



## Data Article

# Oceanography dataset in Bonpies archipelago as remote island in Java Seas, Indonesia



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## ABSTRACT

The oceanographic data presented in this article were collected in the Bonpies island, as part of the Java Seas. The data were collected by *in-situ* measurement from several expeditions from 2011 to 2016. The data presented here include bathymetry, sea surface temperature (SST), sea surface salinity (SSS), ocean transparency, dissolved oxygen, and pH. All data were collected by daily *in-situ* measurements in different seasons. There were 5768 data measured from several portable instruments, including echo-sounder and portable instruments. Calibration of the instrument was carried out before and after the survey in accordance with the protocol provided by the manufacturer. Measurements are made directly and recorded into a log sheet paper and the data format is Comma Separated Files (.csv). This *in-situ* data would be most useful for regional climate studies, including forecasting such as El Nino and Indian Ocean Dipole effects, oceanographic condition, and marine resources management.

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## Specification Table

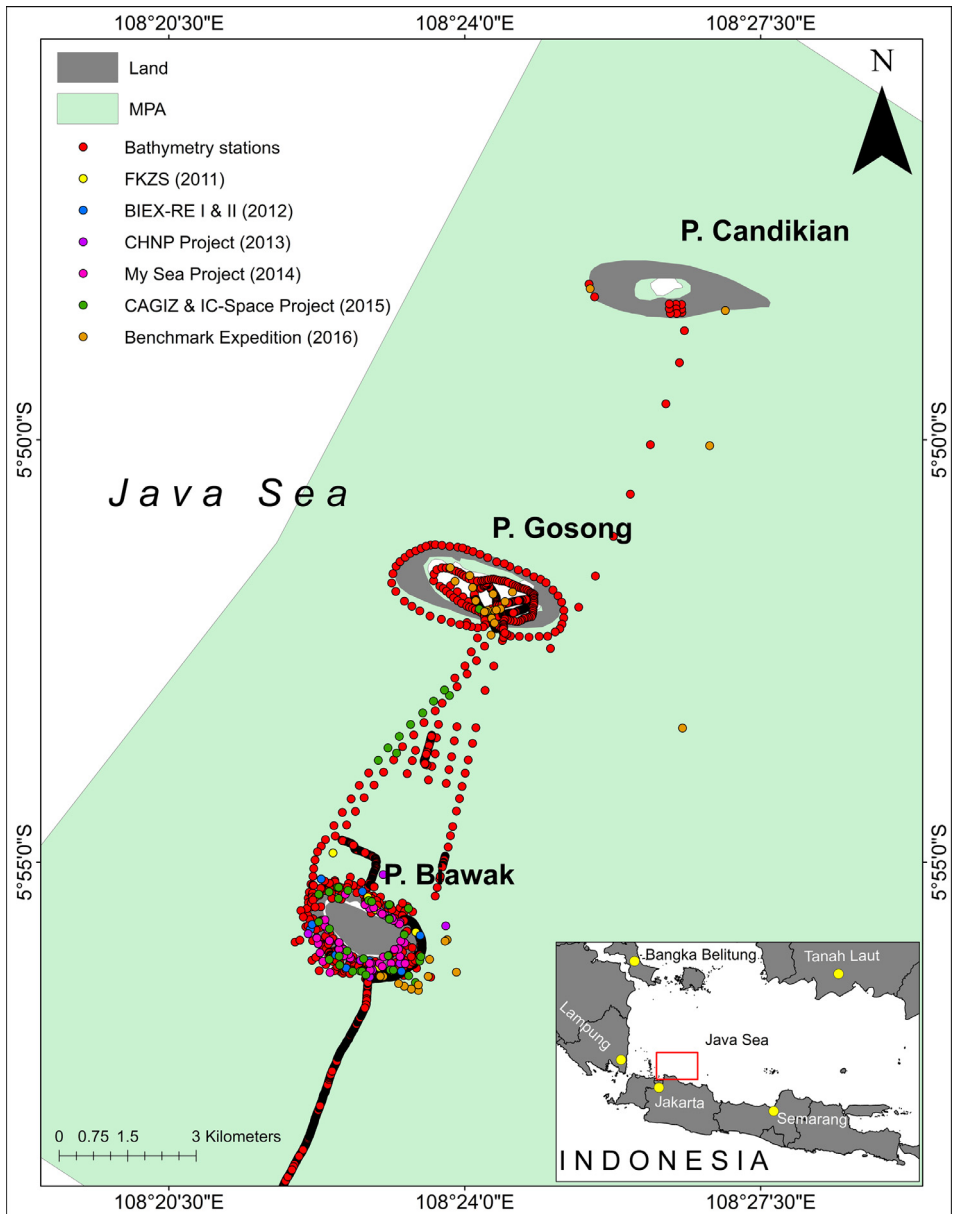
|                                |  |
|--------------------------------|--|
| Subject                        | Earth and Planetary Science  |
| Specific subject area          | Oceanography, Physical Oceanography, Marine Protected Areas, Biophysical and Chemical data   |
| Type of data                   | Table, Figure, Chart, Graph  |
| How data were acquired         | <i>In-situ</i> sampling with a variety of instruments, including GPSMap, handheld refractometer, Secchi disc, and Lutron water quality instrument.   |
| Data format                    | Raw data   |
| Description of data collection | Data was collected during several expeditions from 2011 to 2017. Six parameters are presented here, including bathymetry, surface temperature (SST), sea surface salinity (SSS), ocean transparency, dissolved oxygen, and pH. Direct measurements are taken on board the ship, recorded on paperwork, and then moved into excel sheets.   |
| Data source location           | This data was collected by several expedition and surveys with detail information below: <ul style="list-style-type: none"> <li>• Institution: University of Padjadjaran and KOMITMEN Research Group</li> <li>• City/Town/Region: Bandung, West Java</li> <li>• Country: Indonesia</li> <li>• Latitude and longitude: 5.930752 °S and 108.379548 °E</li> <li>• 5768 data from 2011 to 2016 were collected using portable instruments.</li> </ul>                               |
| Data accessibility             | Repository name: Repository Ilmiah Nasional (RIN) or National Scientific Repository<br>Permanent identifier: <a href="https://hdl.handle.net/20.500.12690/RIN/YML12D">https://hdl.handle.net/20.500.12690/RIN/YML12D</a><br>Direct link to the dataset:<br><a href="https://data.lipi.go.id/file.xhtml?persistentId=hdl:20.500.12690/RIN/YML12D/6ZY0G3&amp;version=2.0">https://data.lipi.go.id/file.xhtml?persistentId=hdl:20.500.12690/RIN/YML12D/6ZY0G3&amp;version=2.0</a> |
| Related research article       | Purba, N.P., Faizal, I., Pangestu, I.F., Mulyani, P.G., Fadhillah, M.F., 2018. Overview of physical oceanographic condition at Biawak Island: Past achievement and future challenges. IOP Conf. Ser. Earth Environ. Sci. 176. <a href="https://doi.org/10.1088/1755-1315/176/1/012001">10.1088/1755-1315/176/1/012001</a>  |

