Data Article

A photographic data set of reef and coral communities across Venezuela

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\textbf{A B S T R A C T}

This dataset contains 2850 photographs of the seafloor in coral communities from Venezuela that were taken during 2017 and 2018. We used a hierarchical experimental design with four random factors representing four different spatial scales: (1) region (hundreds of kilometers), (2) localities (tens of kilometers), (2) reef sites (hundreds of meters) and (3) transects (a couple meters) across the Venezuelan coast. At each site, four 30-m transects were deployed parallel to the coastline, and 15 pictures were taken every other meter at each transect, containing an area of at least $80 \times 90$ cm with enough resolution to identify benthic groups. This dataset covers spatial scales from a few meters to hundreds of kilometers; marine protected areas, and non-protected areas; coastal zones, continental and oceanic islands. These images have the potential to be further used for training researchers in benthic organisms identification, and training artificial intelligence classification algorithms. Also, they represent and updated baseline to perform spatial and temporal comparisons in Venezuela or further studies involving multiple spatial scales in the region.

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Specifications Table

| Subject                    | Ecology                        |
|----------------------------|-------------------------------|
| Specific subject area      | Coral Reef Ecology            |
| Type of data               | JPG Images                    |
| How data were acquired     | Images were taken using a Nikon Coolpix AW130 or a SeaLife Micro 2.0 |
| Data format                | Raw                           |
| Parameters for data collection | Selected sites had to have shallow coralline communities (between 8 and 10m) with enough visibility to photograph the bottom and be able to identify the organisms at the best taxonomic resolution possible. Each Locality had to have at least three different sites, separated by several hundred meters. |
| Description of data collection | All surveys were conducted using scuba equipment between 8-10 meters depth. At each site, four 30-m transects were deployed at least five meters apart, and 15 pictures were taken every other meter at each transect. One of four types of frames were included in the picture for scaling: (1) a yellow-black bar indicating 10cm for each colored segment; (2) an L-shaped bar with perforations, the separation between two perforations being 5cm; (3) a regular bar with perforations every 10 cm. (4) a regular bar with yellow tape separated by 10 cm from the external borders of the tape. |
| Data source location       | Venezuela. For details, please see Table 1. |
| Data accessibility         | Repository name: OSF          |
| Data identification number | DOI https://doi.org/10.17605/OSF.IO/HE6QW |
| Direct URL to data         | https://osf.io/he6qw/         |

Value of the Data

• This photographic dataset represents the first publicly available repository of images from coral habitats in Venezuela across different spatial scales (from a few meters to hundreds of kilometres), encompassing marine protected areas, and non-protected areas; coastal zones and continental and oceanic islands. The data set can be used to determine the structure of benthic communities and associated with coral reefs and coralline habitats. These data can allow to further insights about the benthic community structure associated with coral reefs and coralline communities from late 2017 to mid 2018 in the Southern Caribbean. The data represents a baseline for this period that will be valuable for purposes of comparisons in times of rapid climate change.

• These data are available for all the scientific community, students, conservation practitioners and marine protected areas policymakers and managers.

• These images can be used for capacity building through the identification of species and/or major benthic taxa, and to train and test artificial intelligence models. They also represent a baseline of the surveyed communities for future spatial and temporal comparisons or regional studies encompassing the Caribbean basin.

1. Data Description

Here we provide a collection of 2850 photographs as jpeg files. They contain an area of at least 80 × 90cm (with the only exception of the locality Ocumare, where the area of the quadrat is variable in the even transect) of the seafloor in coral communities in Venezuela during 2017 and 2018. This dataset includes 36 sites encompassing the Venezuelan coast, with enough resolution to identify benthic groups and up to taxonomic species in many cases. These images can
be analysed with software like PhotoQuad [1], CPCE [2], or CoralNet [3] to generate multivariate data of benthic communities at different taxonomic and functional resolutions. These images were used in the research articles Miyazawa et al. [4] and Montilla et al. [5]. The locations are listed in Table 1:

2. Experimental Design, Materials and Methods

2.1. Experimental design

The surveys were designed to test hypotheses regarding coral communities variation at several spatial scales. We considered in our experimental design four factors:

- Region: random factor, with three levels: Eastern, Central, and Western regions of the Venezuelan coast.
- Locality: random factor and nested to Region, with a total of seven levels, distributed as two eastern locations, two central locations and three western locations.
- Site: random factor, nested to Locality, with a total of 36 levels. Each locality included three to seven sites.
• Transect: random factor, nested to Site, with a total of 143 levels, four transects for each site.

