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Study of the effect on the addition of anti-slamming bulbous bow to total resistance in tugging supply vessel using CFD

Kiryanto ; Chrismianto, Deddy; Hadi, Eko Sasmito; Firdhaus, Ahmad
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Abstract

Anti-Slamming Bulbous Bow (ASB) is a bulbous bow that has been modified according to the Anti-Slamming principle. For waters that have varying wave heights, for example, in the East Nusa Tenggara region where waters meet the criteria for the application of anti-slamming technology and are related to the existence of several offshore buildings and the use of tugging supply vessels (AHTS) for the benefit of the region. This research was conducted to determine the effect of installing anti-slamming bulbous bow and Anti-slamming height on the total resistance of the ship using numerical methods with the help of CFD software. The method used is to vary the height of anti-slamming and the type of bulbous bow on the bow of the ship. Ship modeling is carried out with CAD Software, and while the obstacle analysis uses CFD Tdyn software. Based on the analysis that has been done, the effect of the anti-slamming bulbous bow on the total resistance value of the ship

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Developing Small Dual-Fuel Diesel Engine to Control Marine Pollution by Reducing NOx Emission for Application in Fishing Vessels

A Santoso[1*], Semin[1], B Cahyono[1] and B Sampurno[2]

[1] Marine Engineering Department, Sepuluh Nopember Institute of Technology, Indonesia
[2] Industrial Machinery Engineering Department, Sepuluh Nopember Institute of Technology, Indonesia

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Abstract. Using natural gas for fueling a ship growing extensively since environmental issues become one of the priorities in the shipping industry. The ship uses natural gas as the main fuel commonly called as a gas-powered ship. Gas has lower specific prices compare with any type of diesel fuel. But due to handling, storage, and distribution costs then gas prices for ships become higher even still a bit cheaper than diesel fuels. Besides prices, technically gas is cleaner so it may give the lower emission levels. Dual fuel technology is the best choice in occupied gas as ship fuel due to the existence of the IGF Code. Established Dual-fuel diesel engine is very expensive and available for big power capacity. This research develops a small dual-fuel diesel engine from a conventional engine with power less than 10 HP. The piston crown is a part of the engine that was modified so that the engine can use natural gas in the best performances as the conventional one. NOx as the most hazard emission in the diesel combustion process is controlled to be as the lowest as possible. The quality of air may be significantly affected by those small engine pollutions because of the large number of vessels in that dense environment in the typical fishery villages. In conclusion, the modified dual-fuel diesel engine capable of reducing NOx emission by up to 31% at a practical safe operation of 50% dual-fuel. The higher gas portion gives a lower NOx emission level.

Keywords: Dual-fuel, Diesel Engine, Marine Pollution, NOx Emission, Fishing vessel

1. Introduction

Fuel price is a dominant cost in the operation of fishing vessels for any size and type of the ships. Fisherman usually uses high-grade diesel oil called as a high-speed diesel oil (HSD). The diesel fuel prices often fluctuated but mostly it is costly even the global prices decrease such as in the recent situation. One of the alternatives to overcome the problem above is to use natural gas as fuel [1]. Natural gas can be formed as LNG (Liquid Natural Gas) or CNG (Compressed Natural Gas). Other choices are LPG (Liquid Petroleum Gas) and several types of biogas. From the national scope point of view, Indonesia is no longer as an oil producer, but Indonesia still has good enough natural gas deposits. The natural gas has much lower prices than any type of fossil oil. This condition should encourage any researchers to optimize the existing natural gas resources to help the fisherman to solve their difficulty in operational costs. Natural gas is not only offering economic benefits but also contribute a massive solution for environment conservation such as controlling emission NOx, SOx, CO, and HC [2]. Using natural gas as a fuel also becomes one of the solutions to comply with TIER III Annex VI MARPOL 73/78 that will be enforced globally soon [3]. This solution much better than other methods in controlling emission NOx that uses certain chemical agents such as ammonia, urea, or hydrocarbon type agents, it is known as a Selective Catalytic Converter (SCR) [4] that the processes are always accompanied with other types of pollutant [5].

