The 3rd International Conference on

MARITIME SCIENCES & ADVANCED TECHNOLOGY

BOOK OF ABSTRACTS

"Toward Ocean Sustainability for a Better Future Through Sciences and Technology"

Pangandaran Integrated Aquarium
& Marine Research Institute (PIAMARI)
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BADAN INFORMASI GEOSPASIAL

KEMENTERIAN KELAUTAN DAN PERIKANAN

Preface

We believe that during the two days conference, all of us have obtained a fruitful discussion. We have learned a lot from the keynote sessions delivered by the amazing keynote speakers, twenty-four invited speakers who have shared their interesting work, and 6 mini-sessions were delivered by very interactive mini-session moderators. Once again, thank you for delivering such important materials so that all of us can deepen our knowledge about research in maritime sectors.

Furthermore, we would like to express my appreciation to all the participants from researchers, professionals, lecturers, students, and even teachers from Pangandaran Education, Youth, and Sports Office, for attending the conference and to all your organizations in Indonesia for sending excellent participants to the conference, such as Geospatial Information Agency Republic of Indonesia (BIG), Marine Affairs and Fisheries Republic of Indonesia (KKP), Meteorological, Climatological, and Geophysical Agency (BMKG), Indonesia Institute of Sciences (LIPI), and other institutes and universities. We are certain that every presenter has presented excellent presentations and active discussions. Thus, we can conclude that the purpose of the conference has been completely accomplished. We hope that what you have learned through the conference will help you a lot in your duties and lead to the stability of the region in the future. We sincerely hope that through your presentation and discussion afterward, all of us can contribute to solving issues related to the maritime sector in our own countries. Small contribution considered valuable.

Finally, we would like to apologize for any inconvenience that you might experience during this conference. We do also hope that we can meet again in the 4th MSAT 2023. Thank you!

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Book of Abstracts

These are the original abstracts submitted to 3rd MSAT 2021. Please note that revised abstracts and full papers are already published on IOP Conference Series: Earth and Environmental Science. Please follow this link to access full of proceedings publication.

Toward Ocean Sustainability for a Better Future Through Sciences and Technology

The 3rd International Conference on Maritime Sciences and Advanced Technology (MSAT)-Virtual

Pangandaran Integrated Aquarium and Marine Research Institute, Indonesia, August 5-6, 2021

[ABS-2]

THE COMPARATIVE STUDY OF WAVE ON TOAYA BEACH USING GUMBEL METHOD AND FISHER TIPPET-TYPE 1 METHOD

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ABSTRACT

Toaya is one of the villages in Sindue district of Donggala which along its village lay on the coastal area of the high sea. Donggala regency is the oldest port in central Sulawesi province which the region has a long coastal area that is 400 km. The waves that occur in the oceans are mainly caused by the influence of wind. This research aims to determine the height of wave that occured in Toaya Beach and can predict a wave that occurs with a return period some coming year period (2, 5, 10, 25, 50, 100) years using Gumbel Method and Fisher Typpet-Type 1 Method.

Based on the result analysis, then obtained significant wave height (Hs) = 1,65 m and the significant wave period (Ts) = 7,05 seconds in 2013 northwest direction. For the frequency distribution analysis with Gumbel Method on a return period of 2 years = 1,45 m, the return period of 5 years = 1,59 m, the return period of 10 years = 1,69 m, the return period of 25 years = 1,80 m, the return period of 50 years = 1,89 m and the return period of 100 years = 1,98 m while the frequency distribution analysis by The Fisher Tippet Type-1 Method in the period of 2 years= 1,45 m, the return period of 5 years = 1,56 m, the return period of 10 years = 1,63 m, the return period of 25 years = 1,72 m, the return period of 50 years = 1,79 m and the return period of 100 years = 1,86 m.

Keywords: Wind, Fetch, Wave, Return Period, Toaya Beach

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-5]

A NEW REGIONAL OCEANOGRAPHIC DATA PORTAL: PADJADJARAN OCEANOGRAPHIC DATA CENTRE (PODC)

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ABSTRACT

A website was developed to distribute freely oceanographic data based on a variety of in-situ sampling instrument. A data portal (www.isea(dash)podc.org) collected, stored, and investigated by the experts. It is also can display real-time data. Universitas Padjadjaran leads the Marine Research Laboratory (MEAL) in partnership with Marine Science Institute (MSI), University of the Philippines. This framework data will provide information in support of marine, ecosystem, fisheries, and climatology science. Furthermore, all data are discoverable to decision-makers in all aspects. Recently, the data come from student research, new instruments (RHEA and ARHEA) developed by MEAL. In the future, the portal will integrate with other government institutional data and other functional features. It also provides for network-wide analyses. Last, to gain more impact, need more effort to collaborate with other countries, especially in Asian countries.

Keywords: Ocean Data, Indonesia seas, Indonesia Array, Oceanographic Condition, RHEA-ARHEA

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-7]

DESIGN AND ANALYSIS OF LOW-COST UNDERWATER GLIDER FOR SHALLOW WATER

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ABSTRACT

This paper aims to design a low-cost underwater glider to operate in shallow water. The proposed design was developed by manufacturing engineering software. Analysis of the hull using manufacturing

engineering software and 3D computer-aided design (CAD). The analysis of hydrodynamics using computational fluid dynamics (CFD). This glider was designed to operate for a maximum depth of 10 m and a maximum speed of current 12,96 km/h, or 3,6 m/s. To reduce and minimize the cost to manufacture this underwater glider, the mechanics, electrical, electronics, and power source were using common tools on the market, not on demand. The hull pressure had 2.05 atm or 207716.2 Pa for maximum depth 10 m and max speed 12,96 km/h. Maximum pressure occurs on the nose and behind the wings. This unmanned vehicle was designed to be in 9 compartments. The first compartment and 8th compartment are used for ballast tanks. The others for: mechanics of ballast system, altimeter and attitude controller, payload, battery pack, main controller part, propulsion system, and propulsor.

Keywords: underwater glider, unmanned vehicle, 3D CAD, CFD, shallow water, low cost

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-14]

HYDRODYNAMICS TIDAL AND MONSOONAL CURRENT CHARACTERISTICS IN PONDOK DAYUNG PORT OF TANJUNG PRIOK HARBOR JAKARTA

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ABSTRACT

Pondok dayung Port is part of the Tanjung Priok Harbour in the Jakarta Coastal Bay. Information concerning hydrodynamics tidal and monsoonal current characteristics is important for vessels movement and laid/dock in the port basin/jetty. This hydrodynamics condition has been simulated using two-dimensional shallow water equation modeling. Ocean current simulation is generated by a coupling between tidal and monsoonal wind. In general, simulation results showing the ocean current characteristics inside port area is dominated by tidal, and its interaction with coastlines, jetty, and breakwaters. The numerical simulation has been satisfying validated using time series sea elevation from the tidal station at the port area, which operated by National Geospatial Agency (BIG). An incredibly good RMSE showing value 0,0405 - 0,0458 m, with strong linear correlation value between 0.9648 and 0.9843. During flood tide, ocean current is flowing to basin area. Meanwhile, during ebb tide, ocean current moving out of basin port area. The maximum tidal current speed (0,26 m/s) is found at the waterways of port area. The maximum current speed (0,26 m/s), has been found also at the same waterways of port area, during west and east monsoon. The minimum ocean current speed (nearly zero m/s) has been found in basin port area, during west and east monsoons. Those conditions implying that the Pondok Dayung Port and its breakwater system can protecting, all vessels inside, from the rough ocean current condition

Keywords: hydrodynamics, tidal, monsoonal, current, pondok dayung port, tanjung priok harbour.

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-16]

AN EXPERIENCES OF AIRBORNE TOPO-BATHYMETRIC LIDAR TECHNOLOGY FOR NEARSHORE MAPPING IN WESTERN PART OF JAVA ISLAND

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ABSTRACT

Indonesia is a largest archipelago country along with its 108.000 km coastline and more than 17.000 islands. Many cities are in the coastal area which made it necessary to have a reliable a coastal map for spatial planning and development. The Geospatial Information Agency, appointed to fulfil this task, have to provide a map for the whole area including the coastline. The coastline, located in shallow water, is an important element for several applications such as topographic height reference, a reference in the delimitation of the marine management area and coastal boundaries. This information can be extracted from seamless terrain and seabed profile. However, it is a challenge to do mapping due to its physical characteristic. A conflict will occur when the mapping is not done properly and the data is not appropriate. This paper presents our experience on nearshore mapping (coastal area) using airborne topo-bathymetric LiDAR technology at the western coast of Java and southeast of Sumatera. A point cloud which an output of the system, obtained from pulse and waveform data process, then filtered and classified to the terrain and seabed profile. The coastline delineated from this data after its transforms to geoid and tidal datum correction has done. As a complement, a digital camera integrates with the system as a one platform and digital photogrammetry workflow is implemented to provide a mosaic photo. Several field independent check points and hundreds points of shorelines transect used to check the accuracy. The result shows that vertical accuracy within decimeter level.

Keywords: LiDAR Topo-Bathymetry, Coastline Mapping, Indonesia

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-18]

ASSESSMENT STANDARDIZATION BASED ON IHO SP-44 SIXTH EDITION IN THE SINGLEBEAM ECHOSOUNDER (SBES) SURVEY (CASE OF FIELD EXCERCISE STTAL 2019)

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ABSTRACT

In September 2020, Special Publication No. 44 (SP-44) 6th Edition has been published by The International Hydrogaphic Organization (IHO). Based on the SP-44 5th Edition, for achieving Order 1B Classification at Singlebeam Echosounder (SBES) survey, recommended maximum line spacing is 3 x average depth or 25 meters. Based on the SP-44 6th Edition, recommended maximum line spacing is replaced by a minimum bathymetric coverage area. The requirement for minimum bathymetric coverage area to achieving Order 1B is 5%. The bathymetric coverage area at SBES is determined by the ability of the SBES itself. And also determined by the depth of the surveyed waters where the deeper the waters, the wider the SBES Beam Foot. This Paper aims to analyze whether STTAL practical exercise held in June and September 2019 (SBES survey) has a bathymetric coverage area equal or more than 5%.

Keywords: SP-44, Sixth Edition, Singlebeam, bathymetric coverage area, assessment

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-27]

STUDY OF BATHYMETRY AND SEABED MORPHOLOGY CHANGES AROUND ANAK KRAKATAU WATERS OF 2018 POST-ERUPTION

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ABSTRACT

Anak Krakatau is an active volcanic mountain located in the Sunda Strait, Indonesia. On December 22, 2018, this mountain erupted and the flank collapses off into the water. This changes the bathymetry and morphology of the seabed around the waters of Anak Krakatau volcano. This study uses bathymetry data surrounding the Anak Krakatau waters from the Indonesian Navy Hydrographic and Oceanographic Center (PUSHIDROSAL) in 2016 and 2019. The data were obtained by survey using Echosounder Multibeam System MBES EM2040 and EM302. By means of surface analysis method (hillshade), the data were process to observe the bathymetry and seabed morphology changes around the Anak Krakatau volcano waters by the eruption. The results of bathymetry data processing show a depth change of about 25 m, with the lowest value in 2016 ranging from -250,328 m and in 2019 ranging from -226.12 m. The average value of the slope of the seabed in 2016 was 5.31o and 4.98o in 2019

Keywords: Bathymetry- Seabed Morphology- Mount Anak Krakatau

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-30]

COMPARATION STUDY OF VARIOUS TIDAL PREDICTION MODELS WITH WATER ELEVATION DATA IN BENOA WATERS, BALI

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ABSTRACT

Indonesia has various potential marine activities because of its strategic location. In order to support those marine activities, it is necessary to use tidal data (tides). The availability of good tidal data proceeds from field measurement is inadequate compared to Indonesian seas^ total areas. The tidal numerical model can be one of the solutions to describe water level changes in certain areas. Those models provide information on sea-level fluctuation with different accuracy and errors. The aim of this study was to compare the level of accuracy from Tidal Model Driver (TMD), Oceanomatics, NAO tide, and Mike21 tide models. The tides in Benoa Bali waters were used for the pilot location to examine the accuracy of the headland waters model in Indonesia. The results showed that the NAO tide prediction model provides better accuracy for headland type, with the minimum error value 0,1403 and strongest correlation value 0,9731 compared to other tidal models.

Keywords: tidal prediction model, Tidal Model Driver (TMD), Oceanomatics, Naotide, Mike21 and Benoa Bali.

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-31]

ACCURACY ASSESSMENT OF SATELLITE DERIVED BATHYMETRY MODEL FOR DEPTH EXTRACTION IN SORONG SHALLOW WATER AREA

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ABSTRACT

Geospatial Information Agency (BIG) has government task in providing the coastal environment map including bathymetric layer as one of the components of the map. Marine research in BIG has continuously improved methods in obtaining related bathymetric data- not only relying on the conventional methods for i.e. echosounder-based methods, but also by incorporating satellite technology for i.e. passive remote sensing technology, i.e. satellite derived bathymetry (SDB). Regarding the SDB method, as we know, variation of sea bed cover can influence the relation between the spectral reflection of shallow water area and the depth of the sea. In this situation, normalization of the sea bed variation is needed. Previous studies have mentioned that the band ratio can help to normalize the variation of sea bed cover. This research is intended to compare the accuracy of satellite derived bathymetry by using single band and band ratio by incorporating two different methods: the conventional linear regression-based method and machine learning-based method i.e. random forest. For this research, two bands of Sentinel 2A (blue and green bands) are used along with a single beam echosounder (SBES) measurement data published in 2015 that are used as training and testing data for the SDB model. Furthermore, we evaluate the influence of sun glint correction to the results and estimate the accuracy of the model. In total there are two single bands and one combination of band ratio that are used for this research. The results show that: a) band ratio is effective in normalizing the variation of sea bed cover showing by a significantly lower RMSE values- b) machine learning outperforms linear regression method in achieving better SDB model- 3) the use of sun glint correction in the process is also increase accuracies of the SDB model. The use of SDB model to extend methods in obtaining bathymetry data is promising as more images become available free of charge and in various resolutions.

Keywords: Band ratio- Random forest- Sun-glint correction- Bathymetry- Satellite Derived Bathymetry

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-34]

CONTROLLED EXPERIMENT OF UNDERWATER VISION-BASED MAPPING AND NAVIGATION: A PRELIMINARY EVALUATION

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ABSTRACT

Underwater vision-based mapping (VbM) and navigation constructs three-dimensional (3D) map and robot position simultaneously out of a quasi-continuous structure from motion (SfM) method. It is the so-called simultaneous localization and mapping (SLAM), which might be beneficial for mapping of shallow seabed features as it is free from unnecessary parasitic returns which is found in sonar survey. This paper presents a discussion resulted from a small-scale testing of 3D underwater positioning task. Here, we analyse the setting and performance of a standard web-camera, used for such a task, while fully submerged underwater. SLAM estimates the robot (i.e. camera) position from the constructed 3D map by reprojecting the detected features (points) to the camera scene. A marker-based camera calibration is used to eliminate refractions effect due to light propagation in water column. To analyse the positioning accuracy, a fiducial marker-based system -with millimetres accuracy of reprojection error- is used as a trajectory^s true value (ground truth). Controlled experiment with a standard web-camera shows that such a system is capable to robustly performing underwater navigation task. Sub-metre accuracy is achieved utilizing circa 30 keyframes (pose) every second.

Keywords: Vision-based mapping, SLAM, Underwater navigation

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-37]

Evaluation of A New Integrated Marine Instruments: RHEA (Drifter GPS Oceanography Coverage Area)

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ABSTRACT

Marine instrumentation implements natural resources in the marine sector obtained in oceanographic characteristic storage data to be used widely. This research aims to evaluate a new lagrangian instrument called RHEA, developed by the Marine Research Laboratory, Padjadjaran University. This research was conducted by examining the correction factors contained in the RHEA from the mechanical and electronic side to optimize the work and carry out appropriate validation of the oceanographic parameter data. The method used is by studying marine instrument literature and conducting a series of tests on the tool until it is ready for use at sea. The output of this research is in the form of literature on how the device works to be effective and efficient in collecting information about certain oceanographic factors. The result shows that RHEA has various functions: measuring pH, dissolved oxygen, temperature, turbidity, and salinity in real-time time. This instrument needs to be slightly modified again related to its design so that it can be more optimal when measuring oceanographic parameter data. In addition, in terms of data acquisition, it is necessary to improve the electronic components by replacing or adding several parts so that the data obtained can have high accuracy.

Keywords: Marine Instrumentation- Oceanographic- Lagrangian method- Arduino- Archipelagic

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-48]

THERMAL FRONT CHARACTERISTICS IN THE STRAIT OF MALACCA

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ABSTRACT

The Malacca strait is an important seaway for international sea traffic as well as a provider of biological and non-biological resources. This strait also has dynamic conditions as the result of interaction between the Indian Ocean in the north and the Pacific Ocean in the south of the strait. The dynamics of the strait that have not been studied comprehensively is the characteristic of the thermal front. The purpose of this study is to analyze the horizontal thermal front phenomenon based on seasonal and interannual variations, and to identify the vertical structure of seawater temperature characteristics in the area where the thermal front occurs in the strait of Malacca. The data used in this study are sea surface temperature of AquaMODIS level 2 satellite images from https://oceancolor.gsfc.nasa.gov/, seawater temperature data of Marine Copernicus from https://marine.copernicus.eu/, Ocean Nino Index (ONI) and Dipole Mode Index (DMI) data from https://stateoftheocean.osmc.noaa.gov/. The data were processed from 2012 to 2016 using the Single Edge Image Detection (SIED) method by Cayula and Cornillon (1992). The results of this study indicate that the highest incident of the thermal front during 2012 until 2016 occurred in the west season. The combination of La Nina and negative IOD shows the highest number of thermal front events compared to El Nino and positive IOD also normal conditions. The variation of temperature in the area where the horizontal thermal front occurred shows a different vertical structure between the northern regions, the middle, and the south of the strait.

