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# Analysis of the monthly rainfall in 2018-2019 in Palembang City and its relationship with climate conditions

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**Kata kunci:**
bulan wet,
bulan moist,
bulan dry,
kondisi iklim,
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Kota Palembang

**ABSTRAK:** Jumlah curah hujan bulanan dapat diklasifikasikan menjadi bulan Wet, bulan Moist, dan bulan Dry. Jumlah bulan Wet, bulan Moist, dan bulan Dry ini berhubungan dengan kondisi iklim pada tahun terkait. Pada tahun 2018 tidak terjadi anomali (penyimpangn) iklim, namun pada tahun 2019 terjadi anomali iklim akibat adanya fenomena alam *Positive Indian Ocean Dipole* (IOD+). Penelitian ini bertujuan menghitung jumlah bulan Wet, bulan Moist, dan bulan Dry yang terjadi pada tahun 2018 dan 2019 di Kota Palembang serta mengaitkannya dengan kondisi iklim pada kedua tahun tersebut. Data yang digunakan adalah jumlah curah hujan hasil pengukuran dari 2 Station pengukuran, yaitu Station UNSRI Bukit Besar dan BMKG Kenten Palembang. Hasil penelitian ini menunjukkan bahwa pada kedua tahun tersebut untuk Kota Palembang terjadi bulan Wet, bulan Moist. dan bulan Dry. Pada bulan Dry 2019 khususnya di bulan Agustus dan September, jumlah curah adalah sangat minim bahkan di bulan Agustus hampir tidak ada hujan. Hal ini terjadi karena pada tahun 2019 terjadi anomali iklim yang berkaitan dengan fenomena alam *Positive Indian Ocean Diople* (IOD+).

**Keywords:**
wet month,
humid month,
dry month,
climatic conditions,
IOD+,
Palembang City

**ABSTRACT:** The amount of monthly rainfall can be classified into wet months, humid months, and dry months. The number of wet months, humid months, and dry months is related to the climatic conditions in the year concerned. In 2018 there was no climate anomaly (deviation), but in 2019 there was a climate anomaly due to the Positive Indian Ocean Dipole (IOD+) natural phenomenon. This study calculates the number of wet months, moist months, and dry months that occurred in 2018 and 2019 in Palembang City and relates them to the climatic conditions in both years. The data used is the amount of rainfall measured from 2 measurement stations, namely the UNSRI Bukit Besar station and the BMKG Kenten Palembang. The results of this study indicate that in both years for the city of Palembang, there were wet months, humid months. and dry months. In the dry months of 2019, especially in August and September, the amount of rainfall is very minimal, even in August there is almost no rain. This happened because in 2019 there was a climate anomaly related to the Positive Indian Ocean Dipole (IOD+) natural phenomenon.

## 1 INTRODUCTION

Indonesia has high complexity in weather and climate phenomena. The atmosphere above Indonesia is very complex and the cloud formation is very unique. Latitudinally and longitudinally, Indonesia is under the influence of equatorial and monsoon circulation which have very different characteristics [1], [2]. These facts show that rainfall in Indonesia is very unstable, complex, and has very large variability, so that even though prediction accuracy is very important, up to now it is very difficult to predict accurately using traditional forecasting methods [3]-[5]. Even in the field of climatology, rainfall in Indonesia is one of the most difficult factors to predict accurately.

Rainfall data can be obtained by measuring it using a rain gauge. The Meteorology, Climatology and Geophysics Agency (BMKG) of Palembang Mu-

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nicipality uses an observatory type rain gauge, which collects rainwater and there is a tap to release rainwater that has been collected into a measuring cup in millimeters every morning at 07.00 for 24 hour measurements. [6]. In this way, rainfall data is obtained. The advantages of the observatory rain gauge are that it is affordable, easy to maintain, but the weakness is that it only gets daily resolution rainfall data.

Rainfall is the result of the amount of rainwater that enters a rain storage container in a flat area on a horizontal surface, which does not experience the process of evaporation, infiltration and does not flow in units of millimeters within a certain period of time such as hourly, daily, weekly, monthly and annual. Meanwhile, rain intensity is the height or depth of rain per certain unit of time as long as the rain lasts [7]-[10]. Climatic conditions can change so that the amount of rainfall can be affected. Climate anomalies that frequently occur recently can result in very minimal rainfall or conversely excessive rainfall. This climate anomaly occurs due to natural phenomena such as ENSO [11]-[14] and the Indian Ocean Dipole (IOD) [15]-[17]. In 2018 the climate was normal, while in 2019 the IOD+ phenomenon occurred which resulted in Indonesia experiencing an extreme lack of rainfall in the dry season [18]-[21].