Study of the effect on the addition of anti-slamming bulbous bow to total resistance in tugging supply vessel using CFD

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[2]Naval Architecture Department, Faculty of Engineering, Diponegoro University, Semarang, Indonesia

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Abstract. Anti-Slamming Bulbous Bow (ASB) is a bulbous bow that has been modified according to the Anti-Slamming principle. For waters that have varying wave heights, for example, in the East Nusa Tenggara region where waters meet the criteria for the application of anti-slamming technology and are related to the existence of several offshore buildings and the use of tugging supply vessels (AHTS) for the benefit of the region. This research was conducted to determine the effect of installing anti-slamming bulbous bow and Anti-slamming height on the total resistance of the ship using numerical methods with the help of CFD software. The method used is to vary the height of anti-slamming and the type of bulbous bow on the bow of the ship. Ship modeling is carried out with CAD Software, and while the obstacle analysis uses CFD Tdyn software. Based on the analysis that has been done, the effect of the anti-slamming bulbous bow on the total resistance value of the ship without an anti-slamming bulbous bow is reduced by 3.75%. The ship model, with the use of the anti-slamming bulbous bow, which has the smallest total resistance, is the ship with the form of anti-slimming bulbous bow type Delta (Δ - Type).

1. Introduction

With respect to the challenges of petroleum exhaustion and global warming, international regulations, such as the energy efficiency design index (EEDI) and ship energy efficiency management plan (SEEMP, 1961), were enacted to a decrease the growth rate of fuel consumption and greenhouse gas (GHG) emission in the shipping industry [1].

The main challenge in designing ships is the difficulty of achieving optimum efficiency, both in economics and performance. One of the efficient design optimization targets is how to get the optimum ship speed with the lowest possible use of engine power. So the calculation of the total resistance value of the ship when the ship operates becomes essential to be taken into account.

In obtaining an excellent design to reduce resistance, an addition was made to the bow section in the form of a bulge, also called a bulbous bow, which was able to reduce the drag 10% to 15% on a monohull ship [2]. Also, when sailing the ship's hull will definitely receive dynamic loads caused by waves that change every time, there is a time when the hull structure will experience a breakdown due to the continuous dynamic load that causes damage to the hull structure, one of the causes is the slamming effect.

When facing waves from the front, the ship will experience vertical unidirectional movement which causes the phenomenon of green water and slamming. Green water phenomenon is an event where the deck on the bow of a ship is touched by sea level. While the phenomenon of Slamming is an event where the basic direction. the ship was lifted from the surface of the water then crashing again. Both of these phenomena are used as one item to evaluate the seakeeping quality of a ship. Greenwater and Slamming

Analysis of Leading Edge Protuberances on Fully Submerged Hydrofoil of 15 m Pilot Boat

D Chrismianto[1], AWB Santosa[1] and A Wirahutama[1]

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Abstract: Resistance greatly affects on selection of the main engine and ship fuel consumption. To achieve the speed of the ship, the ship must be prepared to overcome resistance in the waters to be passed by choosing the right engine according to the needs of the ship. In the last few years there have been many studies on biomimetics or the use of systems in nature to be applied in a technology. Such as the use of Leading edge protuberances. Despite its large size and stiff flexibility, the humpback whale has a good maneuver even when chasing prey compared to other animals of its size. This study aims to obtain the highest lift force result and the smallest resistance with a hydrofoil model configuration of leading edge protuberances which resembles a humpback whale fin (megaptra novaengliae). The Computational Fluid Dynamics (CFD) is applied to analyse lift faorce and ship resistance of all models variation. The results indicates that from all variation of models at the Fn 1.356, the model has 5 ° angle of attack were able to reduce the total resistance value of Pilot Boat by 35.13%.

1. Introduction

In a previous study based on the results of the analysis of variations in the shape of a 15 meter step hull pilot boat, the total resistance value was scaled down to 16.96%, this condition occurred in variation of step hull with angle 180° at a speed is 26 knots [1]. In the analysis of the addition of a hull vane in 15 meter pilot boat can increase the lift value by 26.529 kN and reduce the total resistance of the ship by 35% in the hull vane model with an angle of attack of 2° with a depth of 100% T [2]. Then in the analysis of the addition of foil on the 15 m pilot boat with a variation of the swept foil angle model, the value of the total resistance value decreased to 38.021% than the original ship for angle of attack's variation 4° and swept 10 degrees Fn 1.356 [3].