## Value of Data

1. Long-term data in Bonpies island is the key to increasing our understanding about diverse range of coastal ecosystems and Marine Protected Areas (MPA). Furthermore, nowadays, marine pollution and human activities have an impact on this area.
2. Academics and stakeholders (fisherman and non-governmental organizations), and the government can use this dataset to develop regulation and research activities.
3. Data information will be used to assess the state of the ocean in a specific area, such as an MPA region, for academic purposes, to examine the impact of global warming on the MPA region, and to assess water quality data.
4. Finally, Bonpies islands area represent the ocean condition in Java Seas. The mission is to create this island to be the permanent observation station.

## 1. Data Description

Bonpies island or Biawak island (local name), is one of the islands group located in the Java Sea. The islands are located 21.98 miles from the northern coast of West Java and are



**Fig. 1.** Geographic Location and station sampling. Green colour represent MPA boundary (UNEP-WCMC and IUCN, 2021).

administratively part of the Indramayu Regency. Bonpies Islands consists of two islands (Biawak Island, Gosong island) and one atoll (Candikian). The area is located at  $5.930752^{\circ}\text{S}$  and  $108.379548^{\circ}\text{E}$  (Fig. 1) and designated as Marine Protected Areas (MPA) since 2004, with an area of 720 Ha (UNEP-WCMC, 2021).