2.2. Field methods

At each selected site, a team of divers deployed four 30m-long random transects at a minimum depth of 8 meters and a maximum of 10m. Each transect had a separation of at least 5m. 15 photographs of the bottom were taken every other meter. One of four types of frames were included in the picture for scaling: (1) a yellow-black bar indicating 10cm for each coloured segment; (2) an L-shaped bar with perforations, the separation between two perforations being 5cm; (3) a regular bar with perforations every 10 cm. (4) a regular bar with yellow tape separated by 10 cm from the external borders of the tape.

Ethics Statement

Authors did not use any animal or human experimental materials, and are not, therefore, subject to their ethical concerns

CRediT Author Statement

Luis M. Montilla: Formal analysis, Investigation, Data Curation, Writing – original draft; Emy Miyazawa: Formal analysis, Investigation, Data Curation, Writing – review & editing; Alejandra Verde: Investigation, Writing – review & editing; Esteban Agudo-Adriani: Investigation, Writing – review & editing; Alfredo Ascanio: Investigation, Writing – review & editing; José Cappelletto: Software, Investigation, Writing – review & editing; María López-Hernández: Investigation, Writing – review & editing; Gloria Mariño-Briceno: Investigation, Writing – review & editing; Stephanie Martinez: Investigation, Writing – review & editing; Zlatka Rebolledo-Sánchez: Investigation, Writing – review & editing; Andreína Rivera: Investigation, Writing – review & editing; Daniela S. Mancilla: Investigation, Writing – review & editing; Aldo Cróquer: Conceptualization, Methodology, Investigation, Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

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References

[1] V. Trygonis, M. Sini, photoQuad: a dedicated seabed image processing software, and a comparative error analysis of four photoquadrat methods, J. Exp. Mar. Biol. Ecol. 424–425 (2012) 99–108, doi:10.1016/j.jembe.2012.04.018.
[2] K.E. Kohler, S.M. Gill, Coral point count with excel extensions (CPCe): a visual basic program for the determination of coral and substrate coverage using random point count methodology, Comput. Geosci. 32 (2006) 1259–1269, doi:10.1016/j.cageo.2005.11.009.
[3] O. Beijbom, P.J. Edmunds, C. Roelfsema, J. Smith, D.I. Kline, B.P. Neal, M.J. Dunlap, V. Moriarty, T.-Y. Fan, C.-J. Tan, S. Chan, T. Treibitz, A. Gamst, B.G. Mitchell, D. Kriegman, Towards automated annotation of benthic survey images: variability of human experts and operational modes of automation, PLOS ONE 10 (2015) e0130312, doi:10.1371/journal.pone.0130312.

[4] E. Miyazawa, L.M. Montilla, E.A. Agudo-Adriani, A. Ascanio, G. Mariño-Briceño, A. Croquer, On the importance of spatial scales on beta diversity of coral assemblages: a study from venezuelan coral reefs, Peer J. 8 (2020) e9082, doi:10.7717/peerj.9082.

[5] L.M. Montilla, E. Miyazawa, A. Ascanio, M. López-Hernández, G. Mariño-Briceño, Z. Rebolledo-Sánchez, A. Rivera, D.S. Mancilla, A. Verde, A. Cróquer, The use of pseudo-multivariate standard error to improve the sampling design of coral monitoring programs, Peer J. 8 (2020) e8429, doi:10.7717/peerj.8429.