On hhydrofoil supported catamaran (Hysucat), the use of hydrofoil on catamarans makes the lift force on the ship higher which causes the ship's draught to be reduced, so that reduce in total resistance. In the analysis of calm water conditions it is proven to reduce the resistance value of the catamaran model sample by 30% to 50% [4, 5]. In other studies, the use of hydrofoil on catamaran vessels was proven to reduce the value of ship resistance by 35% at Fn > 1.8. [6, 7].

In the last few years there have been many studies on biomimetic or the use of systems in nature to be applied in a technology, such as the use of Leading edge protuberances. Leading edge protuberances is the shape resembles a humpback whale fin (Megaptera novaengliae) [8]. Despite its large size and stiff flexibility, the humpback whale has a good maneuver even when chasing prey compared to other animals of its size.

The Study of Coastline Changing and Total Suspended Solid Distribution Based on The Remote Sensing Data in Teluk Lamong Multipurpose Port Terminal

Widi Agoes Pratikto[1], Ahmad Fitriadhy[2], Muhammad Ilham Maulana[1], Abiyani Choirul Huda[1], Destyariani Liana Putri[3], Liany Ayu Simatupang[1], Nazariano Rahman Wahyudi[1], Rendatiyarso Laksono[1], Anggie Vibriyanti Rossari Dewi[1]

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Abstract. Looking forward to the abovementioned conditions, this research is needed to elaborate on the effects of the reclamation to the marine resources in Teluk Lamong Multipurpose Port Terminal as the reclaimed product. In order to describe the impact of the port development, this study will analyze the shoreline changing, the current pattern modeling, as well as the Total Suspended Solid (TSS) modeling using the remote sensing data. The several numbers of expected objectives through this study are to get the set of scientific information on the shoreline changing in Teluk Lamong Multipurpose Port Terminal in the year of 2012 and 2020, to get the figure of current pattern in Teluk Lamong Multipurpose Port Terminal in the year of 2012 and 2020, and to elaborate TSS concentration through the modeling approach in Teluk Lamong Multipurpose Port Terminal in the year of 2012 and 2020. Hence, there is a set of methodologies and tools to cooperate with the information before and after the reclamation. The use of the Digital Shoreline Analysis System (DSAS) software to analyze coastline conditions. The using of Mike 21 to analyze the current pattern and TSS concentrations. In addition to the TSS analysis, it will also need a set of remote sensing data from the Google Earth Engine (GEE). The modeling and calculation give information about the End Point Rate (EPR) values and TSS values. The EPR values are 107.5 m/year, 59,625 m/year and 10,375 m / year. The TSS values are 0-20 mg/L, 20.1-40 mg/L, 40.1-80 mg/L, 80.1-120 mg/L and >120.1 mg/L. Moreover, the result shows the different values among the length of coastline, the current pattern, and TTS in the years 2012 and 2020. The difference in the coastline reaches 950 m at this latest 8 years. While it also brings the changing to the current pattern and sediment transport which show through its current velocity and sediment content per liter of seawater during high and low tide accordingly.

ISOCEEN 2020

Wellcome Remarks by Chairman of ISOCEEN 2020

Webinar/Virtual Seminar On 27-28 October, 2020 hosted using the Zoom Meeting and Youtube Broadcast at Department of Ocean Engineering, Sepuluh Nopember Institute of Technology (ITS) Surabaya-Indonesia.

The first that we respect, Rector of ITS, Prof. Mochamad Ashari, Dean of Faculty of Marine Technology, Head of Ocean Engineering Department, Senior Director, International Activities Center (IAC), Japan Society of Civil Engineering (JSCE), Japan (Prof. Dr.Eng Hitoshi Tanaka), Representative of Indonesian Coastal Management Expert Association (HAPPI) and Indonesian Coastal Engineering Expert Association (PARPI), distinguished

keynote speakers: Prof. Dr.Eng Hitoshi Tanaka, Tohoku University, Japan; Assoc. Prof. Ahmad Sana, Ph.D, Sultan Qaboos University, Oman; Assoc. Prof. Dr. Alvaro Semedo, IHE-Unesco Delft, Netherlands; Assoc. Prof Ts. Dr. Mohd Faris Khamidi, Qatar University, Qatar. **Invited speakers**, Prof. Dr.Eng, Nguyen Trung Viet, Vice-President, Thuyloi University –Vietnam; Assoc. Prof. Suntoyo, Ph.D, Sepuluh Nopember Institute of Technology, Indonesia, Assoc. Prof. Ir. Dr. Eng. Ahmad Fitriadhy, Universiti Malaysia Terengganu. Lecturers within ITS, Contributing Authors, Seminar delegates, experts, scholar, all student, Ladies and gentlemen.