Keywords: seawater temperature, thermal front, Strait of Malacca, ENSO, and IOD

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-49]

PATHWAYS, TIMESCALES AND TRANSPORT OF THE INDONESIAN THROUGHFLOW IN A HIGH-RESOLUTION OCEAN CIRCULATION MODEL

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ABSTRACT

The tropical Indonesian Seas play an important role in the climate system. There is a central water flow in this sea called the Indonesian Throughflow (ITF). ITF is recognized as one of the important currents in the global thermohaline circulation that connects the Pacific and the Indian Ocean. The heat and freshwater carried by the ITF is identified to have an impact on the Pacific and the Indian Ocean. Within the Indonesian Seas, the characteristics of the Pacific water, marked by the large salinity variations in the vertical direction, are modified to form nearly isohaline profile. The water masses from the Indonesian Seas can be distinguished in the Indian Ocean as low salinity water. Existing knowledge about the ITF is still limited, especially on the influence of small-scale ocean features on the main ITF routes. In addition, the transformation of thermocline water masses that turn into isohaline profiles is still not fully understood. This study aims to answer how the high-frequency flow variabilities affect the ITF residence time and path.

Keywords: ITF- Lagrangian- transport- residence time- path

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-56]

TEMPORAL DISTRIBUTION AND CHARACTERISTIC ANALYSIS OF OIL SPILL IN BALIKPAPAN BAY

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ABSTRACT

Balikpapan Bay has an oil spill case that attracts many people because it is considered a serious environmental problem and is detrimental to the environment. One of the cases that occurred was the leak of an oil pipeline in Balikpapan Bay due to the wrong anchorage of a ship that occurred on March 31, 2018. Detection of oil spills for three months using Sentinel 1-A satellite data to determine the distribution and analysis of the same oil characteristics from the source of pipe leaks in the Gulf of Balikpapan. The multi-temporal distribution of oil spills in Balikpapan Bay in March, April, and May 2018 has a significant difference in the upstream and mouth of the bay due to a pipe leak on March 31, 2018. Characteristics of upstream oil spills represented by stations 4 and 5 have the anisotropy value is lower than at the mouth of the bay which is represented by stations 1 and 2. The characteristics of the oil spill in Balikpapan Bay have differences before and after the oil spill due to pipe leakage as indicated by the decrease in the anisotropy value.

Keywords: oil spill, remote sensing, SNAP

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-58]

DETERMINATION OF FISHING CATCHMENT AREA USING SATELLITE REMOTE SENSING DATA WITH MACHINE LEARNING METHOD

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ABSTRACT

Fishing is the largest source of economic activity and food in Indonesia. However, fishing productivity is decreasing in several areas including Tanjung Pandan, Bangka Belitung Islands. The decrease in productivity occurs because the effort for fishing is greater than the amount of caught fish so that the catch per unit effort (CPUE) is low. High effort and a small number of caught fish are a major problem now. Problems come from unknowing the right location and time to catch fish, so it is not effective. Therefore, this study will determine the potential fishing areas for Tanjung Pandan. The data used are sea surface temperature (SST) and monthly Chlorophyll-a (Chl-a) level 3 images from Moderate Resolution Imaging Spectroradiometer Satellite (MODIS) from 2008 to 2018 and data of fish catches of PPN Tanjung Pandan which include in WPP-RI 711. This study shows that, with the integration of remote sensing technology, statistical modeling using machine learning and geographic information systems (GIS) is a new method for the fishing catchment area. The expected result is the optimal determination of potential fishing areas in Tanjung Pandan for each season, so the productivity of fishermen in Tanjung Pandan can increase with effective effort.

Keywords: Fish Catchment Area, CPUE, Satellite Remote Sensing, and Machine Learning.

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-59]

THE IMPACT OF GROUNDWATER TABLE VARIABILITY ON MANGROVE GREENNESS IN KARIMUNJAWA NATIONAL PARK BASED ON REMOTE SENSING STUDY

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ABSTRACT

Karimunjawa National Park is located on Karimunjawa Island and Kemujan Island, Central Java Province, Indonesia. The characteristics of the mangroves in the Karimunjawa National Park are unique because some mangroves in this area grow not in intertidal areas like common mangrove. This condition may cause mangrove in this area to suffer drought or dieback due to decreasing soil moisture caused by decreasing the groundwater table in the dry season. This study aims to know the correlation of groundwater table variability on the soil moisture and mangrove greenness in Karimunjawa National Park. The mangrove greenness and soil moisture can be estimated by using remote sensing method. The mangrove greenness was estimated using Normalized Difference Vegetation Index (NDVI) and the soil moisture was estimated using Normalized Difference Water Index (NDWI). The groundwater table data obtained from six observation point from 11 October 2019 to 29 September 2020. We used Sentinel-2 L2A Image and Google Earth Engine (GEE) to estimate Vegetation Indices (NDVI and NDWI) in time series based on the groundwater table observation time. The groundwater table data and obtained vegetation indices then calculated in monthly average. The results show that cloud was the main problem in obtaining vegetation indices from satellite images. Thus, we obtained fewer images in the wet season because clouds covered the study area. Moreover, the groundwater table data show positive correlation with vegetation indices. Therefore, the water table influences the soil moisture and the mangrove greenness in Karimunjawa National Park. A low groundwater table decreases soil moisture and then decreasing mangrove greenness.

Keywords: Mangrove, NDVI, NDWI, GEE, Groundwater Table, Karimunjawa

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-75]

FISHING BOAT DETECTION USING SENTINEL-1 VALIDATED WITH VIIRS DATA

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ABSTRACT

Detecting fishing boat activity is still a challenge for archipelago countries to monitoring the huge water area. Space technology using sensor SAR to detect the ship has been developed since 1951. However, the cost to use SAR image is one of the barriers for operational detection mainly for detecting fishing boat activity. This research aims to evaluate the use of Sentinel-1 to identify fishing boats. We use VIIRS data for validating purposes. Both data sources could be accessed freely. The object detection process could be derived in three steps: pre-processing, object discrimination and object validation. We used the constant false alarm rate (CFAR) method to discriminate the object at sea. To identify fishing vessels, we used the size of the vessels and the intensity of light capturing by VIIRS. The overlaying SAR data and VIIRS data showed a good correlation.

Keywords: Fishing Boat Detection, SAR Sentinel-1, VIIRS, Vessel Monitoring

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-78]

STUDYING DYNAMIC OCEAN TOPOGRAPHY IN INDONESIA SEA BASED ON SATELLITE ALTIMETRY

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ABSTRACT

Dynamic Ocean Topography is a part of sea surface variabilities that is derived from Sea Surface Topography as a time-dependent component. The Dynamic Ocean Topography height in this study was determined using the geodetic method of instantaneous sea level height measurement from satellite altimetry technology and the results are expected to be used to study the characteristics of the Indonesian seas for scientific and engineering purposes. In the territory of Indonesia seas, a picture of the long wavelength phenomenon from the Dynamic Ocean Topography ranges from 0-2.5 meters with three distribution zones of low, medium and high value. While the correlation with the positive value of Steric Sea Level Rise was obtained in almost all parts of Indonesia except for the area in the southern part of Java Island around longitude 1070E and in the Pacific Ocean region, where that are thought to be caused by the existence of several permanent marine high frequency physical phenomenon but with an indefinite period which is usually act as dominant time-independent component of the Sea Surface Topography.

Keywords: DOT, SLA, SLR, Altimetry, Indonesia

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-85]

IDENTIFICATION OF POTENTIAL FISHING GROUND ZONE BY USING SATELLITE OCEAN COLOR REMOTE SENSING: CASE STUDY INDONESIA SEA

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ABSTRACT

Monitoring of Surface chlorophyll-a (chl-a) concentrations and Sea Surface Temperature (SST) are important for the management of fishing ground. Satellite-estimated of SChl-a and SST have often been used to investigate the spatial and temporal changes of sea surface condition which is influencing fishing ground within Indonesia Sea. The thermal front indicated by SST and phytoplankton indicated by chl-a are analyzed and transferred onto map called an ^potential fishing ground (PFG)^ map. Results revealed that there were occurrences of thermal front and chl-a in the southeast monsoon that were likely related to high fisheries potential. Finally, the remote sensing techniques can be an important tool for policy makers, environmental managers and the scientific community to monitor shifting of the fishing ground.

Keywords: Fishing Ground, MODIS Aqua, Surface Chlorophyll-a, SST, Thermal Front.

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-94]

PUMMA (Perangkat Ukur Murah untuk Muka Air Laut) PERFORMANCE FOR WATER LEVEL MONITORING OF MANGROVE ECOSYSTEM IN PANGANDARAN

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ABSTRACT

PUMMA is a real-time tide gauge that has been operating in several parts of Indonesia. One of them was installed in a mangrove area of Pangandaran that supports both the fisheries and tourism sectors. Tidal dynamics is one of the factors that can affect the species richness and abundance of fish in the mangrove ecosystem. PUMMA Pangandaran monitors the water levels of the mangrove ecosystem in real-time 24/7 and produces CCTV images. This paper aims to analyze the performance of the PUMMA in Pangandaran based on data from water level measurements and image quality from CCTV. The results show that the tidal range in the waters of the mangrove ecosystem in Pangandaran is 1.3 M, with the maximum and minimum high tides being 0.79 m and -0.53 m. The tidal type in the mangrove ecosystem in Pangandaran is a daily trend semidiurnal affected by the tides and the geometry of the estuary. The water level in the mangrove area was influenced by sediments that form a sandbar at the mouth of the Ciputrapinggan river, which controls the fluxes of seawater. There is a data gap of 367 hours in the observation period where at the beginning of the installation of PUMMA, technical problems still often occurred. However, after March and April, performance improved with only three hours data gap. For the quality of CCTV cameras, good quality images contributed to about 76.60% and only 5.41% on bad quality. Overall, PUMMA^s performance showed excellent reliability in monitoring the water levels and the conditions of the mangrove ecosystem.

Keywords: PUMMA- water level- Pangandaran

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-110]

Effect of Turbidity, Temperature and Salinity of Waters on Depth Data from Airborne LiDAR Bathymetry

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ABSTRACT

The influence of seawater parameters cannot be ignored when conducting bathymetric LiDAR (Laser Induced Detection And Ranging or Light Detection And Ranging) surveys such as turbidity, temperature and salinity. Turbidity affects the attenuation diffusion coefficient of the green laser in penetrating the air column. The comparison of LiDAR bathymetric depth with Secchi disk depth is used as a reference in determining the effect of turbidity. The results are in locations with mostly clear water the ability of LiDAR can penetrate up to 7m, while in turbid waters up to 3m. On average, the ability of the green laser LiDAR bathymetry is able to penetrate the waters of 1.5-2 times the depth at the location of this study around the bay of Lampung Indonesia. Other water parameters are temperature and salinity. These parameters are used to calculate the refractive index value of water. The use of different temperature and salinity values in a water column can result in differences in the accuracy of the bathymetry LiDAR depth of 4-6mm. The influence of water column parameters can be a concern in planning and processing airborne LiDAR altimetry (ALB) surveys.

Keywords: Lidar- Bathymetry- Depth-

Topic: Marine Geodesy, Satellite and Operational Oceanography

[ABS-6]

HEAVY METALS CONCENTRATION IN SEDIMEN OF MAKASSAR STRAIT

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ABSTRACT

The concentration of heavy metals Pb, Cd, Cu, Cr, Zn and Ni in sediments of Makassar Strait were investigated. Sediment samples were collected at 28 research station. All samples was analyze using Atomic Absorption Spectrophotometer (AAS). The aimed of this research is known the levels of heavy metal contamination and pollution in sediments. The results showed that the concentration of all heavy metals stiil low and inlined with the sediment standard guidelines, exception Cu and Ni. Based on the value I_geo and PLI, sediment in the Makassar Strait is still normal for marine life, and sediment including to unpolluted categories (PLI<1). The sources of heavy metals in this strait is came from human activities in the land of Kalimantan dan Sulawesi Island.

Keywords: Makassar Strait, sediments, heavy metals

Topic: Marine Hazard and Coastal Degradation

[ABS-9]

THREE-DIMENSIONAL NUMERICAL MODELLING OF TIDAL CURRENT IN BALIKPAPAN BAY USING DELFT3D

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ABSTRACT

Balikpapan is one of the main port cities which has residential areas, industry, trade, and vital objects scattered from north to south along the coast of Balikpapan Bay. This dense activity increases traffic in Balikpapan Bay so the hydrodynamic conditions in these waters are important to be reviewed. The purpose of this research is to simulate hydrodynamics in Balikpapan Bay. The simulation results of the hydrodynamic model for sea-level elevation values are close to the conditions in the field, as indicated by the correlation coefficient 0.98- skill 0.99- and RMSE 0.15 m. The ocean current velocity verification includes the average of correlation for x direction and y direction, 0.93- RMSE 0.05 m- and the percentage error 6.7%. The significant current velocity is at low tide during spring tide with an average of 0.1 m/s and a maximum speed of 1.62 m/s. Temporally, the observation point at the mouth of Balikpapan Bay has the most significant BSS magnitude value with an average of 0.05 N/m2. Spatially, the highest BSS magnitude value is at the time of spring tide when it recedes towards the tide with an average BSS in the bay of 0.16 N/m2. The most dominant tidal components are M2 and S2, with a contribution value of 65.3%. The phase propagation from mouth to upstream of Balikpapan Bay for the M2 component in Balikpapan Bay is 10.5 degrees (22.77 minutes) and 5.5 degrees (11 minutes) for the S2 component.

Keywords: Balikpapan Bay, hydrodynamics, numerical model, tidal current.

Topic: Marine Hazard and Coastal Degradation

[ABS-10]

Influence of variability to coastline dynamic in the small uninhabited reef islands of Kepulauan Seribu

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ABSTRACT

Small reef islands provide habitable land for coastal communities in many part of the world. Small, low lying reef islands are commonly considered among the most geomorphically sensitive landforms to changes in sea level, wave processes, sediment supply and anthropogenic impacts. Kepulauan Seribu in the Java Sea comprise of numerous reef islands. By 2019, the islands chain is host to more than 24 thousands people. Kepulauan Seribu is affected by monsoon wind cycle. The monsoon wind also known to interact with an interannual phenomenon such as Indian Ocean Dipole (IOD) which affecting regional and local wind circulation. This study aim to examine the reef shoreline response to seasonal and interannual climate variability using satellite data that encompasses yearly monsoon cycle and IOD event. Strengthens (weakens) of winds speed in the study area during the East (West) monsoon, which in some year also coincides with a positive (negative) IOD event, are observed from 2009-2018 ERA-Interim by The European Centre for Medium-Range Weather Forecasts (ECMWF) data. These variability influence shoreline shifting in the uninhabited reef islands of Kepulauan Seribu as considered based on satellite imagery analysis. More pronounce shifted of large sediment flux are perceptible on opposing monsoon which coincides with positive/negative IOD event. Small uninhabited reef islands have ecological and economical value, therefore enhance coastal resilience from erosion by using combinations of natural and built infrastructure (hybrid approaches) should be taking into consideration. Ultimately, a good understanding of climate variability that controlled changes in beach systems of reef islands is important for adequate coastal management decisions

Keywords: Reef island, erosion, variability, coastline dynamic, monsoon

Topic: Marine Hazard and Coastal Degradation

[ABS-20]

Littoral drift analysis based on long-term observation of mesotidal beach profile in Kuta Beach, Bali for coastal retreat assessment

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ABSTRACT

The beach profile survey in the intertidal zone is crucial for a temporal variability study of shoreline and beach profile change for coastal management. The combination of numerical modelling and field data has proven to be successful in identifying the primary hydrodynamic and sediment transport processes such as littoral and cross-shore drift. Those parameters are relevant to the sandbar migration process and shoreline changes. The purpose of the present study is to analyse the littoral drift that caused temporal variability shoreline change in mesotidal beach for coastal retreat mitigation. Beach profile data of Kuta Beach was analyzed by 7 years of long-term field observation data. The shoreline definition used mean sea level (MSL) 1.3 m and high water level (HWL) 2.6 m as reference. By using the MeEPASoL program as graphical user interface program, shoreline changes converging to an equilibrium state can be simulated by taking into account the existing breakwater. Temporal shoreline position resulting from littoral drift and beach width change from its initial position is estimated for coastal erosion analysis. Furthermore, this study can be used in the process of identifying the primary hydrodynamic analysis in erosion disaster management as assessment of beach erosion.

Keywords: intertidal zone, littoral drift, shoreline equilibrium, coastal retreat

Topic: Marine Hazard and Coastal Degradation

[ABS-23]

Identification of Marine Debris and Its Distribution Using Unmanned Aerial Vehicle (UAV) on the Cirebon Coastal Area, Indonesia

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ABSTRACT

Marine debris monitoring is needed to control debris which is increasing every day. A specific plan is required to minimize the debris amount in the sea with basic information in the form of the dominant debris type and the debris extent. This aims of study is to identification marine debris in the Cirebon Coast Area. This study^s marine debris monitoring uses orthophoto obtained using an Unmanned Aerial Vehicle (UAV)/drone with the DJI Phantom 4 Pro type. The orthophoto was taken from a height of 80 m along the study area. The debris identified in Cirebon Coastal Area (CCA) based on the orthophoto are plastic, pieces of cloth, pieces of wood/mangrove trunks, bamboo, banners, and pieces of asbestos. Visually, debris in Karang Anom more than in Rawa Urip. The change in tidal height can affect debris not visible on the orthophoto at the maximum water level. In addition, the tides can also move marine debris varying from 10 to 50 cm from its previous position. The area of marine debris at Rawa Urip Beach at the time of slack before flood tide was larger (55.53 m2) than the area at the time of slack before low tide (52.71 m2). Meanwhile, the area of marine debris at Karang Anom Beach at ebb tide (129.89 m2) is larger than the area at slack before ebb tide (75.79 m2). Factors that affect the area of debris in the Cirebon Coast Area include tidal height, beach slope, seawater visibility, type and density of debris. Marine debris monitoring using UAV is effective for identifying marine debris with a large area in a short time without direct contact with the debris.

Keywords: marine debris, UAV, Cirebon Coastal Area

Topic: Marine Hazard and Coastal Degradation

[ABS-24]

Potential Source Analysis of Macro Debris in Untung Java Island by Using Trajectory Particle Modelling

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ABSTRACT

Untung Java is one of the small islands in Thousand islands. One of the most highlighted problems on this island is the accumulation of macro debris that occurs in the coastal and mangrove ecosystems. The purpose of this study is to determine the most potential source point for distributing debris to Untung Java Island by using a hydrodynamic model and particle trajectory model of MIKE 21. The scenario of the simulation is using pre-reclamation condition. The estuary in Jakarta Bay is illustrated as the starting point for debris transport. Five other estuaries as potential source assumption are selected, namely Cisadane, Citarum, Muara Angke, Ciliwung and Cikeas. The validation data model used tidal data from Intergovernmental Oceanographic Commission (IOC) Sea Level Monitoring by utilizing Root Mean Square Error (RMSE) method. The RMSE is calculated up to 0.49-12.78%. The tidal current of Jakarta Bay is simulated up to 0.015-0.375 m/s. The Cisadane estuary is the most potential source as a supplier of macro debris to Untung Java Island due to its debris movement pattern and the nearest distance to the island.

