provide consistent results throughout the study area as compared with the National Coastal Erosional Studies 2015 from the Department of Irrigation and Drainage Malaysia.

KEYWORDS: Shoreline Evolution, Shoreline Delineation, Sentinel-2, Landsat 8, Digital Shoreline Analysis System.

RELIABILITY OF SHORELINE DELINEATION BETWEEN SENTINEL-2 AND LANDSAT 8 IMAGERY IN DETERMINING SHORELINE EVOLUTION FOR DSAS METHOD: A CASE STUDY IN PAHANG COASTLINE

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Mazmirul Abd Rahman

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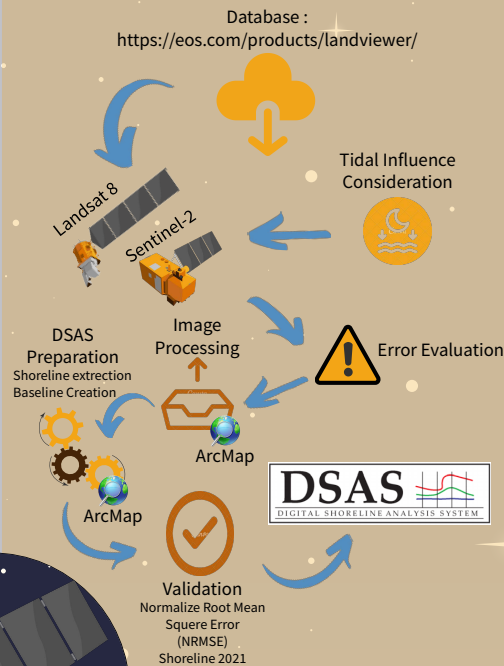


The Aperçu

Pahang consists of many beautiful beaches that facing the South China Sea, and most of these beaches are severely threatened by erosion. Coastal erosion can lead to permanent land loss in the coastal area, which surely impacts the livelihood of residential reside near the coastline. There are many methodologies in which one can determine coastline changes, and for this study multi spectral Landsat 8 and Sentinel-2 were compared to show the reliability of shoreline delineation extraction between the spectral imagery for the period from 2018 to 2021. The shortwave infrared 1 from Landsat 8 and Sentinel-2 imagery were downloaded and processed. The different in tidal influences were minimized to the greatest extent possible in which for Landsat 8 is $1.88 \text{ m} \pm 0.21 \text{ m}$ and Sentinel-2 is $2.1 \text{ m} \pm 0.18 \text{ m}$. The rate of net changes in shoreline positioning was statistically calculated using Linear Regression Rate (LRR). Analysing extracted shoreline from 2021 with ground control point from field visits to calculate the normalized RMSE revealed that Sentinel-2 produced more reliable results than Landsat 8, $\text{NRMSE} = 0.0009$ and $\text{NRMSE} = 0.0019$, respectively. In overall, Sentinel-2 and Landsat 8 provide consistent results throughout the study area as compared with the National Coastal Erosional Studies 2015 from the Department of Irrigation and Drainage Malaysia.

Method

The Study Framework



Data Acquired

- The Data acquired are in form of level 1 and 2.
- The acquired level already orthorectified and georeferenced.
- Study selection along Pahang Coastline with temporal image of 2018, 2019, 2020 and 2021.
- Image were selected during middle tide as calculated to the nearest station.

Data Processing

- The Shortwave Infrared 1 is used in the study.
- All imagery data for the four years are geometric correction with ground control points (GCPs).
- The RMSE of rectification must not exceed 0.5.
- Covered cloudy image is overlay with same year imagery.

DSAS Preparation

- Shoreline extracted using unsupervised classification.
- Baseline of 150 m from shoreline is created.

