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## The Effect of ENSO and IOD on the Variability of Sea Surface Temperature and Rainfall in the Natuna Sea(Conference Paper)([Open Access](#))

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### Abstract

The Natuna Sea is located at the northwestern part of Indonesia. Previous studies had showed that ENSO has a stronger impact on SST than chlorophyll-a. According to several studies, Indonesian oceans are heavily impacted by IOD. This study uses SST data with high-resolution satellite imagery (MODIS and Pathfinder) and rainfall and wind data from the Reanalysis Model (ERA-5) which is processed using a composite method and correlation grid. This research results, when La-Nia negative IOD SST will decrease 1 C and rainfall rises 7 mm/day while when El-Nio IOD positive SST will increase by 1 C while in rainfall will decrease by 3 mm/day. The variation of SST and rainfall is more influenced by ENSO than IOD. © Published under licence by IOP Publishing Ltd.

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## Preface

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## PREFACE

On behalf of the Organizing Committee, I would like to extend our warmest regards to all participants of the 6<sup>th</sup> International Conference on Tropical and Coastal Region Eco-Development (ICTCRED) 2020. This annual conference was held on 27-28 October 2020, organized by the Faculty of Fisheries and Marine Science, Universitas Diponegoro, Semarang, Central Java, Indonesia.

We brought an essential global topic the *Sustainable Development in Coastal Area*. The conference aims to provide a forum to exchange ideas and their current achievements for researchers, academicians, professionals, and industries to expose and exchange innovative ideas, methods, and experiences in the areas related to tropical life sciences and coastal development.

We have accepted 107 abstracts for oral and poster presentations coming from different universities and research centers from Indonesia, Japan, USA, UK, Netherlands, South Korea, Belgium, and Malaysia, which were consisted of 15 big interests. Besides, we have cordially invited ten highly respected researchers as keynote speakers with different fields to share their knowledge and expertise. We are grateful for each one of them for setting aside their valuable time to participate in this conference.

The 6<sup>th</sup> ICTCRED 2020 was firstly planned to be held offline in Semarang, Indonesia. However due to the pandemic COVID-19 situation, we had to adapt the new normal regulation which restrict the face to face meeting to avoid the massive virus transmission. Therefore, the 6<sup>th</sup> ICTCRED 2020 was held in virtual format using Zoom application. This event could not be postponed since it has become the annual event of the Faculty of Fisheries and Marine Science, Universitas Diponegoro. Despite virtual event, we guarantee that the 6<sup>th</sup> ICTCRED 2020 was held professionally, following the rule of scientific conference. Starting with the plenary session with the presentation from the keynote speakers, the participants have their presentation in the panel sessions with 10 minute presentation and 10 minute discussion. The presentation of participant was in video recording format to avoid the technical problems during the presentation. However, the presence of participant was an obligation to answer the questions emerging during discussion session. The recording of the plenary session in the first and second day of the 6<sup>th</sup> ICTCRED 2020 can be seen on <https://www.youtube.com/watch?v=j7uZx6ebRQg&t=3094s> and <https://www.youtube.com/watch?v=UQqZrAsvEJg&t=2990s>, respectively.

The committee extend very kind thank all participants for the success of the conference. They were Rector of Universitas Diponegoro, Dean of Faculty of Fisheries and Marine Science, the keynote speakers. We also would like to acknowledge the Institute of Physics (IOP) for the collaboration in publishing the conference proceedings, our sponsors the Universitas Diponegoro, COREM Undip, ICZM Center Undip, WCU Undip, ISOI, NIOZ, NWO, Tufts University, and TU Delft.

Finally, we proudly present 62 selected papers in IOP Conference Series: Earth and Environmental Science. We do hope that the 6<sup>th</sup> ICTCRED 2020 event brings a fruitful knowledge and be a memorable event not only from the scientific perspective but also in the joy of meeting with other scientists for mutual collaboration.