Research on rainfall has been carried out by many people [22]-[24], but specifically research that calculates the amount of rainfall with the classification of wet months, humid months and dry months in 2018 and 2019 for Palembang City based on data from the UNSRI Campus has not yet been carried out. been done before. The results obtained were analyzed by relating them to natural phenomena that occurred in both years. This research utilizes measurement data from the Rainfall Measuring Station at the UNSRI Bukit Besar Palembang Campus and at the BMKG Kenten Palembang Rainfall Measuring Station.

## 2 MATERIALS AND METHODS

### 2.1 Time and Place

The research entitled "Analysis of the Amount of Monthly Rainfall in 2018-2019 in Palembang City and its Relationship with Climate Conditions" was carried out in May - July 2022 at the Physical Oceanology and Atmospheric Science Laboratory (OFSA) of the Physics Department, FMIPA UNSRI.

### 2.2 Equipment and Materials

The equipment used in this research is a laptop and MATLAB release 14 software which has features grouped based on certain applications (toolbox). The data used is rainfall data for 2018-2019 for Palembang City which comes from data from measurements at the UNSRI Bukit Besar Campus Rainfall Measurement Station and at the BMKG Kenten Station, Palembang.

### 2.3 Data Analysis

Data processing and analysis is carried out by:

a. Convert daily rainfall data to monthly rainfall data
b. Classify the amount of monthly rainfall into wet months, humid months and dry months.
c. Calculate the number of wet months, humid months and dry months
d. Analyzing the amount of rainfall classification that occurred and relating it to climate conditions in 2018 and 2019, where in 2019 climate conditions were normal and in 2019 there was an IOD+ climate anomaly.

## 3 RESULT

This research has produced information about rainfall classification for the Palembang City which is displayed in the form of tables and graphs. The results of data processing regarding the classification of average monthly rainfall (CH) for Palembang City in 2018 and 2019 based on the results of UNSRI station measurements at Bukit Besar Campus are shown in Table 1, and the time series graph of rainfall dynamics is shown in Figure 1. Meanwhile for the average monthly rainfall classification for Palembang city in 2018 and 2019 based on the results of BMKG station measurements is shown in Table 2, and the time series graph of rainfall dynamics is shown in Figure 2.

Table 1 Classification of Rainfall Measurement Results from UNSRI Station

| No. | Month | Rainfall (mm/month) | | Classification | |
|---|---|---|---|---|---|
| | | 2018 | 2019 | 2018 | 2019 |
| 1. | January | 104.6 | 220.2 | Moist | Wet |
| 2. | Febuary | 106.3 | 206.1 | Moist | Wet |
| 3. | March | 163.8 | 427.6 | Moist | Wet |
| 4. | April | 171.3 | 376.1 | Moist | Wet |
| 5. | May | 125.5 | 108.2 | Moist | Moist |
| 6. | June | 64.3 | 118.9 | Dry | Moist |
| 7. | July | 30.1 | 114.8 | Dry | Moist |
| 8. | August | 60.7 | 0 | Dry | Dry |
| 9. | September | 36.2 | 8.2 | Dry | Dry |

| | | | | | |
|---|---|---|---|---|---|
| 10. | October | 185.4 | 66.7 | Moist | Dry |
| 11. | November | 464.3 | 55.0 | Wet | Dry |
| 12. | December | 289.7 | 398.2 | Wet | Wet |

Table 2 Classification of Rainfall Measurement Results from BMKG Station

| No. | Month | Rainfall (mm/bln) | | Classification | |
|---|---|---|---|---|---|
| | | 2018 | 2019 | 2018 | 2019 |
| 1. | January | 228.8 | 109.1 | Wet | Moist |
| 2. | Febuary | 263.5 | 307.4 | Wet | Wet |
| 3. | March | 453.8 | 484.6 | Wet | Wet |
| 4. | April | 324.6 | 349.5 | Wet | Wet |
| 5. | May | 137.4 | 166.4 | Moist | Moist |
| 6. | June | 172.7 | 119.8 | Moist | Moist |
| 7. | July | 43.3 | 96.0 | Dry | Dry |
| 8. | August | 95.3 | 0.5 | Dry | Dry |
| 9. | September | 77.9 | 14.9 | Dry | Dry |
| 10. | October | 214.8 | 75.9 | Wet | Dry |
| 11. | November | 310.1 | 67.7 | Wet | Dry |
| 12. | December | 211.5 | 242.2 | Wet | Wet |