Keywords: Untung Java Island, Macro Debris, Potential Source, Estuaries, Trajectory Particle

Topic: Marine Hazard and Coastal Degradation

[ABS-26]

Wave driven Setup across the North Coast Region of West Java

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ABSTRACT

Wave energy dissipation on the surf zone is compensated with the increase of mean sea level, the so-called wave setup, within the area. This study used the numerical model Delft3D to investigate the dynamics of setup across the north coast region of West Java (Losari to Indramayu) influenced by monsoon variations, in which the wave forcing was obtained from previous field studies on Cirebon coastal region. The waves within the region were largely dissipated far from the coastline, mainly at the area between Babakan and Karangampel, due to the gentle slope of the North coast of Java. The waves approaching the shoreline were mainly influenced by the east monsoon associated with the longer fetch from that direction. The wave setups varied from ~0.3 to 0.08 m with the maximum setup occurred near the coastline of the east (Losari) and west (Indramayu) parts of the model domain that consisted of steeper slopes. This potentially inducing severe coastal inundation that became a serious problem across the coastlines. Meanwhile, the setup near the coastline of the middle area of the domain (Babakan to Karangampel) was weaker, which was correlated to the larger wave dissipation within the offshore area of that region.

Keywords: wave setup, inundation, coastal, North West Java

Topic: Marine Hazard and Coastal Degradation

[ABS-32]

Microplastics contamination in invertebrates from mangrove forest of Probolinggo, East Java

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ABSTRACT

Mangrove has been considered as one of the ecosystems that vulnerable to microplastic pollution. It receives continuous exposure to contaminants by both land and marine-based activities. Microplastics accumulated not only in the mangrove environment such as surface seawater and sediment, but also in the organisms. This study aimed to analyze the occurrence of microplastics in three different invertebrates in the mangrove ecosystem, which are gastropod (Telescopium telescopium), bivalve (Isognomon isognomon) and mud crab (Scylla serrata). Microplastics were observed in 15 individuals of each invertebrate and out of 45 samples, only 12 samples were found without microplastics in its soft tissues. Microplastics were counted in almost similar number in each organism with the average of 2.7particle per individual for S. serrata, 2.3 particle per individual for T. Telescopium and 2.1 particle per individual for I. isognomon. However, when the calculation was made according to the wet weight of the soft tissues, S. serrata contained very low number of microplastics (0.04 particle/g) compared to I. isognomon and T. telescopium (0.9 and 0.5 particle/g, respectively). The results indicated smaller size organisms contained more microplastics than the bigger size ones. Fibers were the most common type of microplastics found in each species, while fragment and films were less commonly observed. Fibers have been known to be the dominating type of microplastics in aquatic environment. The results of this study raised concerns about microplastic pollution in mangrove areas and further studies are needed to understand the risks of microplastic ingestion to organisms.

Keywords: Bivalve- Gastropod- Mud Crab- Plastic

Topic: Marine Hazard and Coastal Degradation

[ABS-42]

A numerical study of submarine-landslide-generated tsunami and its propagation in Mamuju, West Sulawesi

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ABSTRACT

On 14th January 2021, there was a devastating earthquake (Mw 6.2) hit Mamuju and Majene, West Sulawesi, Indonesia at 18.28 UTC. According to National Disaster Management Authority, this event causes 84 casualties and 279 houses were damaged. The Sulawesi Island is situated in a very complex tectonic region, there are several thrusts and faults along the area such as Majene Thrust, Palu-Karo Thrust, Matano Fault, and Tolo Thrust that can lead to tectonic activities. One of the largest earthquakes was a 7.9 Mw in 1997 generated from North Sulawesi Megathrust that caused a catastrophic tsunami. Moreover, there were 9 tsunami events in the Makassar Strait from the year 1800 to 1999. In this research, three different scenarios of the tsunami in Majene were applied to obtain the tsunami elevation as well as the tsunami arrival time. The volume of submarine landslide had been used in tsunami submarine landslide modelling as an input. Those are included the height, width and length of the submarine landslide volume. Furthermore, the domain bathymetry was obtained from National Bathymetry (BatNas) with spacing grid 300 m x 300 m. The submarine landslide coordinate is also needed as a source of tsunami at 2.98OS and 118.94OE. The slide angle and slope angle are also inputted in this modelling with three experimental volumes, namely 1 km3, 0.8 km3, and 0.5 km3. This submarine landslide tsunami modelling used the Non-Hydrostatic WAVE Model (NHWAVE) method for tsunami wave generation, while for tsunami wave propagation using the Fully Nonlinear Boussinesq wave model - Total Variation Diminishing (FUNWAVE - TVD) method. The highest elevation value at each observation point obtained from this modelling occurred at point 18 (the closest location to the earthquake source), which is around 0.4 - 1.2 m.

Keywords: submarine landslide, tsunami modelling, NHWAVE, FUNWAVE, tsunami height

Topic: Marine Hazard and Coastal Degradation

[ABS-43]

The Shoreline Deformation in Convex Beach due to Sea Level Rise

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ABSTRACT

Sea level rise (SLR) is become more serious on a global scale and has become one of the main reasons causes shoreline changes, and erosion, even on an extreme scale can cause the sinking of coastal areas and islands. It was recorded that many big cities were damage by SLR. The Bruun rule is the most widely used method for predict the horizontal translation of the shoreline associated with a given rise in sea level. In this study, however, the change in the average shoreline at the convex beach, which is more vulnerable to erosion due to sea level rise, is investigated. The increase in water depth by sea level rise causes a change in the wave crestline, ultimately leading to a linearization of the shoreline. In general, it is assumed that the annual average shoreline is parallel to the annual mean wave crestline. And assuming that the equilibrium depth contour is formed according to the crestline, the retreat of the shoreline is predicted. The shoreline change is indirectly predicted through the wave crestline deformation from obtained from a wave model and this method is applied to the convex beach.

Keywords: Sea Level Rise- Coastal Erosion- Sediment Transport- Shoreline Change-

Topic: Marine Hazard and Coastal Degradation

[ABS-52]

Improving the TEWS in the Sunda Strait using real-time tidegauge sensors

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ABSTRACT

After the 2018 Palu and Sunda Strait Tsunami, the Tsunami Early Warning System (TEWS) due to non-tectonic processes needs to be developed for Indonesia since the existing TEWS was dedicated on earthquake generating tsunamis. The Sunda Strait and surrounding coastal area are strategically important for Indonesia as one of the main international shipping routes with critical coastal infrastructures. The tsunami threat is coming from subduction zone in the south and from the activities of Anak Krakatau Volcano in the middle of the Strait. The objective of the study is to provide parameters why tidegauges are very important for improving TEWS in the Sunda Strait (not just for validation). The tsunami numerical simulation scenario was conducted based on the 2018 tsunami event with latest bathymetry data, and the proposed locations for tidegauge are located based on the analysis of tsunami wave propagation and within the reach of existing communication system. The presence of the volcanic islands and the existing communication system^ for volcanic monitoring purposes have provided advantages for the installation of tidegauge sensors in the area. Based on the tsunami simulation and performance analysis of two-year installed IDSL (data density, latency time, alerts delivery, and CCTV quality) in Sebesi Island and Marina Jambu, the TEWS can be delivered in less than 5 minutes by means of SMS, email and CCTV images.

Keywords: tsunami, Krakatau, idsl, Tidegauge, tews

Topic: Marine Hazard and Coastal Degradation

[ABS-63]

The impact of Tropical Cyclone Seroja to the Rainfall and Sea Wave Height in East Nusa Tenggara

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ABSTRACT

Natural events following the activity of the Tropical Cyclone Seroja in April 2021 are investigated. During its active phase, Tropical Cyclone Seroja generated extreme rainfall events in some sub-provinces of East Nusa Tenggara (NTT): Ngada, Alor, Belu, Rote Ndao on 4 April, 2021, Kupang on 4 to 5 April, 2021, East Sumba on 4 to 6 April, 2021. Moreover, these extreme rainfall events triggered flood in Alor, East Flores, Lembata, The City of Kupang, Kupang, East Sumba, Malaka, Belu, and North Central Timor. The maximum sea wave height of the Indian Ocean at the Southern part of NTT was also increasing, from 4 meters on 1 to 2 April, 2021 up to 6 meters on 3 April, 2021, and rose to higher than 7 meters on 4 to 6 April, 2021. On 7 to 9 April, 2021, the sea wave height declined as the Tropical Cyclone Seroja moved to the Southwest of NTT.

Keywords: Tropical Cyclone, Rainfall, Sea Wave Height

Topic: Marine Hazard and Coastal Degradation

[ABS-72]

Marine Debris Tracking from River Discharge base on Hydrodynamic Simulation on Jakarta Bay

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ABSTRACT

Marine debris pollution is one of biggest problem that occurs in coastal city in Indonesia without exception Jakarta. Those marine debris increase with the addition of the Jakarta population. The main source of marine debris came from 13 rivers that flow into Jakarta Bay. Estimated that around 487 ton/day plastic debris that mismanaged potentially flows into the rivers and ended into the Jakarta Bay. Tidal forcing and current mainly affect the hydrodynamic condition in Jakarta Bay that drive the marine debris spread out from river estuary. The marine debris movement follow the hydrodynamic pattern due to the nature of floating marine debris. The proposed Giant Sea Wall in Jakarta Bay also affected in hydrodynamic condition in Jakarta Bay. As a result, the movement pattern of the marine debris influenced due to complex hydrodynamic condition in Jakarta Bay.

Keywords: Marine Debris, Giant Sea Wall, Jakarta Bay, Hydrodynamic

Topic: Marine Hazard and Coastal Degradation

[ABS-74]

Evaluation of Seroja Tropical Cyclone Event Forecast from InaNWP

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ABSTRACT

An Indonesian Numerical Weather Prediction (InaNWP) is an advanced numerical weather prediction designed to include observation to improve the results. While the performance of InaNWP in the current weather can be assessed by direct comparison to rainfall observation, their ability to represent prediction is resolved. Here the authors examine the performance of InaNWP in high-resolution atmospheric model simulations forced with data assimilation using a combination of data from rain gauge stations, radiosondes, and radar observations. They investigate whether the InaNWP can capture the Seroja tropical cyclone (TC) genesis and tracking path. Prediction of the TC Seroja path is made by using some initial numerical data and compared with the observed data. The results showed that InaNWP has been able to predict the direction of movement and intensity of TC Seroja.

Keywords: InaNWP- Tropical Cyclone- Seroja- tracking path

Topic: Marine Hazard and Coastal Degradation

[ABS-77]

Mapping The Abrasion On Sederhana Beach, Muara Gembong, Bekasi, West Java Province For The Coastal Mitigation Purpose

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ABSTRACT

Sederhana Beach is located in the waters of Muara Gembong, Bekasi Regency, West Java Province, northeast part of Jakarta Bay. The observation data in 2018 showed the morphology of the damaged coast and the massive fallen mangrove vegetation. Loss of land and mangrove populations has a major impact on the economic and environmental aspect. How to mitigate the impact of abrasion? This study aims to map the type of sediment, sediment distribution and its depositional environment, to obtain a correlation with the type and direction of currents causing abrasion. The results would become the basis for determining the appropriate actions to overcome further abrasion, in an integrated coastal area planning program. Seabed sediments were taken using a grab sampler, megascopic descriptions and analysis of the depositional environment off sediments were held on site. The results are plotted onto a map, to determine the distribution of sediments. Sediment types found are: coarse sand, clay, sandy clay, medium-fine sand, and silt. 75% of the study area is: scattered sandy clay, mostly covering the coastline to the north. This is a common phenomenon because the mainland of Sederhana Beach is dominated by mangrove vegetation. The Coarse sand took 20% of the research location. An interesting phenomenon is: the coarse sand reaches the coast directly adjacent to the mangroves, where 5% of silt is found outside this coarse sand zone. The presence of coarse sand on the shoreline with mangrove vegetation indicates that the main current that triggers abrasion is longshore current, moving parallel to the coastline, namely north - south. So, the recommended steps that can be taken in mitigating and anticipating further abrasion at Sederhana Beach is the construction of a wave breaking dam that is perpendicular to the coast line

Keywords: Seabed sediments, sediment distribution, abrasion, longshore current, coastal harzard mitigation

Topic: Marine Hazard and Coastal Degradation

[ABS-93]

Improved Degradation of Petroleum Hydrocarbons by Co-Culture of Fungi and Biosurfactant-producing Bacteria

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ABSTRACT

Microbial remediation has proven to be an effective technique for the cleanup of crude-oil contaminated sites. However, limited information exists on the dynamics involved in defined co-cultures of biosurfactant-producing bacteria and fungi in bioremediation processes. In this study, a fungal strain (Scedosporium sp. ZYY) capable of degrading petroleum hydrocarbons was isolated and it was co-cultured with biosurfactant-producing bacteria (Acinetobacter sp. Y2) to investigate their combined effect on crude-oil degradation. The results showed that the surface tension of the co-culture decreased from 63.12 to 47.58 mN/m, indicating the secretion of the biosurfactant in the culture. Meanwhile, the degradation rate of total petroleum hydrocarbon (TPH) increased from 23.36% to 58.61% at the end of the 7 d incubation period. In addition, gas chromatography - mass spectrometry analysis showed a significant ($P< 0.05$) degradation from 3789.27 mg/L to 940.33 mg/L for n-alkanes and 1667.33 ug/L to 661.5 ug/L for polycyclic aromatic hydrocarbons. Moreover, RT-qPCR results revealed the high expression of alkB and CYP52 genes by Acinetobacter sp. Y2 and Scedosporium sp. ZYY respectively in the co-culture, which correlated positively ($p <0.01$) with n-alkane removal. The findings in this study suggested that the combination of fungal strain and biosurfactant-producing bacteria is effective in enhancing the bioremediation performance of petroleum hydrocarbons, and it could shed new light on the improvement of bioremediation strategies.

Keywords: Bioremediation- Crude oil- Synergistic metabolism- Biosurfactant- Acinetobacter sp- Scedosporium sp.

Topic: Marine Hazard and Coastal Degradation

[ABS-100]

The Application Of Coupled 3D Hydrodynamic And Oil Transport Model To Oil Spill Incident In Karawang Offshore, Indonesia

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ABSTRACT

A numerical model of coupled hydrodynamic and oil transport was used to study the spread of Karawang oil spills at sea due to pipeline leakage failures. This model uses the 3D configuration of ROMS-CROCO in the Java Sea. The model has a resolution of 1 km, 25 vertical layers, and runs from June 2019 to September 2019. Temperature, salinity, sea surface height, ocean currents and harmonic tides are derived from global models and applied to open boundaries. Hourly atmospheric datasets during model simulation are forced as flux input in the surface. The 3D profile of the flow generated by the model is converted to the GNOME oil transport model format as mover type input to disperse the oil. The results of the hydrodynamic model show that the model result has a good agreement with in-situ data and observation. Compared with radar satellites, oil spill dispersion shows the same scattered trend as satellite data. Both model and satellite are detected the same pattern that the oil spill was moving westward, and some are stranded on the coast between Karawang and Bekasi.

Keywords: oil spill, numerical model, oil dispersion, coupled model

Topic: Marine Hazard and Coastal Degradation

[ABS-103]

Seasonal Simulation of Floating Plastic Debris Transported in Wakatobi Archipelago Waters

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ABSTRACT

Wakatobi Archipelago that consist of Wangi-wangi, Kaledupa, Tobia and Binongko Islands is a well-known tourism destination with abundant coral reef that located in the Coral Triangle Center in southeast of Sulawesi Island. The aim of this study is to investigate the transported plastic debris pathways during dry and rainy seasons in Wakatobi Waters. The 2-dimensional hydrodynamics and trajectory model from DelftFlow were simulated to detect the pathways of floating plastic debris particles. The continuous particles from domestic residents represents the land-based source was originated from Wangi-wangi, Kapota, Kaledupa dan Tomia Islands and simulated during the rainy season in December 2017 until April 2018. The discontinuous particles from sea-based source were came out from Banda and Flores Seas and simulated during dry season in June 2018 - September 2018. The results show that the diurnal circulation due tide moved close to the coastal area. The seasonal current circulation is depending on wind directions. During rainy season, marine debris was stranded in the north, east and south of Wakarobi Waters, while during dry season, it was stranded in the north, east and south of Wakatobi Waters.

Keywords: Marine Debris, Wakatobi, 2-Dimensional Model, DELFT3D

Topic: Marine Hazard and Coastal Degradation

[ABS-108]

Marine Microplastic Observation Along The Nusa Tenggara Waters

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ABSTRACT

These microplastic marine debris can be found near the sources of garbage or spread to waters near remote islands, in the form of fragments or fibers. The 5 Gyres Expedition 2018, using KLM Sea Safari VII, sailed along the waters of Nusa Tenggara, Indonesia on July 21st-29th, 2018. One of the objectives of this expedition was to collect data on the abundance of microplastic marine debris (size < 5 mm) from the waters of Labuan Bajo to Lombok, which has not been recorded until now. Seawater samples were taken on the surface and analysed for the shape and total concentration of microplastic (microplastic particles/liter). The result, microplastic found in all samples of seawater in the form of fibers and fragments. The fibers from were found in all sampling locations (12 locations), while the fragments from were only found in 6 locations. Near Labuan Bajo-East Nusa Tenggara, microplastic in the form of fibers as much as 10 particles/liter were mostly found. Meanwhile, 27 particles/liter in the form of fragments were found mostly in the waters near Gili Banta Island - West Nusa Tenggara (uninhabited island). During the cruise, ocean currents move from east to west with maximum speed of 0.6 m/s in the northern part of Nusa Tenggara.