Furthermore, there is sparse data related to the oceanographic, biological, and chemical conditions before 2010. For example, bathymetric data was measured in the 1920s, while oceanographic data is only found from measurement in 1996. Due to the lack of data, since 2011,

**Table 1**

List of expeditions from 2011 to 2016.

| No. | Expedition                 | Year | Month             | Season                               |
|-----|----------------------------|------|-------------------|--------------------------------------|
| 1   | FKZS Project               | 2011 | March and May     | Northwest and Transitional 1 Monsoon |
| 2   | BIEX-RE I and BIEX-RE II   | 2012 | June and November | Southeast and Transitional 2 Monsoon |
| 3   | CHNP Project               | 2013 | June              | Southeast Monsoon                    |
| 4   | MySea Project              | 2014 | October           | Transitional 1 Monsoon               |
| 5   | CAGIZ and IC-Space Project | 2015 | April and May     | Northwest Monsoon                    |
| 6   | Benchmark Project          | 2016 | May               | Transitional 1 Monsoon               |

**Table 2**

List of parameters and quantity of data.

| No. | Parameter               | n data | Unit |
|-----|-------------------------|--------|------|
| 1.  | Bathymetry              | 4668   | m    |
| 2.  | Sea surface temperature | 226    | °C   |
| 3.  | Sea surface salinity    | 226    | PSU  |
| 4   | Ocean transparency      | 196    | m    |
| 5.  | Dissolved Oxygen        | 226    | mg/L |
| 6.  | pH                      | 226    | unit |

University of Padjadjaran and Komitmen Research Group (KRG) have conducted several expeditions to obtain comprehensive data (Table 1; dataset repository). The stations were sampled from 2011 and 2016 under various expeditions and surveys. The most widely obtained data location is around Biawak island (Fig. 1).

The sampling dates (Table 1) corresponded with four monsoon seasons: the northwest monsoon (December to February), Transitional monsoon 1 (March to May), southeast monsoon (June to August), Transitional monsoon 1 (September to November). Measurements were not taken in the same season each year due to weather conditions.

There are six parameters presented in this paper (Table 2). Basically, the amount of ocean transparency data is different from other parameters. In general, there were seven stations for each parameter were observed on 2011. Next, on 2012, there were 43 stations, meanwhile data for ocean transparency had 37 stations. In the following year, there were 52 stations except only 39 stations for ocean transparency. On 2014, there were 41 stations except ocean transparency data has 31 stations. On the last year of monitoring, there were 34 data and 33 stations for the ocean transparency. The total amount of data that were 5768 data (Table 2; dataset repository).

The data presented in the repository is available in .csv format. Each data has two numbers behind the comma. In additions, there is information on the name of the activity, time (date, time), position (lan, lot), and parameter values. Positions are written in decimal degrees and time in local time (GMT+7). The data is stored in the national repository owned by Indonesia (<http://rin.lipi.go.id>) and in the data portal Padjadjaran Oceanographic Data Centre (PODC) ([www.isea-podc.org](http://www.isea-podc.org)) (dataset repository). All the parameters measured are written on a log-sheet paper and then transferred into a tabular sheet.

In general, the range of values from SST is 27.26°C–33.12 °C, with an average of 30.14°C. The range of values from SSS is 28.93 PSU–33.98 PSU, with an average of 31.22 PSU. The value range of ocean transparency is 2.5–15 m, with an average of 6.46 m. The value ranges from DO is 27.26 °C–33.12 °C with an average of 30.14 °C. The range of values from pH is 6.01–8.53, with an average of 6.74 (dataset repository).

## 2. Experimental Design, Materials and Methods

### 2.1. Data collection

Water samples were collected in the surface water approximately at 1 m depth using a submersible water bottle for oceanographic measurements. The entire sampling was done in the daytime only (8.00 am to 5.00 pm local time). Furthermore, all the water sampling was directly measured in the boat using several portable instruments (Section 2.2. to 2.3).