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Prof. Ir. Tri Winarni Agustini, M.Sc., Ph.D.  
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# The Effect of ENSO and IOD on The Variability of Sea Surface Temperature and Rainfall in The Natuna Sea

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**Abstract.** The Natuna Sea is located at the northwestern part of Indonesia. Previous studies had showed that ENSO has a stronger impact on SST than chlorophyll-a. According to several studies, Indonesian oceans are heavily impacted by IOD. This study uses SST data with high-resolution satellite imagery (MODIS and Pathfinder) and rainfall and wind data from the Reanalysis Model (ERA-5) which is processed using a composite method and correlation grid. This research results, when *La-Niña* negative IOD SST will decrease 1°C and rainfall rises 7 mm/day while when *El-Niño* IOD positive SST will increase by 1°C while in rainfall will decrease by 3 mm/day. The variation of SST and rainfall is more influenced by ENSO than IOD.

## 1. Introduction

Indonesian oceans are located between two large oceans, namely the Pacific Ocean and the Indian Ocean. Natuna Sea, which is located in the northwestern part of the Indonesian oceans is thought to be affected by the two oceans. One aspect of climate variability related to sea surface temperature is the *El-Niño* Southern Oscillation (ENSO), where ENSO is an anomaly of sea surface temperature at the equator of the Pacific Ocean. ENSO has three phenomena including normal ENSO, *El-Niño*, and *La-Niña*. SST anomaly does not only occur in the Pacific Ocean but also occurs in the Indian Ocean. IOD or Indian Ocean Dipole is an SST anomaly that occurs in the Indian Ocean which affects Indonesian oceans as well as being affected by IOD [1].

Previous research conducted by several researchers [2,3,4,5] has studied extensively the climate variability of ENSO and IOD, but the research that assessing the simultaneous impact of ENSO and IOD on SST and rainfall has yet to be carried out, particularly in the Natuna Sea. Continuing from previous research, [5] stated that ENSO greatly affects SST in the Natuna Sea and [3] found that IOD

# ***Astrogorgia* sp. from Saparua, Maluku: Phytochemical Content, Antimicrobial, Antioxidant, and Cytotoxicity Properties**

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**Abstract.** Gorgonian is one of marine invertebrates that is still underexplored as a source of bioactive compounds. This study aimed to discover the biological properties of *Astrogorgia* sp. and its phytochemical content. A consecutive extraction method using *n*-hexane, ethyl acetate and methanol was conducted to obtain secondary metabolites from the sample. Antimicrobial assay was performed against ESBL *E. coli*, MRSA, *C. albicans*, and *M. furfur*; cytotoxicity against P388 Murine Leukaemia Cancer Cells, antioxidant was tested using DPPH method. The consecutive extraction method gave yield (%) as follows:  $0.21 \pm 0.22$  from *n*-hexane;  $0.67 \pm 0.17$  from acetyl acetate; and  $1.20 \pm 0.50$  from methanol. All fractions gave positive results on antibacterial assay against all pathogens while only gave antifungal activity against *C. albicans*. Methanol fraction had the highest antioxidant activity, while *n*-hexane fraction showed the best cytotoxicity.

## **1. Introduction**

Sessile marine invertebrates produce unique chemical substances to protect themselves from predator and environmental stresses [1]–[3]. These chemical substances steal attention due to their beneficial biological activity for humans. It is proven by the FDA's approval of several drugs that are originated from marine invertebrate such as ascidian, bryozoan, and sponge [4]. Among all reports, sponge has been emphasized as the most profiling marine invertebrate since many studies successfully isolated bioactive compounds from it [5]. Nonetheless, other invertebrates such as gorgonian become neglected.

Gorgonian is a member of Alcyonacea (soft corals), which is characterized by always have eight tentacles (octocoral) in their polyps with rows of pinnules along both sides of the tentacles [6]. This animal is commonly found in almost all marine environments from shallow-water, mesophotic to the deep sea; therefore, plenty of studies were conducted to discover their biodiversity in Indonesia [6], [7]. However, the study of biological activity of Indonesia's gorgonian is rarely reported. The latest study



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