Keywords: marine microplastic debris, Nusa Tenggara, 5 Gyres Expedition

Topic: Marine Hazard and Coastal Degradation

[ABS-8]

POLYCYCLIC AROMATIC HYDROCARBON (PAHs) COMPOUND IN SEAWATER OF CIMANDIRI RIVER ESTUARY, PELABUHAN RATU

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ABSTRACT

Polycyclic Aromatic Hydrocarbon (PAHs) is a polycyclic aromatic organic compound that is toxic to humans and aquatic organisms. This research aims to determine the level of pollution of PAHs compounds in seawater at the estuary of Cimandiri River, Pelabuhan Ratu. This research was conducted in April 2017 by survey method. Seawater and sediment samples were taken using a water sampler at 15 research stations. The levels and types of PAHs compounds were determined using Gas Chromatography-Mass Spectrometer, and PAHs sources with individual ratios diagnose. The results showed that seawater and sediment in the Cimandiri River Estuary are still relatively clean from contamination of PAH compounds. The type of PAH in seawater at the estuary of the Cimandiri River is dominated by naphthalene compounds, namely PAH with low molecular weight. PAH contained in seawater at the estuary of the Cimandiri River comes from various sources, likely oil spills, burning petroleum, and combustion of organic compounds. Phosphate nutrient levels, temperature, pH, salinity, and dissolved oxygen levels are still following the criteria set by the seawater quality standard for marine life, while nitrates are higher than these criteria, while silicates do not have a threshold value set in the seawater quality standard. PAH content in seawater of Cimandiri River estuary relatively small and still within the criteria for marine organism life state by The State Ministry Office for Life Environment.

Keywords: Pelabuhan Ratu, Cimandiri, Seawater, PAH, water quality

Topic: Marine Hazard and Coastal Degradation (Sub-session: Coastal Hazard along the South Coast of Java)

[ABS-13]

Tsunami Numerical Simulation of Java Megathrust Scenarios and Its Damage Level Estimation

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ABSTRACT

South Java earthquake for more than 30 years have monitored and recorded by global network of seismometers and GPS, which operated by the National Agency of Meteorology, Climatology, and Geophysics (BMKG), and investigates by the international researchers. Those monitored data showing mega seismic gaps area in the Java subduction area. This zone needed to be investigated because of the potential of megathrust earthquake energy may generating mega-tsunami same level as the 2004 Aceh Christmas tsunami. The Java megathrust tsunami has been 10 hours simulated using two-dimensional shallow water waves equation, using earthquake scenarios: Mw 8.9 epicentre at southern West Java, Mw 8.8 epicentre at southern Central Java, and Mw 9.1 epicentre at southern East Java. GEBCO 1 arc-minute bathymetry/topography data has been employed for model setup. The maximum tsunami wave height can be generated by megathrust scenario are: 6 meters (Mw 8.9), 12 meters (Mw 8.8) and 20 meters (Mw 9,1). The tsunami wave propagation and its time arrival are investigating in Jakarta, Semarang, Pangandaran, Yogyakarta, Surabaya, Bali, and Labuan Bajo. Estimation of damage level to the building in coastal region caused by the tsunami simulations will also provide in this article.

Keywords: tsunami numerical simulation, java megathrust scenario, seismic gaps, damage level estimation

Topic: Marine Hazard and Coastal Degradation (Sub-session: Coastal Hazard along the South Coast of Java)

[ABS-62]

Mapping of IOC-UNESCO Tsunami Ready Indicators in the Pangandaran Village, Indonesia

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ABSTRACT

Pangandaran Village is a tourist village located in Pangandaran Regency, West Java Province, Indonesia. The beautiful view of sand beaches and abundant marine resources make Pangandaran Village has great economic potential. However, in 2006, an earthquake with a magnitude of 7.7 Mw triggered a tsunami disaster in Pangandaran area that caused more than 600 fatalities, injuries, and damage to buildings, especially in Pangandaran Village. Based on current research, there is potential a M8.7~9 class earthquake off south coast of Java in the near future, which can trigger an enormous tsunami. To anticipate the tsunami disaster, the coastal community in Pangandaran Regency has been building tsunami risk reduction strategy. In Pangandaran Village, the local community is piloting the 12 tsunami ready indicator following the guideline from UNESCO-IOC. Therefore, this study aims to map 12 tsunami ready IOC-UNESCO indicators in Pangandaran Village to evaluate which indicators the government and community of Pangandaran village still need to complete, and to evaluate the aplicability and adjustment that need to be taken. The method used in mapping 12 tsunami ready indicators in Pangandaran Village is to take data in the field by doing aerial photographs, conducting interviews with the village government and other related local stakeholder, mapping tsunami evacuation plan and infrastructure, and disseminating questionnaires to the community to find out the response to the tsunami disaster. Based on the result, there are several evacuation signs whose location does not match the data owned by BPBD Pangandaran. In addition, several operational plans that are still in the planning. Tsunami hazard map, the number of people and infrastructure potentially affected by the tsunami inundation is also obtained in this research. The map will be disseminated and given to the government and the people of Pangandaran Village for the basis of tsunami disaster mitigation policymaking.

Keywords: IOC-UNESCO Tsunami Ready- Pangandaran Village- Tsunami Mitigation

Topic: Marine Hazard and Coastal Degradation (Sub-session: Coastal Hazard along the South Coast of Java)

[ABS-70]

Exposures of Building and Population to Tsunami Hazard in Pangandaran Beach, Indonesia

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ABSTRACT

Pangandaran and Pananjung villages are located in the southern coast of Java Island, prone to tsunami hazard originating from a megathrust earthquake off south of Java Island. Those villages experience a tsunamie earthquake on 2006 from an M7.8 earthquake. The National Center for Earthquake Studies released a map of the sources and hazards of Indonesia^s earthquake in 2017 with a potential earthquake of magnitude 8.7-9.2 in the megathrust of Java Island. This research aim to analyze the potential number of buildings and the population affected by tsunami inundation from two scenario- first scenario is based on historical event of a M7.8 intraplate earthquake, and second scenario is based on a plausible M8.7 intraplate earthquake. The first scenario tsunami modeling resulted an inundation of 98.547 ha, while in the second scenario estimate a 542.136 ha of inundation area. Building data is obtained by digitizing aerial photographs taken in November 2021. The calculation of potential affected buildings is carried out by overlaying the tsunami inundation data with the existing building data in the study area. Meanwhile, the population data used is obtained from the local government in 2021. To obtain the number of the affected population, population distribution is first carried out in each class of land cover, overlaid with the tsunami inundation data. The estimated number of buildings and population affected by scenario 1 and 2 in Pangandaran Village is 1040 buildings along with 2.401 people, and 4,856 buildings with 11,209 people respectively. While in Pananjung Village, it is estimated a total of 149 buildings with 361 people affected, and 3,925 buildings with 9,493 people affected respectively. The results of this study can be used as a basis for policymaking by the government in carrying out a more effective tsunami disaster mitigation efforts in Pangandaran and Pananjung Villages.

Keywords: Tsunami- Exposure- Buildings- Population

Topic: Marine Hazard and Coastal Degradation (Sub-session: Coastal Hazard along the South Coast of Java)

[ABS-71]

Characteristics of Potential Tsunami Evacuee and Evacuation Infrastucture in Pangandaran Beach, Indonesia

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ABSTRACT

Pangandaran Regency is a strategic area that supports various economic and social activities. The existence of this strategic area is threatened by the potential of the tsunami disaster, especially from the megathrust along the South Coast of Java Island. One of the efforts to enhance tsunami preparedness is to conduct evacuation plans and drills. Based on previous tsunami occurrences, it is known that the success of evacuation during a disaster is still limited by a lack of community knowledge, preparedness, and limited infrastructures such as informative evacuation route maps, evacuation signs, and proper evacuation sites. Therefore, the purpose of this study is to identify people^s behavior in carrying out evacuations and the actual condition of the current evacuation infrastructure, which is later be used to obtain comprehensive information as the basis for evacuation plan preparation. This study aims to disseminate questionnaires to 174 respondents in Pangandaran Tourism Area and map tsunami evacuation infrastructure. This study shows high awareness of tsunami hazards, in which 82% of respondents choose to evacuate after experiencing an earthquake or getting an early tsunami warning. In addition to the result, some respondents still do not know the route or evacuation site. Uninformed shelter destination and route choice result in potential congestion on the main roads, slowing evacuation by compromising survival rates. Pangandaran Tourism Area currently has 3 Temporary Evacuation Sites (TES) with a capacity of 9.259 people, where it cannot accommodate the entire community with a total of 20.702 people if the occurring earthquake scenario has a magnitude of 8.7. Therefore, the existing building can be utilized as Temporary Evacuation Sites. Furthermore, there is a call to evacuation signs maintenance, in which some signs are currently in unacceptable condition, such as damaged or show misleading information.

Keywords: Evacuation Infrastructure- Evacuee- Tsunami Evacuation

Topic: Marine Hazard and Coastal Degradation (Sub-session: Coastal Hazard along the South Coast of Java)

[ABS-99]

Impact-based Tsunami Modeling of a M8.7 Megathrust Earthquake Scenario in Pangandaran Regency, West Java, as basis for Tsunami Risk Reduction Strategy Planning

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ABSTRACT

The South Coast of Java Islands, Indonesia, is one of the prone areas and areas affected by the megathrust earthquake and tsunami hazard, with many inhabitants and economic activties. In Pangandaran Regency, the current available mitigation tsunami strategy is based on the historical 2006 M7.8 tsunami earthquake experience in Pangandaran, yet this area is also prone to a future plausible tsunamigenic earthquake from a M8.7~9.2 megathrust earthquake. The main objective of this research is to understand the potential impact of the tsunami due to a M8.7 megathrust earthquake to provide a targeted tsunami mitigation strategy and contingency planning, with a locus in Pangandaran Regency. We perfom tsunami inundation modelling, field survey, and impact forecast modelling. The result show that should a M8.7 megathrust earthquake occurred, it estimated that the tsunami inundation in potentially affects 30 villages in 6 affected Districts in Pangandaran Regency with a total affected area of 7,164 hectares of land. The most affected sub-districts is Pangandaran District with total estimated affected population of 42.413 people, Pangandaran dan Pananjung village estimated to be 100% affected. Additionally to the local people, large number of tourist is visiting Pangandaraneach day. Average during pandemic is about 400 tourist per day, while in normal situation could reach up to 8,000 tourist per day. Sectors that will affected include housing, social, public infrastructure, productive economy mainly fishery and tourism, and cross sector, with a total estimate economic loss of 800 Miliar Rupiah. With the massive potential impact of tsunami in Pangandaran due to a M8.7 class megathrust earthquake, it is urgent to update the tsunami risk reduction strategy plan and

strengthen preparedness capacity in Pangandaran Regency, as well as other region along the south coast of Java, to save more lives and reduce the future tsunami risk in the region.

Keywords: Tsunami, Megathrust Earthquake, Impact forecast, Pangandaran, coastal hazard

Topic: Marine Hazard and Coastal Degradation (Sub-session: Coastal Hazard along the South Coast of Java)

[ABS-19]

The Movement of Plastic Marine Debris in Indonesian Waters Using a Trajectory Model

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ABSTRACT

Research on ocean currents carrying plastic marine debris using hydrodynamic models and trajectories has been carried out, but it is still constrained to be applied in Indonesian waters. Therefore, this research aims to obtain the movement patterns of plastic marine debris, influenced by the dynamics of currents in Indonesian waters using hydrodynamic and trajectory models. The methodology used in this research is to use the HAMburg Shelf Ocean Model (HAMSOM) numerical model and the trajectory model. Plastic marine debris is assumed to be conservative particles at sea level with a macro size (2.5 cm-1 m) and has a density more diminutive than the density of seawater (<1,020 kg m-3). The particles are released in 6 coastal cities (Manado, Balikpapan, Makassar, DKI Jakarta, Semarang, and Denpasar) at the beginning of the month and stop at the end month. The results showed that particles originating from 6 coastal cities moved along the current to the surrounding areas, across islands within the Indonesian territory (particles from Balikpapan and Makassar), and even left Indonesian territory (Manado, DKI Jakarta, Semarang, and Denpasar).

Keywords: plastic marine debris, transboundary, trajectory model

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-22]

Modeling of Plastic Debris Particle Trajectory during Pre and Post Reclamation in Jakarta Bay

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ABSTRACT

One of the challenges of environmental problems in the waters of Jakarta Bay is the change in hydrodynamics due to reclamation and the land-derived waste from 13 watersheds that end in Jakarta Bay. Hydrodynamic and trajectory simulations were carried out in Jakarta Bay in June and December 2006 and 2005 to see the distribution of plastic debris in pre and post-reclamation conditions. Numerical simulation using the Hamburg Shelf Ocean Model (HAMSOM) describes the hydrodynamic conditions and particle trajectory in Jakarta Bay to describe the distribution of plastic debris in pre and post-reclamation conditions, with data verification using secondary tidal data and primary ADCP data. The distribution of plastic debris released during the simulation depicts a distribution that follows the monsoon pattern, moving west during the east monsoon and moving east in the west monsoon and spreading along the coastline in both conditions. The percentage of plastic debris increased by 21.42% in June and 4.07% in December, which shows the impact of the reclamation island. The increase in the percentage of plastic debris that does not leave the waters of Jakarta Bay is due to a decrease in current velocity of 0.03 - 0.05 m/s after the reclamation island is formed. Due to the decrease in current velocity in the bay, trajectory simulations show that plastic debris takes 69.52 - 304.25 hours longer to leave the bay. Plastic debris piling up around the reclamation islands shows that the islands are like garbage traps, so there needs to be regular cleaning of garbage, especially in the canal area and around the reclamation island.

Keywords: : Jakarta Bay, plastic debris, reclamation, trajectory

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-29]

The Effect of Changes in Land Cover on Total Sediment Yield in Peusangan Watershed, Aceh Province

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ABSTRACT

The watershed is an area above or higher than a river whose topographical boundaries cause water to flow into the same river. The river flow carries sediment particles that potentially cause silting of the estuary area. The sediment carried by the river flows from the erosion process that occurs in the watershed. Changes in land cover potentially affect the rate of sediment export to rivers due to changes in surface roughness and the rate of water infiltration to the ground. This study aims to identify the effect of the land cover change on the amount of sediment yield from the Peusangan Watershed, Aceh Province. The sediment yield is calculated from the erosion rate and the sediment delivery ratio. The erosion rate is modeled using the revised universal soil loss equation, while the sediment delivery ratio is calculated based on the function of the watershed area. From the results of the calculation, in general, the rate of erosion is at a very level where the average erosion rate in 1995 is 26,715 tons/ha/year, in 2005 it is 26,886 tons/ha/year, in 2015 it is 24,959 tons/ha/year and in 2018 amounted to 26,771 tons/ha/year. With a sediment delivery ratio value of 0.180, the total sediment yield was 1.083.148,20 tonnes in 1995, 1.090.047,94 tonnes in 2005, 1.011.920,71 tonnes in 2015, and 1.085.398,35 tonnes in 2018. The results of the identification show that the changes in land cover that affect to amount of sediment yield that comes out from the Peusangan Watershed.

Keywords: soil- erosion rate- sediment- modelling

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-33]

On the investigation of vertical uncertainty of depth sounding in a shallow environment with muddy seabed: Preliminary results from a launch operation of a dual-frequency echosounder

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ABSTRACT

Hydrographic echosounder has been the standard instrument that provides a measure of water depths. In a muddy environment, this detection is not as straightforward as it seems- low gradient of acoustic impedance presence within the water-sediment interface resulting in vertical separation of liquid-solid boundary detected by different frequencies of depth sounding system. In this paper, we investigate the depths measured by a dual-frequency hydrographic echosounder in a muddy environment, coupled by a simultaneous probing of the water-seabed interface by means of a free-fall penetrometer. We intend to understand the extent of uncertainty of a depth-sounding system to precisely locate the liquid-solid boundary within the water-seabed interface layer, specifically at Patimban coasts, where muddy sediments dominate the seabed. From our investigation, we found that high frequency sounding underestimates nautical depth in the order of sub-meters. It is roughly comparable to the vertical separation between 200 and 24 kHz depth detection in the study area. In addition to that, an approximate error of between half to one meter must be considered when depths from sounding and probing are to compare with uncertainty of about several decimetres.

Keywords: Echosounder, free-fall penetrometer, muddy seabed, water depth, shallow water

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-35]

Spatial Modeling of Sediment Export Rate with Rainfall Variability Scenario in Peusangan Watershed, Aceh Province

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ABSTRACT

The rainfall affects the environmental interaction of watersheds and coastal areas. The high intensity of rain and water runoff will lift and carry particles in the watershed environment in the erosion process. This study estimates the total exports of sediment in Peusangan Watershed in the period 1995, 2005, 2015, and 2018 with rainfall variability scenarios. Total sediment exports are calculated from the erosion rate and sediment delivery ratio (SDR). Erosion rate modeling uses the RUSLE (Revised Universal Soil Loss Equation) that takes into account erosivity of rainfall , soil erodiability, topography, land cover, and land-use practices. While SDR is calculated based on its function as watershed area so that homogeneous value that causes the value of sediment export rate is directly proportional to the erosion rate value. The correlation between rainfall variability and sediment export rates is calculated based on rainfall variability correlation to erosion rate change. There is a direct relationship between rainfall variability and sediment export rates because the correlation coefficient is close to one. The rate of erosion in Peusangan watersheds falls into the light category based on the classification of erosion hazard levels according to the Ministry of Forestry in 1998. Based on the estimated rate of erosion and SDR, the total annual number of sediment exports obtained in the Peusangan watershed in 1995, 2005, 2015, and 2018 amounted to 1,066,027,426 tons, 909,914,623 tons, 1,075,759,133 tons, and 1,085,490,841 tons, respectively. Based on spatial distribution of sediment export, Peusangan watershed falls into the category of normal erosion.

Keywords: Peusangan Watershed- Rainfall- Sediment export- Erosion rate- Sediment Delivery Ratio

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-36]

The Response of Phytoplankton Abundance and Environmental Variables in Bali Straits, Indonesia

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ABSTRACT

Phytoplankton plays an important role in the small pelagic ecosystem by providing good feeding source for marine biota such us larvae, juvenile, and small pelagic fish. It is first study in the Bali Straits wherein the phytoplankton data are linked with nutrient parameters to develop a prediction system using an additive model (GAMs). This study aims to illustrate how nutrients can influence the abundance of phytoplankton in Bali Straits. Time series plankton sample and nutrients variables (nitrate, phosphate, chlorophyll-a, and silica) were collected in 2013. The stepwise generalized additive models (GAMs) were used to know the respond of two major groups of phytoplankton (diatoms and dinoflagellates) on the nutrient variability. Models showed the differences respond for each group with deviance explained (DE) is 43.5% and 39.0% for diatoms and dinoflagellates, respectively. For diatoms, nitrate (NO3) was able to explain the highest deviance (43.3%) followed by salinity (Sal), and pH. While, dinoflagellates have high respond with pH (DE = 23.6%) followed by silica (SiO3) and salinity (Sal). Both phosphate (PO4) and chlorophyll-a (Chl) have less influence on both of phytoplankton groups.