Assalamu alaikum Wr. Wb., Good Afternoon! Presence of Allah SWT 's grace that has given favors and gifts in this morning. Welcome to this **The 8th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management (ISOCEEN 2020)**. I am pleased to join you here today.

We are delighted to announce that This International Seminar was initiated by a collaboration between Institut Teknologi Sepuluh Nopember (ITS) especially Department of Ocean Engineering and Tohoku University that have collaboration since 1997. In which, in the year 2006, a Memorandum of Understanding (MoU) has been signed and then extended between Tohoku University, Japan and Institut Teknologi Sepuluh Nopember to promote further collaboration between two Universities. Many activities that have performed well in term of collaborative research, faculty and student exchange, joint educational program, seminars, workshops etc, especially for the seminar and workshop has been done before, namely; Japan – Indonesia Workshop on Estuary and Climate Change (JIWECC), 8-10 August 2010 at Surabaya, Indonesia. However the previous seminar activity organized not regularly therefore Since 2013 has been held an annual seminar entitled The 1st International Seminar on Ocean, Coastal Engineering, Environmental and Natural Disaster Management (ISOCEEN), November 11, 2013, Surabaya Indonesia.

With the increasing amount of cooperation between Indonesia, Japan, Netherlands and another country then this forum is more focused on creating and expanding professional network to foster the relationship between the University, industry, business and communities across the country.

This year, again we are proudly to announce that Institut Teknologi Sepuluh Nopember (ITS), Surabaya in collaboration with Tohoku University Japan, IHE – Netherland, HZ University and Applied Sciences Netherlands and Nuffic Internationalizing Education-Netherlands jointly organizing the 8th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management (ISOCEEN) 2020" within Webinar/Virtual-Seminar in Department of Ocean Engineering, Faculty of Marine Technology, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, on 27 – 28th October 2020. This seminar is also supported by Indonesian Coastal Management Expert Association (HAPPI) and Indonesian Coastal Engineering Expert Association (PARPI).

With 4 keynote Speakers, 3 invited speakers, 54 regular talks contributions from over 250 participants (viewers) from 11 countries (Indonesia, Japan, Netherlands, Oman, Qatar, Germany, Portugal, Spain, Ireland, Vietnam, Malaysia and Korea) are disseminated from the zoom meeting and Youtube Broadcast. Participants of this seminar came from 14 foreign universities, 12 domestic universities, 6 research centers / Agency for the Assessment and Application of Technology, 4 overseas research centers. Selected papers presented in ISOCEEN 2020 will be published in The IOP Conference Series: Earth and Environmental Science (ESS) indexed in SCOPUS.

Finally, on behalf of the organizing committee of the seminar, I would like to warmly thank all the authors who, with their presentations, generously contributed to the lively exchange of scientific information that is so vital to the endurance of scientific conferences of this kind. Special thanks are also due to all keynote speakers and all committee for the efforts in preparing the manuscripts and managing the sessions, respectively.

Thank you !

Wassalamu alaikum Wr. Wb.

Chairman of ISOCEEN 2020
Assoc. Prof. Suntoyo, PhD.

Seminar programme and the reports on the success of ISOCEEN 2020

1. Seminar Programme of ISOCEEN 2020
2. **Keynote and Invited Speakers**
    1. Prof. Dr.Eng Hitoshi Tanaka, Senior Director, International Activities Center (IAC), Japan Society of Civil Engineering (JSCE) and Tohoku University, Japan
    2. Assoc. Prof. Ahmad Sana, Ph.D, Sultan Qaboos University, Oman
    3. Assoc. Prof. Dr. Alvaro Semedo, IHE-Unesco Delft, Netherlands
    4. Assoc. Prof Ts. Dr. Mohd Faris Khamidi, Qatar University, Qatar.
    5. Prof. Dr.Eng, Nguyen Trung Viet, Vice-President, Thuyloi University –Vietnam
    6. Assoc. Prof. Suntoyo, Ph.D, Institut Teknologi Sepuluh Nopember, Indonesia
    7. Assoc. Prof. Ir. Dr. Eng. Ahmad Fitriadhy, Universiti Malaysia Terengganu, Malaysia