Technically, measurement and recording are carried out directly on board the ship using the log sheet while observers have different tasks onboard. To reduce bias, each instrument was handled by only one observer. All precautionary steps were followed according to the manufacturer's guidelines. Before each casting, the settings of all the instruments was calibrated.

### 2.2. Bathymetric measurements

Depth measurements were carried out by using the single beam echo-sounder Garmin GPSmap 585. Depth measurement lines are always following the measurement stations of oceanographic parameters. Measurements are always done during the day using wooden ships. This tool performs recording automatically and is stored in a memory card. The data is position (latitude: x, longitude: y) and depth (z). There were 4668 data recorded during the expedition. The data has not been corrected with the ups and downs and depth of the transducer draft. For water depth less than one-meter depth, measurement is done using a "guess stick". Before processing and visualizing, a simple statistical analysis is done to see anomaly data. Then, the seabed profiles are obtained by calculating the slope using a bathymetric contour map from the data [1].

Before the measurements were taken in the waters, the simulation was conducted at the edge of the jetty by comparing the results of the echo-sounder and stick. This is to see the degree of precision of the echo-sounder. Then for the position, data from echo-sounder was compared with handheld GPS Garmin 62sc. To get a precision position, we usually measured when there is a minimum of 4 satellites was locked by the echo-sounder. The three satellites to determine the position, and one to adjust the error in the receiver's clock [2]. The speed of boat was range from 2-3 knots.

### 2.3. Oceanographic parameters

Oceanographic parameters were measured directly by using portable sensors. Several oceanographic parameters were provided, including water transparency, Sea Surface Temperature (SST), Sea Surface Salinity (SSS), ocean transparency, dissolved oxygen (DO), and pH.

For temperature parameters, measurements are made using a Lutron Cd-4319sd and a temperature sensor from GPSmap. Technically, water samples taken with Nansen bottles were lifted on board and were immediately measured and repeated three times. The data from Lutron was then compared to the temperature readings displayed on the GPSmap screen. Then the data is recorded in the logbook. Calibration of the temperature sensor is done before the measurement. Moreover, the sensor is immediately cleaned with fresh water after using. The same thing is done every time before and after the measurement.

Furthermore, salinity measurements are carried out with two instruments, namely with Lutron Cd-4319sd (<https://www.lsinstrumentation.com/wp-content/uploads/2016/10/CD-4319SD.pdf>) and portable handheld refractometer (<https://www.atago.net/en/products-master-top.php>), which is already widely used in the field of oceanography [3,4] Technically, the observer took a sample of Nansen bottle water and lifted it onto the ship onboard. The observer uses gloves and then takes the water with a drop pipette with three times repetitions. . The same thing is done

with Lutron instrument with calibration is done twice on each tool. For handheld refractometers, validation is done by cleaning and testing freshwater samples. After use, both tools are cleaned with fresh water.

SDD measurements are done by first measuring the depth of the waters. Furthermore, SDD was determined at each station using a conventional white Secchi disk with a diameter of 60 cm and a viewer tube. This SSD comes with ballast at the bottom. The measurements were taken between 9 a.m. and 3 p.m when the sea is in the calm condition. There is a number on the strap with a number per 0.5 m. The SDD is handled by one person and another person responsible for the tube. Technically, SDD lowered slowly into the water until it is no longer visible and parallelly, another person also deploy the tube into the water column and record depth of the SDD. The final value is average of the depth SSD when it is visible and sighted. SDD measurement in one station were carried out three times. Furthermore, to avoid bias, the sampling should do by the same person.

DO and pH measurements are performed using a portable DO meter (Lutron DO-5510). Before used, the instrument is calibrated according to manufacturer guidelines and checked every day before sampling. Technically, the water sample from nansen bottle was measured directly on board by dipping Lutron DO-5510 into the water sample. The observer also uses gloves and to avoid bias, DO and pH measurement in one station were carried out three times.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

## CRediT Author Statement

**Noir P. Purba:** Conceptualization, Funding acquisition, Writing – original draft; **Ibnu Faizal:** Methodology, Writing – original draft; **Mega L. Syamsuddin:** Validation, Writing – review & editing; **Ajeng Wulandari:** Data curation; **Tonny Bratasena:** Visualization; **Ryadelle Therie:** Data curation.

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