Keywords: generalized additive models, nutrient, diatoms, dinoflagellates

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-38]

Nutrient enrichment induced by tropical cyclone Seroja in the Southeastern Tropical Indian Ocean

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ABSTRACT

Tropical cyclone (TC) passage triggered a complex response from the adjacent ocean, including vertical mixing that leads to biochemical alteration and affects the surrounding ecosystems^ dynamics. In previous studies, increased nutrient concentrations and primary production were observed along the cyclone track after the storm. TC Seroja was awakened near the equator in the Southeastern Tropical Indian Ocean, making this TC interesting to be investigated, primarily how the ambient ecosystem responds. Hence, we analyzed the sea surface temperature and nutrient changes during the Seroja event using multi-satellite remote sensing and numerical model data in the south of Indonesia and East Timor, along the Seroja track between 2 - 10 April 2021. Just after the TC Seroja passed, sea surface temperature cooled down to 3 &#8304-C around the TC lane. At the same time, the spatial distribution patterns showed the upsurge of some nutrient in response to the passage of TC Seroja- the surface nitrate swells up to 1.5 mmol/m3, while phosphate increased up to 0.2 mmol/m3, and the dissolved silicate concentration enhanced up to 1.0 mmol/m3. The responses recover in 2-7 days after the storm. These results indicate that tropical cyclones contribute to nutrient enrichment in oligotrophic areas outside of their usual annual upwelling time, thereby further supporting ecosystem sustainability.

Keywords: nutrient enrichment, ecosystem response, tropical cyclone Seroja, Southeastern Indian Ocean

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-39]

Communities Participation of a Small Islands in supporting Marine Tourism Destinations in Indonesia

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ABSTRACT

A small island is a separate, remote region that has a unique exotic and specific community conditions. Unique environment and habitat make a small island one of the most attractive tourist destinations. This study aimed to explore the readiness of the communities and resources of small islands as marine destination in Indonesia. Study site located at a Small Island named Barrang Caddi in one of the biggest Archipelago, South Sulawesi, Indonesia. The research methods encouraged included site surveys, focus group discussions, and in-depth interviews. Data processing was done by using SWOT analysis. Community and environmental mapping were carried out to look more specifically at the readiness of resources and community support. The results obtained illustrate that the culture of helping each other, openness, friendliness, and politeness served as the driving factors in the development of tourism potential on small Island. Environmental cleanliness, good village facilities, infrastructure, communication services, and white sand were highly attractive. Extant cultures and local events such as boat racing were a supporting factor in the attractiveness of small Island. The cultural potential combined with the strong will of the community and the attraction of the beach environment, such as the white sand, make small Island a potential tourist destination.

Keywords: destination, coastal, culture, natural, social condition

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-45]

Developing the Debris Incinerator Vessel as a New Solution for Managing Marine Debris in Small Islands of Indonesia

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ABSTRACT

Marine debris has been considered as global environmental issue, yet its impacts to each country are vary. In Indonesia as an archipelagic country (which comprises of thousands of islands), marine debris have threatened many sectors, such as marine endangered species protection, coastal ecosystem, and human livelihood (e.g., sea transportation, tourism, fisheries).

The government of Indonesia have implemented various efforts to address this marine debris issue, which include applying recent methods and prototypes from global partners. Based on these approaches, we learned there are three key success factors to clean marine debris in a very large area of Indonesia, i.e.: good understanding of marine debris dispersion in Indonesian water, sufficient budget, and good coordination among stakeholders.

Hence, Marine Research Centre developed a prototype vessel in 2021 for managing marine debris, particularly surround small islands, which called ^Kapal Insinerator Sampah^ (KIS) / ^Debris Incinerator Vessel^ (DIV). This vessel will be focusing to manage waste generated by local inhabitants and marine debris stranded in small islands.

Keywords: Plastic Waste, ICZM, Small Island, Indonesia

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-46]

Seasonal and Interannual Variability of Satellite-Derived Chlorophyll-a (2002-2020) in Lampung waters and surrounding area

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ABSTRACT

In recent years, the phytoplankton blooming phenomenon occurred at Lampung Bay, it has a negative impact on living organism due to its toxicity. Chlorophyll-a concentration (Chl-a) is the crucial biological parameter for simulating marine phytoplankton biomass. In this study, eighteen years (2002-2020) of satellite-derived chlorophyll-a concentration (Chl-a) are used to analyse the seasonal and inter-annual regional patterns of Chl-a variability in Lampung waters and surrounding area. We have analyzed the regional patterns of seasonal in Lampung waters and surrounding area using ocean-color remote sensing data. For time series analysis, the coastal waters are divided by three. They are the east coast of Lampung, the Southern part of Lampung, and the Bay of Lampung. The result shows that the east coast of Lampung highest than other areas. It indicated that the river runoff will be a significant impact on phytoplankton blooming.

Keywords: Chlorophyll-a- Satellite data- Lampung Waters

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-50]

Overview of Planktonic Foraminifera in Relation to Ocean Currents in Sulawesi Sea

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ABSTRACT

Foraminifera is very diverse and adaptive, both in its morphology and biology. It is a potential bioindicator to understand the ecological and physical conditions of the ancient and modern waters based on their distribution. It is often assumed that the abundance of foraminifera (as a fossil) in sediment is representing the ocean conditions above where they were deposited. Planktonic foraminifera however can be considered as passive particles, their movement is carried by ocean currents. In consequence, the abundance of foraminifera may not represent ocean conditions above where they were deposited. This study aims to examine the role of ocean currents in the distribution of foraminifera in the Sulawesi Sea. Ten surface sediment samples at a depth of 73-3009 m were retrieved by RV Geomarin III from the Marine Geological Institute. We conducted quantitative analysis including calculation of abundance and cluster analysis. Two decades (1992-2012) of ocean current simulated data from the Hybrid Coordinate Ocean Model (HYCOM) is used in this analysis, extending from 115&#730-E-140&#730-E and 8&#730-N-2&#730-S. The result indicates that planktonic foraminifera is abundant in the Sulawesi Sea by 86.3%. There were several predominant planktonic species such as Globigerinoides ruber (22.6%), Globigerina bulloides (15.3%), and Neoglobuquadrina dutertrei (10.1%). For the ocean current above the sample location, it is constantly moving eastward as part of the NECC. Based on the average currents velocity it shows that foraminifera in sample site 3 with depth 2064 m may originate from up to 936 kilometers away from its recent location.

Keywords: Foraminifera- Ocean Current- ITF

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-53]

The Growth Rate of Seabass in Floating Net Cages, Inner Ambon Bay using 1D Ecosystem Model

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ABSTRACT

Inner Ambon Bay is used by the government for fishery research. One of the species that has been cultivated is seabass because it has high economic value. Seabass cultivation in floating net cages has been developed by Ambon Marine Aquaculture Center (BPBL Ambon). The characteristics of seawater in Inner Ambon Bay (IAB) based on the observation data in the project Ocean Current System of Indonesia Waters and Its Effect on Marine Fisheries Production in May 2017 show that the temperature is in the range 29.8 until 30.9 C. Meanwhile the salinity is about 26.1 up to 31.4 psu and the chlorophyll concentrations as much as 0.99 up to 3.61 mg per m3. The 1D ecosystem model simulation is performed to know how is the growth rate of seabass is with two way interaction between nutrient, phytoplankton, zooplankton, and detritus (NPZD) towards zooplanktontivor (fishes which consume zooplankton). The verification of model result (fish mass) with the observation data of fish mass which conduct by BPBL Ambon show the RMSE value is 0.001 kg and the correlation is 0.99. The nutrient concentration since 2016 until 2018 in the range of 3.08 up to 3.78 mmolC per m3. While the phytoplankton, zooplankton, and detritus concentration during 3 years each one is 4.67 until 5.84, 11.53 up to 15.77, and 16.88 until 20.67 mmolC per m3. The fastest growth rate of Seabass is 1.52 grams per day with the duration of 257 days and when the juvenile spread in January. The fastest growth rate of Seabass with add some feed is 2.23 grams per day during 175 days.

Keywords: NPZD, ecosystem model, Seabass, growth rate

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-60]

Potential coral implementation area for Indonesia Coral Reef Garden in Nusa Dua, Bali

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ABSTRACT

The Indonesia Coral Reef Garden (ICRG) program is announced as a coral reef restoration program which can support the marine tourism sector since the Covid-19 pandemic hit Indonesia, particularly in Bali. Coral reef restoration requires long term effort since the coral growth count in the scale of mm per year. A comprehensive survey and preliminary study are necessary to be conducted to decide a suitable point or to avoid a premature choice for the restoration location. Field survey in Nusa Dua, Bali was carried out on November-December 2020 to determine physical characteristics of seawater which appropriate for coral life. The activities involved bathymetric measurement, water quality identification, and sediment sample. The bathymetry at Nusa Dua, Bali varied from shallow to middle water depth. Based on the conformity of water quality, the middle depth region has sufficient condition for coral growth. Sediment samples are used to classified coral distribution spatially. The potential area is located generally at a distance above 500 meters or 1 km in front of Tanjung Benoa. It is expected that the coral will increase in following decades and beneficial for local ecosystem and marine tourism.

Keywords: ICRG, ocean survey, potential coral restoration mapping

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-61]

Forecasting the Stranded Area of Marine Debris in Indonesian coasts. An Initial Research of Simulating the Seasonal Pattern of Marine Debris by Tracking the Floating Drifter

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ABSTRACT

Plastic litter had become world major concerned since 2015 and Indonesia had been placed as the second contributor after China. Around 200,000 metric tons of plastic wastes discharged from Indonesia rivers mainly from Java and Sumatra Islands every year. This surge of waste then become a serious threat to ocean and coastal ecosystem, as well as marine biota conservation in Indonesia. Therefore, it is very important to study the seasonal pattern of marine debris and monitor the dispersion within Indonesian water in near real time. By year 2020, an initiative action has been taken by The Ministry of Marine Affairs and Fisheries of Indonesia. More than 20 drifters were released on 3 selected rivers^ mouth in Indonesia namely Cisadane, Bengawan Solo and Musi. Results indicated that marine debris are drifted away, influenced by wind and current from time to time. The simulation will forecast the time and location where the marine debris expected to traverse and stranded in each season. This information will be very important to provide the baseline information of marine debris movement, locally and even beyond of Indonesian. Also, it will improve the mitigation, better coordinative action plan and encouraging further marine debris research in Indonesia.

Keywords: Marine Debris, Tracking, Drifter, Indonesia

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-64]

Site Suitability Assessment for Wave Power Development in Indonesia

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ABSTRACT

Renewable energy is our future energy resource. It is environmentally friendly because not produced carbon emissions (zero emission). It is different with the fossil energy that their exploitations leave behind environmental problems. Global warming affected by carbon emission is one of the consequences of using fossil energy. There are several renewable energy sources in the ocean, such as ocean current energy, ocean thermal energy conversion (OTEC), and wave power. Wave energy has excellency in high density and continuity, so it is the potential to be developed. The aims of this study are to investigate the site feasibility for wave power development in Indonesia. This research area is located in 90E to 150E, 15N to 15S. We used a hindcast data simulation of WAVEWATCH3 with 0.125 deg (14 km) spatial resolution and sixhourly data for 25 years (1991 to 2015), GEBCO bathymetric data with 30 second resolution, and Indonesia basemap. We developed the weighted model to analyze the site suitability by overlaying the wave power density, bathymetry, the distance from the coastline, and the presence of exceedance. The electric power estimation was calculated based on the array WEC installation scheme with a 200 meter distance of grid. We choose M3 Wave, where it can work optimally in a mid-shore area with 10 to 40 meter depth. We were only calculating the electric estimation in an area with more than 10 kW/m power density. The results of this study show that wave power density is affected by monsoon interplay. The power density was changing periodically in line with the monsoon cycle. The greatest power density occurring in the Indian Ocean spread out from Aceh until Bali. Based on our model, the suitable area for wave power development in Indonesia is about 3,372 km seq spread in West Sumatra, Bengkulu, Lampung, Banten, West Java, Central Java, Yogyakarta Special Region, East Java, and Bali. The electric power estimation based on this simulation is 12,65 to 42,16 GWh.

Keywords: site suitability, wave power, WAVEWATCH-III, electric power estimation

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-67]

A Preliminary Study of Environment-Larva Relationship In Ambon Bay During East Monsoon of 2019

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ABSTRACT

Research related to the presence of fish larvae in Ambon Bay is still lacking and species-environment relationship is not fully studied as well. Thus, the preliminary study aims to identify larval fish assemblages, oceanographic conditions, and species-environment relationship in Ambon Bay during east monsoon where Banda Sea upwelling occur, and upwelled water enters Ambon Bay and change its characteristics. Field measurement was conducted at 18 stations, where fish larvae and vertical profile of physical-chemical of sea water collected. We found 117 larva fish individuals mainly pelagic and mesopelagic fish families. Based on species-environment relationship, spatial distribution of larva has a close relationship with physical parameter where the parameter also variates in seasonal and tidal timescale due to the occurrence of tidal upwelling that more frequent and stronger during this study in shaping the water characteristic in Outer and Inner Ambon Bay. Besides that, physical parameter changing due to deep-water renewal caused by tidal upwelling maybe one of the mechanisms that import larva or draw attention of fish to spawn in Inner Ambon Bay that need future research. The knowledge of species-environment relationship in this preliminary study presented here will be a basis for future studies on larva species-environment relationship.

Keywords: Ambon Bay, fish larvae, oceanographic conditions

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-68]

Concept and Design of Integrated and Sustainable Seaweed Resource Information System for Coastal and Small Islands Communities in Indonesia

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ABSTRACT

Seaweed is one of fisheries commodities, which has been proven to improve the household income of coastal and small island communities in Indonesia for the last two decades. The global need for seaweed is raising, since it is used as a raw material for many industries, i.e.: food, pharmaceuticals, cosmetics, livestock feed, and fertilizers. These factors have encouraged the Government of Indonesia to increase the quantity and quality of seaweed commodities until it reaches a strategic position in the fisheries sector. One of the efforts is enhancing the data and information reliability, which will support all business actors from upstream to downstream- with the objective to accelerate the industrialization and production, resource sustainability and improving the welfare of coastal and small island communities. This paper aims to provide an overview on the improved concept and design of information system for seaweed commodity, based on the principles of traceability, sustainability, production process improvement and system integration. It is expected that business actors, resources managers, and policy makers will take advantage of this improved information system, where reliable data and information can be accessed easily in real time.

Keywords: Information System, Seaweeds, Sustainability,Fisheries

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-73]

Integrating Suitable Plastic Waste Processing Technique into the Coastal Zone Management Aspect. Case Study: Coastal Area and Small Islands of Karimunjawa, Wakatobi, Aceh and Seribu Islands, Indonesia.

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ABSTRACT

Indonesia is an archipelagic country with more than 17,000 islands scattered across the country. Unique ecosystems, such as mangrove and coral reefs that have a very important ecological function, can be found in coastal area along with highly diverse species. Coastal area is also place for many major cities, while small islands became tourist destination. Human activities in these areas have generated pressure to the coastal resources and environment sustainability, (e.g.: the emerging unmanaged waste in major cities and tourist destination, which leaked to the ocean, then drifted, dispersed, and stranded in other shores). This study aims to evaluate the existing gap of waste management practices in selected sites where they have limited capacity to managed plastic waste, then recommends the best applicable approach. The result indicated that waste management practices in each place are vary, adjusted with their specific condition (e.g.: total population, daily waste generation, and existing waste processing technology). This study recommends that these various site-specific approach for waste management system in coastal areas and small islands should be integrated into the existing Integrated Coastal Zone Management (ICZM) practice, to strengthen the community^s resilience and ecosystem conservation as well as protection of Indonesia biodiversity.

Keywords: Plastic Waste, ICZM, Small Island, Indonesia

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-76]

The Relationship Between Oceanographic Parameters And Fish Larval Dispersal In The Fisheries Management Area Of The Republic Indonesia (FMA) 717

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ABSTRACT

Cendrawasih Bay and the Pacific Ocean are known as potential fishing areas and as fish spawning locations in Fisheries Management Area 717. Larval dispersal in the waters is strongly influenced by oceanographic parameters. This study was conducted to examine the relationship between oceanographic parameters on the larval dispersal in FMA 717. This research was conducted using KR Bawal Putih III in November 2019. A number of 42 stations were determined for observation. Environmental parameters such as temperature, salinity, oxygen, chlorophyll-a, turbidity, photosynthetic active radiation (PAR), and pH were measured using SBE 19 plus V2 CTD and pelagic fish larvae were collected using a bonggo net. Analysis of the correlation between oceanographic parameters with pelagic fish larvae abundance and spatial distribution was calculated using PCA (Principal Component Analysis) statistical analysis. The result showed that the pelagic fish larvae was influenced by salinity, temperature, PAR, chlorophyll-a, turbidity, pH, turbidity, and DO. Temperature and salinity have a direct interaction to the abudance of pelagic fish larvae.

Keywords: Oceanographic parameters, larval dispersal, FMA 717, PCA

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-79]

Analysis of suitable site for seaweed aquaculture development in Indonesian Sea (case study IFMR-713) with the application of numerical model data

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ABSTRACT

Seaweed is an excellent product for cultivation in Indonesia. The expansion of seaweed aquaculture must be supported by the availability of data and accurate information. The Republic of Indonesia^s fishery management region-713 (IFMR-713) has the potential for the development of seaweed cultivation. This study aims to conduct a spatial analysis of suitability for the development of seaweeds cultivation using numerical models data based on multi criteria evolution (MCE) in the IFMR-713. The main datas were used in each sub models: (depth, wave height, current) to physical geographical and (temperature, salinity, ph, phosphate, nitrate) to water quality. The potential area of seaweed cultivation in RIFMR-713 is 63.125 km2 (13.12%) of the total area in IFMR-713 (481.300 km2). The very suitable area category for the cultivation of seaweed are only a little part utilized by the local community (based on data and information from each Local Goverments), so that it is still wide open to be developed especially for areas with very appropriate categories. However, it is recommended that its use must be based on environmental methods and adapted to the coastal spatial plan so that it can be used as an important foundation to support the application of ecosystem-based fisheries.