3. YouTube Broadcast channel of ISOCEEN 2020

#Day 1: 27 October 2020

https://youtu.be/pMtWKinQmD8

https://youtu.be/J_hznWLUCGM

#Day 2: 28 October 2020

Room 1 : https://youtu.be/vd3MvBhrkb0

Room 2 : https://youtu.be/qRQB9VYKIHE

Room 3 : https://youtu.be/i3-KMwpbCDQ

4. Abstracts of Proceeding ISOCEEN 2020 Final

5. Documentation of ISOCEEN 2020


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Suntoyo, Ph.D
ISOCEEN 2020 Chairman


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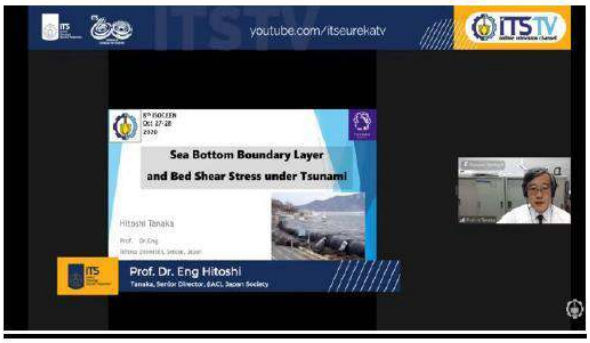
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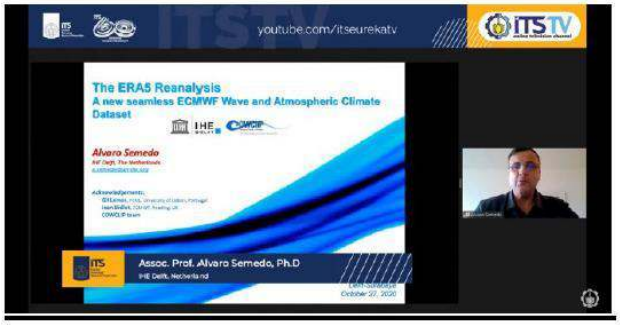
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The ERA5 Reanalysis
A new seamless ECMWF Wave and Atmospheric Climate Dataset
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Assoc. Prof. Alvaro Semedo, Ph.D
IHE Delft, Netherland


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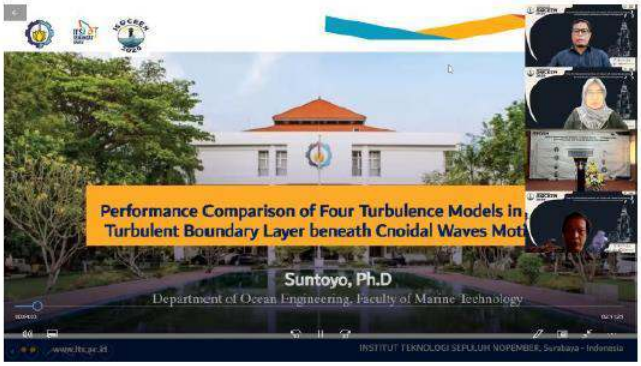
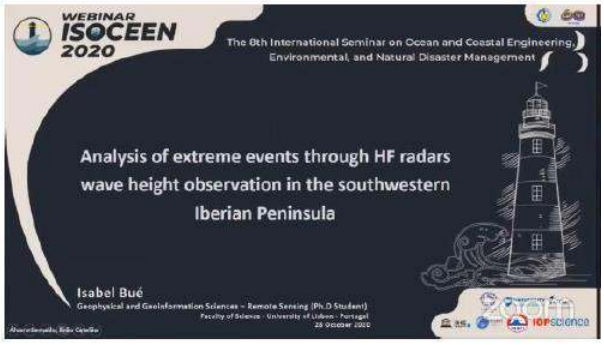
GLOCALISING
NATIONAL RESILIENCE AGENDA
VIA TRANSDISCIPLINARY APPROACH
Assoc. Prof Tansri Dr Mohd Faris Khamidi
College of Engineering, Qatar University