If a recapitulation is carried out regarding the results of classifying the amount of monthly rainfall in 2018 and 2019 for the two measurement locations, the results obtained are as shown in Table 3 below:

Table 3. Recapitulation of Rainfall Classification for 2018 and 2019

| Station | Monthly Rainfall Qualification | | | | | |
|---|---|---|---|---|---|---|
| | 2018 | | | 2019 | | |
| | Wet | Moist | Dry | Wet | Moist | Dry |
| UNSRI | 2 mm | 6 mm | 4 mm | 4 mm | 3 mm | 4 mm |
| BMKG | 7mm | 2 mm | 3 mm | 4 mm | 3 mm | 5 mm |

In Table 3 it can be seen that in general in 2018 and 2019 in Palembang City there were Wet months, Moist months and Dry months, both based on the results of UNSRI Station and BMKG measurements.

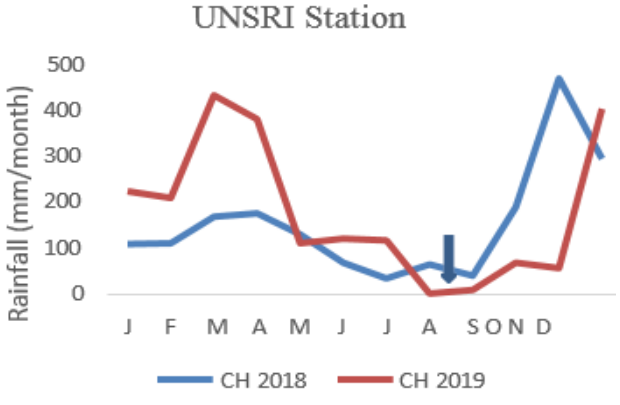


Figure 1. Monthly Rainfall Graph for Palembang City UNSRI Station in 2018 and 2019

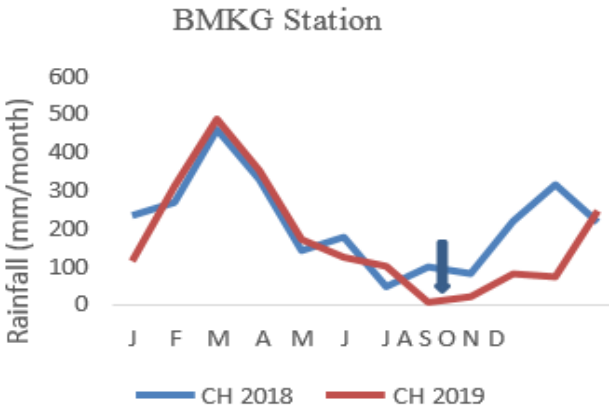


Figure 2. Graph of monthly rainfall at BMKG Kenten Station in the city of Palembang in 2018 and 2019

## 4 DISCUSSION

The results of this research show that the amount of rainfall classified as Dry months that occurred in August and September 2019 was very minimal, both from the UNSRI Station and BMKG Station measurements. This can be seen in Figure 1 and Figure 2. The months of August and September are included in the dry season period in Indonesia, which usually occurs in the period July to October. It can be said that in 2019 there was an extreme dry season, especially in August and September 2019.

When compared to the 2018 dry season, the 2019 dry season is drier. This happened because of a climate anomaly that occurred in 2019, whereas in 2018 the climate was normal. The 2019 climate anomaly occurred due to a natural phenomenon called the Positive Indian Ocean Dipole (IOD+) [3], [11], [15]-[17]. The extreme drought in August and September 2019 resulted in severe fires in forests and peatlands in South Sumatra.

The Indian Ocean Dipole (IOD) occurs because of the interaction between the sea and the atmosphere in the Indian Ocean. This interaction results in differences in temperature and pressure on the sea surface in the Indian Ocean which causes convection currents that carry clouds from West to East or vice versa. IOD consists of 2 types, namely Positive IOD (IOD+) and Negative IOD (IOD-) [21], [25]-[28]. The Indian Ocean Dipole has an effect on the climate in Indonesia, where when IOD+ occurs, Indonesia experiences a lack of rain, and when IOD- occurs, Indonesia experiences excess rain.

## 5 CONCLUSION

Rainfall that occurred in the Municipality of Palembang in 2018 and 2019 was classified as Wet months, Moist months and Dry months. In the dry

months of 2019, especially in August and September, the amount of rainfall was very minimal, even in August there was almost no rain. This happened because in 2019 there was a climate anomaly related to the natural phenomenon Positive Indian Ocean Dipole (IOD+) which caused parts of Indonesia, including Palembang, to experience an extreme dry season. Meanwhile, in 2018 there were no climate anomalies so the dry season ran normally.

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