Keywords: seaweeds cultivation, numerical models, multi criteria evolution (MCE)

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-80]

Comparative Study on the Determination of Vertical Datum (Z0) Between Admiralty and Least Square Methods in 11 Locations of Indonesian Coastal Waters

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ABSTRACT

Tidal data processing is used to determine the value of the harmonic constant carried out by two methods, namely admiralty, and least square. These methods produce different values and quantities of harmonic constants with the ability to affect the accuracy of determining the elevation of tidal predictions, Zo, and chart datum. Therefore, this study aims to determine the vertical datum (Zo) between the admiralty and least square methods in Indonesian coastal waters. Tidal elevation observations data carried out from eleven coastal water locations, i.e., Sabang, Natuna, Marina Ancol, Bangka, Sendang Biru, Nunukan, Lembar, Makassar, Alor, Ternate, and Jayapura.

The computational of one-year tidal elevation data using least square method with employing a script of 90 harmonic components, the RMSE values obtained in range between 4.59 cm (Makassar) and 12.30 cm (Bangka). Meanwhile, when using the admiralty method to compute monthly data, the minimum RMSE values in range between 15.17 cm (Ternate) and 40.63 cm (Bangka).

Furthermore, the maximum Z0 values, which predicted based on the harmonic admiralty, is founded in the range of 62.14 cm (Marina Ancol) and 214.81 cm (Nunukan). Meanwhile, the maximum Z0 value, which predicted based on the harmonic least square, is founded in the range of 72.27 cm (Marina Ancol) and 198.9 cm (Bangka).

Keywords: Tidal, Indonesian Waters, Admiralty, Least Square, Tidal Prediction, Zo, Chart Datum.

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-82]

Design of a Prototype Model for an Energy Efficient and Environmentally Friendly Salt Production House with the Function of Increasing the Quantity and Quality of Industrial Salt

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ABSTRACT

The current national salt demand in 2021 is 4.6 million tons, 84% of it: for manufacturing purposes. The volume of imported salt reaches 50.29 percent of the national salt availability. This high import is caused by lack of the industrial salt. In the 2020-2024 RPJMN, the total national salt production target in 2021 is 3 million tons, not enough, due to the natural conditions of high rainfall. KKP and Kemkomarves are targeting to increase production through intensification and extensification of salt pond land, which is planned to be carried out in Flores and Sumbawa. However, according to our rough calculation, to meet the amount of national salt need, if the choice is the extensification: this will need 20 thousand hectares of new ponds. This is hard, because there are obstacles: limited land, not all types of land can be used for salt farming, high costs, long land clearing time, and dependence on weather. Plus the negative impact on the environment from the land conversion. What is the alternative solution? This study aims to figure the solution for improving the industrial salt production. Methods are the analytical descriptive study, collecting data with reference studies, then compiling data for the formulation of the model. Study results: more efforts are needed on the intensification, by: increasing the quantity of salt production, parallel with improving its quality, and could continuously producing salt in a full year. To fulfill this, the choice is technological engineering, by using a closed system called: the Salt Production House (RPG). A unit of RPG contains the stages of salt production, increasing function on the salt^s quantity, in parallel upgrading function on the quality of raw salt to industrial salt, and ability to produce salt in a full year. RPG is green and sustainable, because it consumes renewable energy, effective and require a small area.

Keywords: Salt demand, industrial salt, intensification and extensification of salt production, natural obstacles in salt production, closed system salt production house RPG

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-86]

Mangrove Ecotourism Development on North Coast of Java

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ABSTRACT

The condition of northern coast of Java is in a high risk due to human activities (fishing, agriculture, industry, settlement, tourism, and transportation). Mangrove ecosystem has an ability to protect the coastal area and it can be used also as a tourist area, known as ecotourism area. The development of ecotourism must be able to truly keep up its principles in maintaining environmental sustainability, providing benefits to community and containing education for the visitors and maintaining local wisdom. However, the development of ecotourism itself still encounters various obstacles in its implementation. The objectives of this study is to analyze the condition and management between 5 different ecotourism locations namely Jembatan Pelangi (Banten), Karangsong and Sumber Mas (Indramayu), Pandansari (Brebes) and Tunggulsari (Pati). Descriptive analysis was conducted based on in-depth interviews with managers, communities and local governments. Several recommendations as a result of this study given to improve some infrastructure and waste management to be more environmentally friendly, a working group supported by local governments should be taken into account for facilitating coordination both between local governments and central government so that the ecotourism area can be properly promoted.

Keywords: mangroves, ecotourism, north coast of Java, local government, recommendations

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-87]

Design of Deep-sea Vibration Sampler and Sea Trails

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ABSTRACT

The study of submarine sediment has played an important role in many field, such as marine geology survey and marine resources exploration.

According to the need for submarine sediment samples, we present a deep-sea vibration sampler that can operate at depth of 3,000 meters.

Compared with seabed rig, the deep-sea vibration sampler has the advantages of high efficiency and simple operation, and it is more suitable for obtaining sandy sediment sample.

First, this paper introduces the structure design and working principle of deep-sea vibration sampling devices.

And then, the process of vibration drilling is simulated based on finite element software ABAQUS, the influence of vibration force and vibration frequency on sampling process is discussed.

In 2018 and 2020, two sets of deep-sea vibration samplers were successfully tested in the South China Sea, which verified the reliability of the deep-sea vibration sampler.

Keywords: submarine sediment, vibration sampler, sea trails

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-88]

Strategy on Marine Debris Reduction in Indonesia : A Review and Recommendation

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ABSTRACT

In 2018, the Indonesian government stated a program: National Action Plan on Marine Debris, with the target to reduce 70% of marine plastic debris by 2025. Based on local research^s result in 2018, there was estimated 0,27 to 0,59 million tons (MT) of marine plastic debris on local seas. Thus, the target of 70% debris reduction would be at 0.35 MT per year, or the reduction of 29.500 Tons of debris per month. That^s a huge number to deal with, especially there is about 3 years left to year 2025. To dirige the program, a roadmap was developed, parallel to other supporting programs as well the regulations, a national task force TKN PSL also established. But, how to improve the achievement of this huge target in limited time? This study aims to figure the proper action to improve the waste reduction program. Methods are refference study to collect data and information, then a comparative and an analityc work, finally constructing a model and action plan recommendation. The results: to improve the achievement of the target, it is needed a proper strategy and program to accelerate and raise the rate of the program^s progress. It is prior to strengthen the waste reduction part, emphasized on technology use. The program is best to be implied directly on sites, in various methods to reduce more marine debris possible. The multiplication of more waste processing TPST 3R units is urging to derive, with 3R Reuse, Reduce, Recycle. The units would be located along side the upstream to downstream water body zone, inland as well on water. For the on-water work, a concept of the integrated green technology-based system with small-sized floating TPST 3R barge, called STAMSAL P2K is recommended to be implied in the action plan, for reducing marine debris directly on sites.

Keywords: marine plastic debris, waste reduction, technological aspects, direct and proper program on sites, 3R processing units, STAMSAL P2K

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-89]

Coastal Inundation and Land Subsidence in North Coast of West Java: A New Hazard?

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ABSTRACT

The North Coasts of West Java are increasingly affected by human activities. The area has been utilized as settlement areas, industrial estates, and associated infrastructures including roads, school, hospital, market, etc. Consequently, this massive landuse and uncontrolled natural resources extraction have contributed to environmental degradation such as coastal erosion, accretion, pollution, inundation, and land subsidence. To date, we have so far very few field measurement data of land subsidence to support its importance. However, satellite image and on-ground observations used to determine spatio-temporal changes in the shoreline and area of inundation confirmed the existence of this hazard. Groundtruth data on selected areas also indicated the indicators of land subsidence such as damages of infrastructures including houses, roads, and sea dikes. The most noticeable shoreline changes in the North Coast of West Java are situated in Muara Gembong Bekasi and Legon Kulon Subang constituting maximum rates of shoreline retreat up to 200 and 150 m/year respectively for the last two decades (from 2000 to 2020). Whilst, the total areas of inundation in Muara Gembong and Legon Kulon based on recent satellite studies are 10.2 and 7.4 km2 respectively. These hazards might be linked to the combination of long-term behavior of oceanographic variables such as wave and sea level, in coincidence with hydrological changes due to river works (i.e. dam constructions and channellings) and an increase of settlement areas, fish ponds, groundwater extraction, etc. A set of preliminary engineering measures, in conjunction with sediment managing schemes, is proposed for the sustainable development of the coastal zone.

Keywords: coastal inundation, land subsidence, satellite images, coastal management

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-90]

Enhancing Coastal Disaster Mitigation Measures: Vegetation Based Feasibility Study for Southern Java, Indonesia

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ABSTRACT

Indonesia is a country that prone to disaster especially earthquake and volcanic eruption because its located in the ring of fire. The type of disasters that mentioned before are disaster that produce another type of disaster which is: tsunami. As an island nation, a tsunami will have severe destruction to the coastal communities in Indonesia. In a span of 18 years, from 1994-2006, there were two major tsunami that hits Indonesia^s most populous island, Java Island. The nature of tsunamis that were hard to predict and arrive with little warning in this area, we can only prepare for the worst by creating coastal protection from the tsunami. In this study we found the location to create the coastal forest as an enhancement of the mitigation effort. We would conduct our study in the Pangandaran district as this district experienced a severe tsunami in the 2006 that caused more than 400 deaths. Model builder was used in this study, the tool for each parameter analysis were mainly Euclidean distance tool, reclassify tool to assign weighted class of vulnerability level. With range of vulnerability from low, moderate, high, very high vulnerability, with weighted score range from 1 - 4. The focus of this study was to find the very high vulnerability level area, which is the parameter of the area should be: lower than 10m, have gentle slope gradient <2%, within proximity of 500m from coastline, lies in the area of 100m from river and should be settlement or urban area. The creation of vulnerability map was using map algebra to calculate the weighted parameter from each class. Based our analysis using GIS analysis using the following criteria on our finding, the most vulnerable area in the Pangandaran district is the bay area, where we found 1,419 acres of coastal area for which coastal forests could be planted to enhance protection against tsunamis.

Keywords: Coastal Protection, Site Suitability, Pangandaran, Tsunami

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-97]

Study of the Historic Shipwreck Sites Area Development for Marine Ecotourism in Thousand Islands

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ABSTRACT

The historic shipwreck sites are a part of the Maritime Archaeological Resources. They are currently occupying an important position as one of the Non-Conventional Marine Resources with Blue Economy potential in it. Sites are usually found in the conditions that have been integrated with the marine ecosystem in their environment. Some have even been completely covered with coral reefs, so that this uniqueness becomes the added value of the site for a tourist attraction. The research was carried out in Thousand Islands waters, which having kept many records of the maritime history of the Nusantara Archipelago for centuries and in their current development, the Jakarta^s Thousand Islands are included as one of the Marine Tourism Village areas (Desa Wisata Bahari/Dewi Bahari). The purpose of this research is to determine the value of the shipwreck sites potency which are suitable for marine ecotourism development area in Thousand Islands waters and for obtaining the sustainable management model that can be integrated with the ecosystem in their environment. The research methods used sites surveys, focus group discussions, and interviews. Data processing was done by using Site Significance Assessment and SWOT analysis. The result shows there are 4 (four) of historic shipwreck sites potency area in Thousand Islands waters which can be recommended as the attraction for marine ecotourism with the model of the Marine Eco Archaeological Park (MEA Park). These sites areas include 1) Shinta wreck and Pipa wreck in Pari Island waters, 2) Tabularasa wreck in Pramuka Island waters , 3) Poso wreck in Karang Congkak waters, and 4) Papatheo wreck in Sepa Island waters.

Keywords: archaeological park, marine ecotourism, historic shipwrecks, thousand islands

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-98]

Spatial Correlation of VIIRS Boat Detection with Sea Surface Temperature and Chlorophyll-a in Anambas Islands Marine Protected Area

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ABSTRACT

Anambas Islands Marine Tourism Park is a national Marine Protected Area (MPA) located within the regency of Anambas Islands, Riau Archipelago. The park is very important since it is situated in the South China Sea and home to 339 types of hermatypic corals, 578 types of coral fishes, two types of sea turtles, and a variety of sea birds. Analysis of the relationship of VIIRS Boat Detection (VBD) with chlorophyll-a and sea surface temperature (SST) will gain our understanding of the productivity of the MPA. Monthly images of VBD, and MODIS-Aqua monthly chlorophyll-a and SST images from January 2020 to December 2020, were used to investigate the correlation. The results showed how the chlorophyll-a and SST that lead to the potential fishing grounds relate to the boats detected from the satellite.

Keywords: Spatial correlation, VBD, Chlorophyll-a, Sea Surface Temperature

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-101]

Temporal and spatial distribution characteristics of wind wave energy and surge energy in China Sea and its surrounding waters

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ABSTRACT

Using the high resolution data and high time precision data of era5 reanalysis, the analysis of wave energy is of great significance to the development of renewable energy in China Sea and its adjacent waters. At the same time, the climate change over many years affects the spatial distribution and intensity, trend change and seasonal analysis of China Sea and its adjacent waters, and explains the reasons for the inconsistency of wind waves. By introducing the EOF distribution over the past 42 years, the modal characteristics of long time series of wave energy are investigated. The periodicity of spectrum signal is studied in space, and the data has strong statistical significance. The results show that there are considerable wave forces in the China Sea, and the areas with abundant wave forces mainly come from the Taiwan Strait, Luzon Strait and some parts of the South China Sea. The wave energy of offshore islands is more stable than that of the Chinese mainland. This indicates that the installation of wave power stations near islands will be an economically viable and environmentally friendly way of power supply.

Keywords: Wave energy- Wind wave energy- Surge energy- Spatial and temporal distribution- EOF

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-104]

Provenance of sediments in the Gulf of Guinea: Evidence from geochemistry

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ABSTRACT

Marine sediments refer to the materials that are transported and deposited on the seafloor by rivers, glaciers, wind and so on. It can be divided into physical, chemical and biological processes. These terrigenous materials contain rich geological information and are a large information base for recording the history of the earth (Zhao et al., 1989). In recent years, the source of sediments has become an important field of modern sedimentary research (Cai et al, 2020). Marine sedimentary geochemistry is an indispensable part of marine sedimentology and marine geochemistry. Based on the analysis of the elements and element combination characteristics of the sediments, this paper studies the material sources of the deep-sea sediments in the Niger Delta area of the Gulf of Guinea. We believe that the main sources of the sediments are terrigenous input, then biological sedimentation, late diagenesis and hydrothermal fluid alteration. Through the changes of major, trace and rare earth elements, we can understand the characteristics of a series of geochemical anomalies in Niger Delta, which plays an important role in understanding the geochemical anomaly indicators of other hydrate rich areas in the world. At the same time, Niger Delta is one of the hottest areas for deep-water oil and gas exploration in west Africa (Zhang et al., 2021), and the study of its geochemical anomalies also plays a role in promoting the deep-water oil and gas exploration in this area.

Keywords: Gulf of Guinea, Rare earth elements, Sediment geochemistry

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-105]

The characteristics of Mg isotopic composition of hot springs discharged in Tengchong Volcanic Area, in Southwestern China

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ABSTRACT

The hydrothermal system plays a crucial role in the cycling of material and energy between the lithosphere and hydrosphere. In general, seafloor hydrothermal systems are one of the important sinks for Mg because of the formation of secondary minerals, but the situation is not as same as in continental hydrothermal systems, in addition, the behavior of Mg isotopes during hydrothermal circulation is still unclear. Thus, in this study, we measured the Magnesium isotopic compositions of hot springs discharged in the Tengchong volcanic area, the subduction zone between the Indian Plate and the Eurasian plate, to better understand the fate of Mg in the continental hydrothermal system. The measured &#948-26Mg values range from -1.668 to 0.173o/oo, which are higher than the local river except for Datang spring. Meanwhile, compared with the volcanic rocks of Tengchong (&#948-26Mg = &#65293-0.51 to &#65293-0.33o/oo), the Mg isotopic composition characteristics of the two are not completely the same, which indicates that Mg isotope fractionation did occur during the hydrothermal circulation. The Mg isotope values of samples collected from the hot springs with calcareous tufa are heavier, suggest that the formation of Mg-bearing carbonate minerals result in the Mg isotope fractionation. While some samples with heavier Mg isotope, we initially think it is the result of mixing with cold water. In the future work, we will try to calculate the Mg mass balance between lithosphere and hydrosphere, make the Mg cycle quantified.

Keywords: Mg isotope, Hot spring, Tengchong volcanic field, subduction zone

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-106]

Calcium isotopic proxies for hydrothermal activities in the sediment cores of Tianxiu hydrothermal field, Carlsberg Ridge

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ABSTRACT

Since the discovery of the first hydrothermal field (Corliss et al., 1979), seafloor hydrothermal processes are a major control on heat flux and the chemical and isotopic composition of the ocean crust and seawater (Hart, 1984- Alt, 1995), and lead to heat and chemical transfer from the interior of the earth to the ocean (Edmond et al., 1979- Mottl and Wheat, 1994). Hydrothermal sediments are products of seafloor hydrothermal activities and are distinguished from pelagic sediments by their distinct mineralogical and geochemical characteristics (Miller et al., 1966- Baturin et al., 1969). The traditional indicators of hydrothermal activity (such as Fe, Cu, Zn and Mn) are easily controlled by redox conditions. Therefore, this paper hopes to seek new hydrothermal indicators to indicate the hydrothermal activity process. In this study, we present the mineralogy, geochemistry, Ca isotopic composition of a near-vent sediment core from Tianxiu hydrothermal field. By comparing with study field basement and other hydrothermal sites sediments, we aim to reveal the hydrothermal signatures, the fluxes of major hydrothermal elements, and discuss that Ca isotope indicates the histories and intensity of hydrothermal activity by the sediment core.

The historical evolution trend of Ca isotopic composition of Tianxiu hydrothermal sedimentary core is basically consistent with that of accumulation fluxes for Fe (except for 1870-2700 yr) and Cu. In addition, the Ca isotopic composition is only controlled by the end members, and there is no isotopic fractionation in the process of hydrothermal activity. Therefore, the Ca isotopic composition is an effective tracer for the process of hydrothermal activity.