The 8th International Seminar on Ocean and Coastal Engineering, Environmental, and Natural Disaster Management
"Integrated Approaches for Sustainable Science and Technology on Ocean, Coastal and Offshore Engineering"
Herman Pratikno, S.T., M.T., Ph.D
Head of Ocean Engineering Department


Performance Comparison of Four Turbulence Models in
Turbulent Boundary Layer beneath Cnoidal Waves Mot
Suntoyo, Ph.D
Department of Ocean Engineering, Faculty of Marine Technology
INSTITUT TEKNOLOGI SEPULUH NOPEMBER, Surabaya - Indonesia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Analysis of extreme events through HF radars
wave height observation in the southwestern
Iberian Peninsula
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Geophysical and Geoinformation Sciences – Remote Sensing (Ph.D Student)
Faculty of Sciences - University of Lisbon - Portugal
28 October 2020


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Nguyen Trung Viet, Professor
Thuyloi University, Vietnam
The 8th International Seminar on Ocean and Coastal Engineering, Environmental, and Natural
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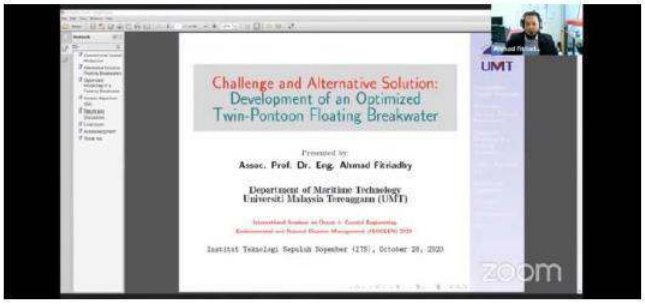
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Development of an Optimized
Twin-Pontoon Floating Breakwater
Assoc. Prof. Dr. Ing. Ahmad Fikriadhy
Department of Maritime Technology
Universiti Malaysia Terengganu (UMT)
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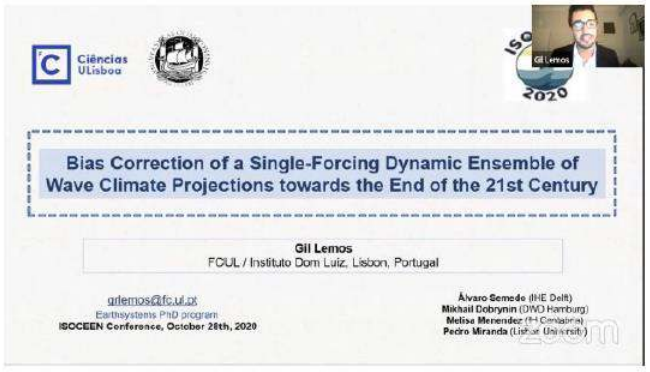
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Bias Correction of a Single-Forcing Dynamic Ensemble of
Wave Climate Projections towards the End of the 21st Century
Gil Lemos
FCUL / Instituto Dom Luiz, Lisbon, Portugal
gflemos@fc.ul.pt
Earthsystems PhD program
ISOCEEN Conference, October 28th, 2020
Álvaro Semedo (IHE Delft)
Mikhail Dobrynin (DWD Hamburg)
Melisa Menendez (IH Cantabria)
Pedro Miranda (Lisbon University)
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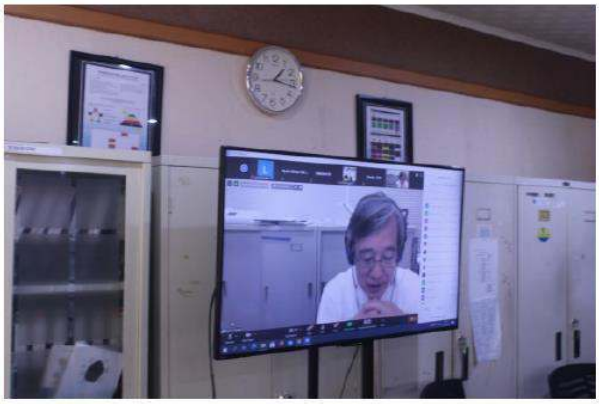

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To avoid the misinformation, please make a correspondence with us using isoceen@gmail.com and cc to : isoceen@its.ac.id