Data Validation

- Validation of the automatic shoreline delineation of 2021.
- The shoreline of 2021 is go through validation process with ground control points (GCPs).
- The NRMSE are calculated using following formula;

$$\text{RMSE} = \sqrt{\frac{\sum_{i=1}^n (L_{\text{Obs},i} - L_{\text{extract},i})^2}{n}} \quad [1]$$

$$\text{NRMSE} = \frac{\text{RMSE}}{L_{\text{Obs}}} \quad [2]$$

Spatial Bands of Sentinel-2 vs Landsat 8

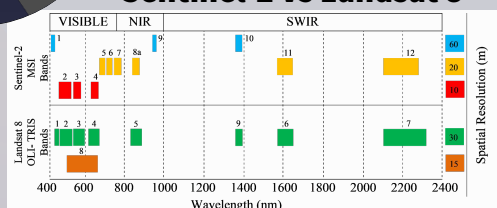


Figure 1: Spatial resolution and spectral range occupied by Sentinel-2 and Landsat 8. (Adapted from Pardo-Pascual et al. 2018).

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- Sheeja, P.S., and A.J. Ajay-Gokul. 2016. "Application of Digital Shoreline Analysis System in Coastal Erosion Assessment." International Journal of Engineering Science and Computing 6 (6): 7876-83. <https://doi.org/10.4010/2016.1848>.

Result

Sentinel-2

- Overall erosion at Pahang Northern Sector is 46.5%.
- Compared with NCES, 2015; 11 sites shown erosion while 2 more slightly eroded.
- The Sentinel have a smaller pixel size which affect the digitization of the imagery resulting less erosion.
- The result of **NRMSE = 0.009**



Figure 2: Digital Shoreline Analysis System output using Sentinel-2

Landsat 8

- Overall erosion at Pahang Northern Sector is 54%.
- Compared with NCES, 2015; all the 13 sites shown erosion results.
- The Landsat have a Larger pixel size which affect the digitization of the imagery resulting more erosion prone.
- The result of **NRMSE = 0.019**



Figure 3: Digital Shoreline Analysis System output using Landsat 8.

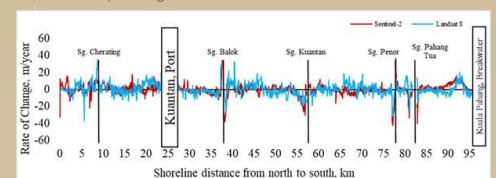


Figure 4: Comparison of linear regression rate between Sentinel-2 and Landsat 8 along Pahang coastline.

- The overall shoreline shifting pattern is identical between Sentinel-2 and Landsat 8.
- The differences in trend can be seen in kilometers 20, 45, and 68.
- In Pahang, the major shifting are more likely to happen at river mouth as it is one of the dynamic site.
- The result portrays, the spike different caused by pixel size.

Conclusion

Shortwave infrared 1 (SWIR_1)

Shoreline delineation

The reliability

The shortwave infrared 1 are proved to classified water body accurately as the band neglect blue spectrum.

As the SWIR_1 can be use in determine the shoreline, with validation it show higher accuracy in Sentinel-2

The comparison of Sentinel-2 and Landsat 8, The Sentinel-2 proved to be more accurate and dataset as compared to Landsat 8.



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**vICOMSA
2022**



CERTIFICATE of Participation

Muhammad Mazmirul Bin Abd. Rahman

Poster Presenter

(virtual) INTERNATIONAL CONFERENCE ON MARINE SCIENCE & AQUACULTURE 2022
The Ocean We Want Towards Sustainable Development

08-10 March 2022

Co-organizers



Graduate School of
Integrated Sciences for Life
Hiroshima University



ASSOC. PROF. DR. JUANITA JOSEPH
Chairman,
Conference Organizing Committee
Borneo Marine Research Institute
Universiti Malaysia Sabah



Certificate of Student Poster Presentation Award

This is to certify that

Muhammad Mazmirul Bin Abd. Rahman

has won the TOP 10 STUDENT POSTER PRESENTATION AWARD in the

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