Keywords: Calcium isotopic, hydrothermal activities, Tianxiu hydrothermal field

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-107]

Comparative analysis of rhamnolipids produced under different oxygen conditions and their promising bioprospecting

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ABSTRACT

A comparative study of properties and structure difference in rhamnolipids produced under aerobic and anaerobic conditions by Pseudomonas sp. CH1 which was isolated from oily sludge produced by ship repair plant was conducted. The critical micelle concentration (CMC) value of rhamnolipids produced in aerobic fermentation (AO) was 100 mg/L. By contrast, rhamnolipids produced in anaerobic fermentation (NO) possessed a low CMC value of 40 mg/L and could reduce the surface tension to 26 mN/m. Moreover, NO comprised of 6 homologues and the proportion of mono-rhamnolipids was up to 87.83% while the ratio of di-rhamnolipids and mono-rhamnolipids in AO was 63.1% : 36.9%. Additionally, NO revealed an outstanding solubilization ability of phenanthrene (Phe) which up to 193.14 mg/L that was 149.7-fold higher than its initial solubility (1.29 mg/L) in water. The viscosity of heavy oil was decreased by over 90% by both two kinds of rhamnolipids products while AO was capable of efficiently reducing the viscosity even at a low temperature. This work provides insights into the different corresponding application of rhamnolipids produced aerobically and anaerobically.

Keywords: Rhamnolipids, Aerobic condition, Anaerobic condition, Solubilization, Reduction of viscosity

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-109]

Distribution of marine debris in Jakarta Bay and its implication to the coastal ecosystem

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ABSTRACT

Marine debris pollution is a worldwide issue that can threaten the environment and natural resources^ sustainability nowadays, while Indonesia is considered the second biggest polluter that contributed to plastic debris into the ocean. Both central and provincial governments have applied massive efforts to manage these problems by collaborating with various stakeholders. Marine debris can impact the coastal ecosystem and its surroundings by closing up mangrove shoots right as the ebb-tidal waters are receding. When the debris stays longer in the mangrove area, it will disturb the environment and reduce the growth rate of mangrove. This research is located in Muara Gembong, Bekasi Regency (considered part of the Jakarta Bay), and conducted to support the Indonesian marine debris management project. The result showed that debris composition in Muara Gembong consisted of 80% inorganic and 20% organic, where plastic debris dominated with 50-81% and was distributed throughout the estuary and mangrove ecosystem. The highest waste density was found in the mangrove ecosystem in the Kali Mati estuary with 222.67 waste/m2, while the heaviest waste was found in the Bendera estuary 4,663.64 grams/m2. This condition explained the lack of marine debris management in the Muara Gembong estuary, where most of the inorganic debris originated from household litter

Keywords: Marine Debris, Pollution, Composition

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM)

[ABS-40]

GROWTH RATE COMPARISON OF EUCHEUMA DENTICULATUM CULTIVATED WITH HORISONTAL NET AND VERTICAL NET

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ABSTRACT

Eucheuma denticulatum is one of the most widely cultivated macroalga commodities. This commodity produces carrageenan iota as raw material for various industries. This study aims to compare the growth rate of Eucheuma denticulatum cultivated by the horizontal net (Horinet) and vertical net (vertinet) methods. This research was conducted in September-December 2019 and located in Lakeba waters, Bau-Bau City, Southeast Sulawesi, Indonesia. The results showed that the specific growth rate of E. denticulatum seaweed cultivated with Horinet and Vertinet was significantly different. The growth of the thallus at an initial weight of 20 g developed to 67 g and 112.5 g as viewed with a horinet and vertnet, respectively. The specific growth rates of these two methods were 5.01 and 6.59%/day using vertinet and horinet, respectively. Based on the results of the t-test showed that the use of the two methods were significantly different by 0.46 and 0.36 ($P<0.05$) on the specific growth rate of E. denticulatum seaweed. Both of these methods can be used to cultivate seaweed with good results, however, these two methods have differences in the growth results obtained.

Keywords: growth, seaweed, cultivation method, vertinet, horinet

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM) (Sub-session: Aquarium)

[ABS-83]

Research on a Full-sea Depth Sampling System for Macro Organisms

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ABSTRACT

The sea area with a depth of more than 6000 meters is known as Hadal Trenches. Hadal area is rich in biological resources, which have inestimable economic, medical and scientific value. However, getting these organisms from hadal trenches that with extremely high hydrostatic pressures is extremely difficult. Due to the huge hydrostatic pressure difference between the deep and the sea surface, many organisms will be critically damaged during recovery process. So it^s challenging to capture living organisms from hadal area. In this research, we build a full-sea depth macro organisms sampling system. A sampling piston with special structure was designed to reduce the weight of the system. Creatures will be kept in a thick-walled cylinder made of titanium alloy. The system is equipped with a ultra-high piston accumulator to compensate for the pressure drop of the cylinder. Besides, a novel liquid pressure compensation mechanism is built to accurately compensate for the pressure loss of caused by the expansion of the cylinder. In addition, we designed deep-sea batteries and motors specially for this system. We conducted a test in a hyperbaric chamber that simulates deep-sea pressure environment and the results indicated that the system possesses the ability to operate in hadal area. The equipment will be tested in the Mariana Trench in the near future.

Keywords: Hadal Trench- high pressure- pressure compensation- pressure sampling

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM) (Sub-session: Aquarium)

[ABS-92]

RAS design for rearing Branzino (D. labrax) in Galveston, Texas

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ABSTRACT

At this time, farming an European branzino seabass is quite challenging due to consumer pressure and regulation. In Europe, this industry has been settled for decades but different in the United States. Back there, they have farmed the fish in the sea cage and retailers in the U.S. have to import that fish to the country. Because of United States regulation that hinders coastal or offshore aquaculture, farming in land-based operation seems a viable option to bring this fish closer to the American market. Our facility has a target to produce 500 metric tons branzino weighed at 300 to 350 grams for each year. We will spawn our 52 males and 26 females owned brood stock. The size of this facility is about 130 m x 95 m (135.000 square feet) and located in Galveston, Texas. One key component that could be introduced to our economic analysis is a marketing plan that would help inform the American public about the quality of branzino, a fish predominantly consumed in Europe. A strategy to educate and inform the American public about branzino is currently needed to produce large sales of this fish. Based on our design, under the best scenario the system will be profitable after 6 grow cycles (7 years).

Keywords: Aquaculture, Branzino, RAS, Texas

Topic: Marine Resources, Conservation, and Integrated coastal zone management (ICZM) (Sub-session: Aquarium)

[ABS-1]

The Momentum Conserving Scheme Implementation for Simulating Dambreak Flow through Various Contraction

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ABSTRACT

Rapid flow downstream due to dam-break has a detrimental effect on the surrounding environment or, more dangerously, can be life-threatening. From a practical point of view, these flows are important to studies due to the limited dam break real case data. This paper discusses the numerical modelling of the dam-break flow through various contraction. Our goal here is to investigate the performance of a numerical model for solving the shallow water (Saint-Venant) equations using a momentum conserving staggered grid scheme (MCS). The scheme is the conservative discrete formulation of the Saint Venant equations. Flows across channels of various widths and depths have been successfully simulated using a version of this scheme. In this work, we simulate dam-break flow in a wave tank through several forms of contraction- trapezoidal and triangular. Our simulation results show good agreement with the experimental data in the literature. This assessment shows the merit of the scheme, which is suitable for dam-break flows in channels of varying width.

Keywords: conservative scheme- dam break- Saint Venant equations.

Topic: Ocean-Atmosphere Dynamics

[ABS-3]

Observed of equatorial currents in the indian ocean during two contrasting IOD events:2006 and 2010

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ABSTRACT

The evolution of Indian Ocean Dipole (IOD) events in 2006 and 2010 is investigated using observational data products that are made to understand several processes in the positive (negative) phase of IOD events. Two Acoustic Doppler Current Profiler (ADCP) moorings mounted at 90E and 80.5E along the equator were used to evaluate the zonal current variation during two contrasting Indian Ocean Dipole (IO) event. Westward anomalies of the zonal current were observed at 0, 80.5E during the peak phase of the positive IOD event from October to December 2006. Meanwhile, the observed zonal currents at 0, 90E only showed the short-term westward anomalies during October 2006. On the other hand, during negative IOD event in 2010, the observed zonal current at both mooring locations indicated strong intraseasonal variations of the eastward anomalies from August to December 2010. Strong easterly (westerly) anomalies of the surface zonal winds were observed during the peak phase of the positive (negative) IOD event in 2006 (2010). Theses easterly (westerly) anomalies forced upwelling (downwelling) equatorial Kelvin waves indicated by the negative (positive) sea surface height anomalies. Strengthening (weakening) of upwelling (downwelling) along the equatorial Indian Ocean would be a significant factor for further understanding of IOD evolutions.

Keywords: Easterly anomaly, equatorial current, negative IOD, positive IOD, westerly anomaly, wyrtki jet

Topic: Ocean-Atmosphere Dynamics

[ABS-11]

Dissolved oxygen variability of Indonesian seas over decades as detected by satellite remote sensing

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ABSTRACT

The dissolved oxygen (DO) decrease in the ocean becomes a notable issue because of its potential impacts on marine biogeochemical cycles and ecosystem services. Satellite remote sensing application to support in-situ measurement is a time and cost-saving on wide scales DO monitoring. This study aims to determine the DO variability from 1993 to 2020, identify the potential areas to experience deoxygenation, and investigate the correlation between DO and other ocean parameters in Indonesian seas. The validation between in-situ and satellite-derived DO shows the determination coefficient of 0.73, indicating the satellite dataset properness for the entire analysis. The multiple regression analysis among the long-term satellite-derived ocean parameters shows that the in-situ DO can be estimated by the combination of the potential temperature, total chlorophyll-a, and salinity. The potential temperature was identified as the parameter with the highest correlation with DO (Pearson correlation analysis). The results of DO variability analysis show the overall decreasing trend with significant decreases in 1998, 2010, and 2016. There is a distinct difference in DO seasonal patterns in the southwestern and northeastern regions. The potential of ocean deoxygenation is detected in western Sumatra waters and the Arafura Sea at the 200-1,000 meters depth.

Keywords: Dissolved oxygen, deoxygenation, remote sensing, trends, Indonesian seas

Topic: Ocean-Atmosphere Dynamics

[ABS-12]

Modelling of Sea Surface Currents in the Eastern Coast of Bawean Island, East Java

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ABSTRACT

Bawean Island is located in the middle of the Java Sea, approximately 80 km north of Gresik Regency, East Java Province. The coastal area of Bawean Island is famous for its potential as a marine tourism area because it has a well-preserved coral reef ecosystem. The potential for tourism development on this island requires the support of environmental suitability. The dynamics of ocean currents as an important parameter for small island development is important to be analyzed. This study aims to determine the characteristics of currents in the eastern coast of Bawean Island through the hydro-oceanographic model. The data used in this modelling is hourly wind and tide data for the period 2018-2019. The results showed that the pattern of current velocity and movement in the waters of the eastern part of Bawean Island was predominantly influenced by tides. The current velocity during the simulation was quite weak, ranged from 0,10 to 0,15 ms-1. The validation process using RMSE and MAE showed minor errors ranged from 0,09 to 0,15 respectively.

Keywords: Bawean island, hydro-oceanographic model, current, simulation

Topic: Ocean-Atmosphere Dynamics

[ABS-15]

A Schematic Model of Low Temperature and High Salinity Seawaters in Southern Java of Indian Ocean During ENSO and IOD 2017

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ABSTRACT

The seasonal-permanent Java coastal upwelling (RATU) has been widely investigated by international researchers. This article focused on investigating the horizontally distribution of probable upwelling area using indicator of low temperature (max. ~26oC) and high salinity (min. 34 PSU) seawater mass in different depth layers. The temperature and salinity daily datasets are obtained from HYCOM archive, wind daily dataset obtained from ECMWF archive, monthly ONI dataset is obtained from NOAA, monthly SOI ENSO dataset is obtained from BoM Australia, monthly DMI dataset is obtained from Jamstec. Horizontal movement of the low temperature and high salinity during 2017 in the depth of 0 m, 50 m, 75 m, 125 m, 150 m, and 300 m has been observed and modeled as schematics. Research results showing that probable upwelling area occur begin from 150/125 meters layer depth until 75/50 meters layer depth. In those layers, the horizontal propagation of low temperature and high salinity during east monsoon (July) until transition monsoon (October) are dominantly start from east and moves westward. It shows that the highest correlation between temperature/salinity and SOI happened on August until October during La Nina from the depth of 0 m until 100. This has the same results with ONI, the low temperature and high salinity also happened during Normal until La Nina phase. Meanwhile the results of correlation between temperature/salinity and IOD shows that the probable upwelling season occurred during IOD (+) phase until the depth of 100 m, since the deeper the ocean, the salinity shows more irregular results.

Keywords: low temperature, high salinity, upwelling, Southern Java, Indian Ocean, ENSO, IOD

Topic: Ocean-Atmosphere Dynamics

[ABS-17]

Mid-Holosen Indo Pacific Warmpool Evolution

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ABSTRACT

The Indo-Pacific Warmpool (IPWP) plays a very big part in determining Indonesian waters weather. One of its drivers is the Trade Winds which implies that major climate system such as El-Nino Southern Oscillation, Indian Ocean Dipole, and Asian-Australian Monsoon could affect IPWP^s behaviors. Our knowledge regarding the long scale variability from these climate systems could be used to predict their nature in future projections. One of the eras that could be used to investigate this variability is mid-Holocene era. The preliminary result shows that IPWP contraction happened around mid-Holocene^ period. In this study, we will compare the sea-atmosphere interaction in IPWP according to physical data such as wind stress and sea surface temperature. These data were extracted from CCSM4 model, running two separate scenarios, Pre-Industrial and Mid-Holocene. With our data, we will conduct a correlation calculation for these two physical parameters, and then apply a Fourier Transformation signal analysis in some areas of interests. These areas are chosen based on the existence of proxies data, and significant correlation value. The evolution of sea surface condition and its interaction with the atmosphere, including the mechanism involved, shows the importance for understanding climate change throughout IPWP and beyond.

Keywords: Indo-Pacific Warmpool, Mid-Holocene, Sea-Atmosphere Interaction

Topic: Ocean-Atmosphere Dynamics

[ABS-25]

Characteristics of Water Mass Movement in The Nusa Penida Waters Using Three-Dimensional Numerical Modelling

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ABSTRACT

The circulation of ocean currents in Nusa Penida Waters (NPW), located in the eastern part of Bali Island, Indonesia is simulated using a three-dimensional baroclinic hydrodynamic numerical modelling method by Finite Volume Coastal Ocean Model (FVCOM). The study was simulated during the northwest (December-February) and southeast (June-August) monsoons, including tidal elevation as the generating force. The verification of ocean current (u and v components), temperature, and salinity from the model compare with observation data has a high coefficient of determination, i.e., 0.87, 0.92, 0.94, and 0.89, respectively. This verification result shows good agreement between model and observation data. The influence of shallow bathymetry conditions and tide significantly affect the pattern of ocean currents in NPW. The northern part of the NPW has a dominant current moving from east to west during the northwest and southeast, while seasonal winds affect ocean currents in the southern part of the NPW. The average flow velocity in the surface layer during the northwest and southeast monsoons ranges from 0.1-1 m/s, with the highest intensity being in the western part of Nusa Penida. The surrounding waters, namely the Badung Strait, have a higher current velocity than in the Lombok Strait. Especially in the Lombok Strait, during the northwest monsoon, the phenomenon of upwelling and downwelling currents becomes more intense in the sill area.

Keywords: FVCOM- Hydrodynamic model- Indonesian Throughflow- Northwest and southeast monsoons

Topic: Ocean-Atmosphere Dynamics

[ABS-28]

Sea surface temperatures in the South China Sea as a natural thermostat to the rainfall over Borneo: preliminary results

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ABSTRACT

Community Climate System Model ver. 4 (CCSM4) had simulated warmer sea surface temperatures (SSTs) in the South China Sea (SCS) for the mid-Holocene scenario compared to the pre-Industrial. Previous sensitivity experiments using the atmospheric component of the CCSM4, the Community Atmospheric Model ver. 4 (CAM4) showed that warmer SSTs in the SCS suppresses rainfall over Borneo, which is in-contrary to the effect of the stronger insolation over the region. In this study, we indicate that warmer SSTs in the SCS, as simulated in the CCSM4, is responding to the stronger convectional rainfall over Borneo due to stronger insolation. This results suggest that warmer SSTs in the SCS might act as a negative feedback which damps the effect of the stronger insolation on rainfall changes over Borneo.

Keywords: Climate Model- SST- CCSM4- South China Sea- Borneo

Topic: Ocean-Atmosphere Dynamics

[ABS-41]

Oceanographic Conditions of Negative IOD Event 2010 around Indonesian Waters

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ABSTRACT

During the IOD formation, temperature anomalies occur in the surface and subsurface layers. Modelled data from HYCOM, used to analyze the temperature evolution in both layers. This study focused on the West Sumatra and South Java seas for negative IOD 2010. The maximum depth used to represent the subsurface layer in this study is 300 m. Positive temperature anomaly occurs in the subsurface layer four months before the onset of negative IOD, accompanied by the emergence of positive sea surface height anomaly (SSHA). The Hovmoller diagram shown there is an eastward propagation of SSHA. Moreover, changes in temperature anomalies will also affect the ocean heat content (OHC) and the depth of the thermocline layer. Positive anomaly formation is also affected by the La Nina phase that coincides with the negative IOD 2010. Indonesian Throughflow (ITF) will carry warm water from the Pacific to enter the South Java seas, and it will support positive anomaly formation. Further research of IOD events is need for a better understanding of temperature evolution in the subsurface layer. Knowledge of temperature evolution in the subsurface layer can be an alternative indicator in identifying and predicting IOD events.

Keywords: Indian Ocean Dipole (IOD)- subsurface layer- Ocean heat content - West Sumatra Seas- South Java Seas

Topic: Ocean-Atmosphere Dynamics

[ABS-44]

Low-Frequency Sea Surface Warming Mode Surrounding the Maritime Continent

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ABSTRACT

Study of sea surface temperature anomalies (SSTA) variabilities across the Maritime Continent and its adjacent ocean basins from trimmed global analysis dataset (HadI SST 1.1) over the last century (1900-2020) was conducted to illuminate the actual dominant pattern that govern the dynamics within the region. The first leading empirical orthogonal function (EOF) mode of SSTA across the region could explain 20.2 % of the observed total variances and appeared as a large-scale warming event with strong quasi-centennial periodicity (~85 years) followed by interannual variations possibly related to the alternating influence between Pacific Decadal Oscillation (PDO) and El Nino/Southern Oscillation (ENSO) which indicated by wavelet coherence analysis. As the strongest mode of SSTA, the long-period warming event clearly influence the SSTA pattern across the region where warming (cooling) event tends to amplify the anomalous SST increase (decrease) during peak period of El Nino (La Nina) event with most pronounced change observed in the Eastern Indian Ocean, Indonesia seas, and South China Sea.

Keywords: Maritime Continent, Sea Surface Temperature

Topic: Ocean-Atmosphere Dynamics

[ABS-47]

Sea surface temperature variability in Indonesia and its relation to regional climate indices

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ABSTRACT

Sea surface temperature (SST) is an essential indicator of ocean condition. It can reveal many physical processes interacting with it. The present study aims to investigate the spatial-temporal pattern of significant SST variability in Indonesia seas. The Empirical Orthogonal Function (EOF) and Power Spectral Density (PSD) are used to analyze monthly SST data from 1979 to 2021. These two methods are combined with correlation analysis to verify the underlying phenomena and their spatiotemporal distribution pattern using regional climate indices as the reference signal. The result shows that the most prominent feature is the annual and semi-annual oscillation due to the Asia-Australia monsoon system. The annual oscillation signature is found almost in the entire Indonesian seas, with an exception in the low-latitude area and the western Pacific region. The signature of semi-annual oscillation is also protrusive, extending across Indonesia from the Timor Sea to the South China Sea. There is also a variation of SST in correlation with Dipole Mode Index (DMI), localized on the western coast of Sumatra. From this research, it is found that EOF is helpful to inspect principal components of the SST variability in a relatively short time. However, along with EOF, spatial PSD is more efficient in separating periodicities and their spatial distribution.

Keywords: Sea Surface Temperature- EOF- PSD- Climate Indices

Topic: Ocean-Atmosphere Dynamics

[ABS-51]

Ocean Response to Tropical Cyclone Seroja at East Nusa Tenggara Waters

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ABSTRACT

Abstract. Tropical Cyclone Seroja was an unique tropical cyclone and had significant impacts along its path, such as floods in East Nusa Tenggara and high waves along the southern coast of Indonesia. Research related to the response of the ocean to tropical cyclone in Indonesia is still not very common because the phenomenon rarely occurs in Indonesian waters. The responses of the upper ocean to TC Seroja were investigated using multi-satellite remote sensing and numerical model of sea surface wind (SSW), sea surface temperature (SST), sea surface height anomaly (SSHA), chlorophyll-a (Chl-a), and mixed layer depth (MLD). The SST cooling occurred around the TC Seroja track of about 0.5 - 3 &#8304-C after the storm has passed. During 1 - 7 April 2021, besides the spatial SST cooling, Chlorophyll increasing, SSHA decreasing, and MLD shallowing were also detected. The maximum Chlorophyll increase, SSHA decrease, and MLD shallow reaching 5 mg/m^{3}, 10 cm, and 20 m respectively. These characteristics indicate an upwelling phenomenon induced by the cyclone.

Keywords: Tropical cyclone Seroja, Chlorophyll-a, Mixed Layer Depth, Sea Surface Height Anomaly

Topic: Ocean-Atmosphere Dynamics

[ABS-54]

Oceanographic and Meteorological Parameter Analysis During Floods in Pekalongan

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ABSTRACT

Pekalongan is one of the coastal regions that is prone to floods caused by tides of seawater that inundate areas with lower elevations. The coastal region is very dynamic, oceanographic and meteorological parameters have an influential role in this region. This study aims to determine the condition of the oceanographic parameters in the form of sea level and significant wave height, and the conditions of meteorological parameters such as wind and rainfall during the flood. This study utilizes the Delft3D hydrodynamic model to analyze sea level and significant wave height conditions on the coast of Pekalongan. Wind data is processed to determine the speed and direction of the dominant wind during the flood. Furthermore, rainfall data from GSMaP and two rain posts is processed to see the accumulation of rainfall. Based on the analysis of the four cases, in general, the conditions of oceanographic and meteorological parameters provide a significant contribution as the cause of flooding. The sea level varies between 0,93 - 1,95 m, with two out of four cases occurring on D-1 and D-2 full moon phase. During the flood, wave conditions with a height of 0,1 - 3,5 m are influenced by strong winds of 20-25 m/s. Rain with heavy to very heavy intensity was also observed during the three cases. Oceanographic parameters in high waves and relatively high sea level can obstruct the discharge flow into the coast. When this phenomenon occurs with heavy rains, it can cause rivers to overflow and exacerbate the damage.

Keywords: Coastal Inundation, Oceanographic Parameters, Meteorological Parameters, Delft3D

Topic: Ocean-Atmosphere Dynamics

[ABS-55]

Linkages between Active and Weakening MJO events to Seasonal Variations over Maritime Continent

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ABSTRACT

Madden-Julian Oscillation (MJO) is a large-scale phenomenon of sea-atmospheric intraseasonal variability that occurs in the equatorial area, particularly in the Maritime Continent (MC). This research focused on the analysis of the MJO propagation process in association with rainfall events and sea surface temperature anomaly (SSTA) during seasonal variations i.e. November, December, January and February, and March (NDJFM) and May, June, July, and August and September (MJJAS). MJO events from 2010 to 2019 were classified as MJO active or MJO weakening according to propagation characteristics and amplitude changes in RMM index. This research uses a dataset of 10-year series of daily Tropical Rainfall Measuring Mission (TRMM) (3B42 V7 derived) measurements for detecting rain rates. Daily OLR data from the NOAA Physical Sciences Laboratory and SSTA daily data from Physical Oceanography Distributed Active Archive Centre (PODAAC) NOAA are considered for analysing MJO propagation. Composites of outgoing longwave radiation (OLR) were also identified differences between 2 events, active MJO events had consistently higher negative OLR anomalies than weakening MJO events. Active MJO events during NDJFM had higher rain rate and positive SSTA than weakening MJO events. Furthermore, composite rain rates distribution over MC during NDJFM are mainly located in the south of the equator, contrarily when MJJAS are north of the equator.

Keywords: MJO- rainfall events- OLR- SST anomaly

Topic: Ocean-Atmosphere Dynamics

[ABS-57]

Sea Surface Temperature and Chlorophyll a variability in the vicinity of Natuna Sea : Role of cold surge during east asian winter monsoon 2020/2021

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ABSTRACT

Cold surge is a phenomenon of cold air outbreaks originating from the highlands of Asia during the winter in the Northern Hemisphere. It is known that the variability of sea surface temperature (SST) and chlorophyll-a (chl-a) is influenced by the presence of monsoon winds. However, the cold surge which is part of the monsoon winds is not yet fully known whether it has a significant influence or not on the variability of SST and chl-a. This study aims to analyze the effect of cold surge on the variability of SST and chl-a during 2020/2021 east asian winter monsoon (November-February) around the waters of the Natuna Sea which is an area of cold surge propagation. The SST data were obtained from satellite observations using the Advanced Very-High-Resolution Radiometer (AVHRR) sensor with the grid resolution of 0.05 x 0.05 and the chl-a data obtained from the Aqua Moderate-resolution Imaging Spectroradiometer (MODIS) satellite observation with the 4 x 4 km resolution. The results of the analysis show that SST gradually cools from November (28 - 30degC) to February (25-27degC). When the cold surge occurs, SST cools in the study area with an anomaly of lower than -1degC for strong cold surge cases. Overall, there are differences in the distribution of chl-a which is influenced by cold surge. An increase in the concentration of chl-a occurred in most of the waters of the Natuna Sea with a significant distribution of values in the waters close to the mainland.

Keywords: cold surge- sea surface temperature- chlorophyll-a

Topic: Ocean-Atmosphere Dynamics

[ABS-65]

Subsurface Ocean Characteristic in the Mentawai Waters during Monsoon Transition Phase on Last 2020

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ABSTRACT

The Indonesia Continental Shelf (LKI) expedition was held during September - October 2020. During the survey, there were nine Conductivity Temperature Depth (CTD) measurement stations that located extending from the west of Mentawai Island to the Indian Ocean. The location of these CTD station was around the area where Wyrtki Jet appear, so it will influence the water mass characteristic in that area. In this study, two-line of subsurface temperature, salinity, and density data were plotted longitudinally. The results show the unique feature between the open ocean and coastal area, the characteristic from open ocean affects the characteristic in coastal zone, it is shown from the salinity data. The maximum salinity found in the thermocline layer, between 90-150 m in both of line. The salinity increases from the surface until the thermocline, then slightly decreases to the deep layer. The surface salinity in the coastal area significantly different from the open ocean, it is less than 34 PSU. That is the fact that Wyrtki Jet current suspected induced the open ocean water to the coastal water in the subsurface. Otherwise, the temperature and density have a similar pattern with range values around 9-31&#61616-C and 1020 - 1030 kg/m3, respectively

Keywords: Mentawai Waters- Water mass- Wyrki Jet

Topic: Ocean-Atmosphere Dynamics

[ABS-66]

Strengthening the Early Detection and Tracking of Tropical Cyclones near Indonesian Waters

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ABSTRACT

In early April 2021, the territory of Indonesia, around the province of East Nusa Tenggara in particular, was severely damaged due to being hit by tropical cyclone Seroja. The impact of tropical cyclone Seroja does not only occur in Nusa Tenggara but also in Australia. In fact, the impact that hit Australia exceeded the damage that occurred in East Nusa Tenggara. The impacts caused by tropical cyclone Seroja in East Nusa Tenggara included 181 deaths and 74,222 houses damaged.

Tropical cyclones are extreme weather anomalies that hit many countries, especially in the middle latitudes associated with vast oceans, such as the area around the South China Sea, the Pacific Ocean and the Atlantic Ocean, such as the Philippines, Japan, America, Australia, Europe, etc. Early detection systems for the genesis of tropical cyclones are still being developed by international collaborations such as The Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) in the Indian Ocean, Tropical Atmosphere Ocean (TAO) in the Pacific Ocean, and Prediction and Research Moored, Array in the Tropical Atlantic (PIRATA).

To find out the early sign of a tropical cyclone, it is characterized by sea surface temperatures > 26.5 C, the growth of very broad and thick convective clouds, and rotating wind speeds of > 63 km/hour. For this reason, continuous observations are needed in the area where the tropical cyclone first developed. Observation equipment required includes satellite observations, buoys, and weather radar. Unfortunately, in the territory of Indonesia, especially in the Indian and Pacific oceans around Indonesia, this equipment is not equipped with such equipment due to very expensive funding factors and vandalism constraints. For this reason, in the future, national and international cooperation will be needed to start building an early warning system for the emergence of tropical cyclones among research centers globally.

Keywords: tropical cyclone-disaster risk reduction-buoy array-early warning system

Topic: Ocean-Atmosphere Dynamics

[ABS-69]

Linkage between the Indian Ocean Dipole Asymmetry and Southeastern Indian Ocean Upwelling

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ABSTRACT

On interannual timescales, Southeastern Indian Ocean (SETIO) upwelling is closely related to the Indian Ocean Dipole (IOD) and El-Nino Southern Oscillation (ENSO). IOD events tend to be stronger when they co-occur with ENSO. However, the linkage between SETIO upwelling and IOD asymmetry that is independent and dependent on ENSO phases is not clear. This issue is investigated in this study based on the analysis of Kelvin wave propagation, subsurface ocean dynamics, and thermocline depth, as well as chlorophyll-a concentration as the upwelling parameters. The impact of IOD asymmetry related to ENSO on SETIO upwelling characteristics was assessed based on composite analysis conducted on two positive IOD events co-occurring with El-Nino events (pIOD-EN) (1997 and 2015) and three independent positive IOD (pIOD) events (1994, 2006 and 2012). During pIOD event, easterly wind anomaly generates zonal sea surface height anomaly (SSHA) across the Indian Ocean, followed by upwelling Kelvin waves propagation along the equator to the coast off Sumatra-Java and also damped the Wyrtki Jet. Consequently, in the Southeastern Indian Ocean, the shallow thermocline depth strengthens the SETIO upwelling in this region as well. During pIOD-EN event, the equatorial zonal wind anomaly blows longer and stronger, resulting in earlier and more persistent shallowing of the thermocline depth, starting in May until April in the following year, and also stronger upwelling with a peak amplitude of up to 2.78 standard deviations. Even though the upwelling is stronger during pIOD-EN event due to shallower thermocline depth, the chlorophyll-a concentration during independent pIOD events is much higher with a peak amplitude of up to 3.19 standard

deviation. It is suggested that this is the result of widespread cold SST anomaly distribution south of 15S due to the absence of El-Nino.

Keywords: El-Nino- Indian Ocean Dipole- upwelling- chlorophyll- Indian Ocean

Topic: Ocean-Atmosphere Dynamics

[ABS-84]

Variation of water mass exchange on tidal-scale in Balikpapan Bay

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ABSTRACT

Balikpapan Bay is enclosed water influenced by freshwater from river runoff and saline water from Makassar Strait. The exchange of water mass was examined by numerical model simulation-Hamburg Shelf Ocean Model (HAMSOM) with horizontal resolutions approx. 150 m and 3 vertical layer applied in Balikpapan Bay. The eleven tidal components and daily river runoff from four main rivers used for model input. Tidal elevation observation fits with the model in Penajam Paseur ASDP Port from 08/10/2015 to 17/10/2015. It correlates 0,87 with a significant level of 95%. The transport volume in the mouth bay was examined. The maximum water transport during spring (neap) tide is 16950 m3/s (1300 m3/s) and -16970 m3/s (-3362 m3/s). Positive (negative) of water transport is inflow (outflow) to Balikpapan Bay. The net transport during the peak of spring (neap) is 20 m3/s (2.062 m3/s). It indicated that water mass from bay more easy flushing during neap tide.

Keywords: Balikpapan Bay, water mass exchange, tidal-scale

Topic: Ocean-Atmosphere Dynamics

[ABS-91]

Staggered grid momentum conservative scheme for dam break simulation with different slopes

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ABSTRACT

A dam break with rapid flow downstream has destructive consequences along its propagation path, it can even destroy buildings, bridges, or lives. Disaster mitigation to estimate the destructive effect of a dam break can be done by modeling and simulation using numerical methods. In this paper numerical simulation of dam-break flow with a hump of different slopes was performed. The Nonlinear Shallow Water Equation (NSWE) is used to represent the flow. We use a staggered grid momentum conservative scheme to solve the NSWE. This paper aims to investigate the performance of our numerical model for simulating a dam break flow in a wave flume with a hump of different slopes. The result shows a good agreement with the experimental data. We also calculate the maximum wave run-up height that is possibly achieved. This indicates that the scheme is capable of simulating dam-break flow with a hump of different slopes.

Keywords: dam-break- momentum conservative scheme- wave run-up-

Topic: Ocean-Atmosphere Dynamics

[ABS-95]

Cyclogenesis Analysis of Surigae Cyclone using Satellite Imagery Himawari

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ABSTRACT

develops in the vast ocean. If a tropical cyclone passes close to land it can cause disaster and damage in some areas. Tropical cyclone Surigae which formed in the Pacific Ocean north of West Papua is a tropical cyclone in the super typhoon category. The resulting impact can affect the atmospheric conditions in the surrounding area. Therefore, it is necessary to monitor the activity of tropical cyclone Surigae because it affects the dynamics of the atmosphere that triggers strong winds and rain clouds. This study aims to analyze the growth, movement and intensity of tropical cyclone Surigae using Himawari -8 IR satellite data. TBB data (temperature of black body) as cloud top temperature is used for convective index analysis, visual observation method with Dvorak technique to monitor the growth and movement of cyclones, T-Number which can be used to estimate intensity in the form of maximum wind speed and minimum pressure at the center of the cyclone . Based on the cloud top temperature analysis, the convective index value was obtained from 0 to 60. Tropical cyclone Surigae has a life span of 12 days, formed in the northern Pacific Ocean in the form of MCS (Mesoscale Convective System) on April 12, 2021 which moved northwest and became extinct on April 23 2021 . The maximum intensity will occur on April 17, 2021 at 18 UTC with a T-number reaching 7.0 with an estimated maximum wind speed of 140 knots and a minimum air pressure of 898 hPa.

Keywords: Dvorak technique, tropical cyclone, himawari satellite.

Topic: Ocean-Atmosphere Dynamics

[ABS-96]

The Effect of ENSO and IOD Climate Variability on Salt Production in Nusa Tenggara Islands

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ABSTRACT

The Nusa Tenggara Islands have ideal environmental parameters for producing salt. This area generally has good water quality, low rainfall, low humidity, high evaporation rate, and high wind speed. Salt production in this region, like other salt producers in Indonesia, is also affected by global climate variabilities such as the El Nino Southern Oscillation and the Indian Ocean Dipole. Salt production increased when El Nino and positive DMI simultaneously occur during the dry season, as happened in 2012, 2014, and 2015. On the other hand, salt production will decrease when La Nina and DMI are negative/neutral simultaneously, as happened in 2016. The La Nina event and IOD negative happening simultaneously in 2016 triggered high rainfall and resulted in a significant decrease in salt production in Nusa Tenggara. about 5.8% of the annual average production (2012-2015). This condition also made salt crop failure on the islands of Java and Madura. It means that the effect of ENSO and IOD climate variability on salt production in Nusa Tenggara is not as large as the salt centers in Java and Madura.

Keywords: El Nino, Dipole Mode, evaporation, precipitation, salt production

Topic: Ocean-Atmosphere Dynamics

[ABS-102]

Atmospheric Boundary Layer in the Presence of Surface Waves

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ABSTRACT

The characteristics of marine atmospheric boundary layer are investigated by using turbulent data measured at four heights of a fixed platform combining with wave measurements. Under wind sea conditions, the turbulence statistics are consistent with Attached Eddy Model and Monin-Obukhov similarity theory due to the measurements are above the shallow wave boundary layer. However, when the sea state is dominated by swell, observation shows that turbulence overlying the ocean surface is modified.

Keywords: marine atmospheric boundary layer-surface waves-air-sea interaction

Topic: Ocean-Atmosphere Dynamics