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Data Descriptor

A Dataset of Benthic Species from Mesophotic Bioconstructions on the Apulian Coast (Southeastern Italy, Mediterranean Sea)

Maria Mercurio [1,2], Guadalupe Giménez [1,2,*], Giorgio Bavestrello [2,3], Frine Cardone [2,4,5], Giuseppe Corriero [1,2], Jacopo Giampaoletti [6,7], Maria Flavia Gravina [2,8], Cataldo Pierri [1,2], Caterina Longo [1,2], Adriana Giangrande [5,9] and Carlotta Nonnis Marzano [1,2]

1 Department of Biosciences, Biotechnologies and Environment, University of Bari Aldo Moro, Via Orabona 4, 70125 Bari, Italy; giuseppe.corriero@uniba.it (G.C.); cataldo.pierri@uniba.it (C.P.)
2 Consorzio Nazionale Interuniversitario per le Scienze del Mare (CoNISMa), Piazzale Flaminio 9, 00196 Roma, Italy
3 Laboratory of Marine Zoology, DISTAV—Dipartimento di Scienze della Terra, dell'Ambiente e della Vita University of Genova, Corso Europa 26, 16132 Genova, Italy
4 Department of Integrative Marine Ecology, Zoological Station "Anton Dohrn", 80121 Naples, Italy
5 NBFC—National Biodiversity Future Center, Palermo Piazza Marina 61, 90133 Palermo, Italy; adriana.giangrande@unisalento.it
6 CNR-IAS—National Research Council—Institute for the Study of Anthropic Impact and Sustainability in the Marine Environment, Località Sa Mardini, Torregrande, 09170 Oristano, Italy
7 PhD Program in Evolutionary Biology and Ecology, University of Rome Tor Vergata, Via della Ricerca Scientifica, 00133 Rome, Italy
8 Department of Biology, University of Rome Tor Vergata, 00133 Rome, Italy
9 Department of Biological and Environmental Sciences and Technologies, University of Salento, Campus Ecotekne, Monteroni di Lecce, 73047 Lecce, Italy
* Correspondence: guadalupe.gimenez@uniba.it

Abstract: Marine bioconstructions are complex habitats that represent a hotspot of biodiversity. Among Mediterranean bioconstructions, those thriving on mesophotic bottoms on southeastern Italian coasts are of particular interest due to their horizontal and vertical extension. In general, the communities that develop in the Mediterranean twilight zone encompassed within the first 30 m of depth are better known, while relatively few data are available on those at greater depths. By further investigating the diversity and structure of mesophotic bioconstructions in the southern Adriatic, we can improve our understanding of Mediterranean biodiversity while developing effective conservation strategies to preserve these habitats of particular interest. The dataset reported here comprises records of benthic marine taxa from algae and invertebrate mesophotic bioconstructions investigated at six sites along the southern Adriatic coast of Italy, at depths between approximately 25 and 65 m. The dataset contains a total of 1718 records, covering 11 phyla and 648 benthic taxa, of which 580 were recognized at the species level. These data could provide a reference point for further investigations with descriptive or management purposes, including the possible assessment of mesophotic bioconstructions as refuges for shallow-water species.

Dataset: The dataset is submitted as a Supplementary File.

Dataset License: CC-BY

Keywords: Benthos; scleractinian reefs; oyster reefs; mesophotic zone; southern Adriatic Sea

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1. Summary

Marine bioconstructions are three-dimensional structures emerging from the seabed, built by the overlapping of successive generations of benthic organisms, the so-called

bioconstructors [1]. The framework of these biogenic concretions is constantly evolving, and the result is a very intricate structure in which several microhabitats can be distinguished. The holes and crevices that characterize these concretions host a complex community, including several invertebrates such as sponges, hydrozoans, polychaetes, mollusks, bryozoans, and tunicates [2]. Compared to shallow habitats (e.g., tropical coral reefs), bioconstructions developing in the mesophotic zone have received less attention worldwide, even though the study of these ecosystems has increased remarkably over the last few decades [3,4].

In the Mediterranean Sea, bioconstructions extend over large areas of the seabed, spreading from the intertidal to the aphotic zone. As a patchwork of several habitats capable of sustaining a wide range of species, they can host exceptional diversity and provide important ecosystem services, including food supply, carbon sequestration, biodiversity conservation, erosion prevention, a source of pharmaceutical ingredients, cultural and aesthetic value, and can be attractive to recreational divers [2]. Among the Mediterranean bioconstructions, the most studied is the coralligenous, which is an endemic habitat in the Mediterranean Sea that represents an important biodiversity hotspot [1,2,5].

Coralligenous consists of a calcareous substrate mainly produced by the accumulation of crustose coralline algae growing in dim-light conditions [6,7] at depths between about 20 and 120 m [8]. Recently, some mesophotic bioconstructions have been described that do not meet the definition of coralligenous sensu stricto [7] as they are not built by calcareous algae. These mesophotic bioconstructions are built by invertebrates with calcareous skeletons and have a thicker and looser texture than calcareous algae bioconstructions [9,10]. Similarly to the latter, the invertebrate bioconstructions support rich and heterogeneous benthic communities [11–14].

In this context, studying the structure and diversity of both algal-based and animal-based bioconstructions allows us to better define their taxonomic composition, aiming to promote sustainable management practices to ensure the protection of these precious and unique marine ecosystems. Indeed, recent studies [15–17] have shown that human and environmental pressures have a critical impact on the distribution of various types of bioconstructions, leading to their degradation, fragmentation, and loss in both shallow and deep waters. The damage of mesophotic bioconstructions could be almost irreversible, thus imposing the utmost attention on any conservation measures [18,19].

The present paper provides accurate and comprehensive data on the distribution of benthic species in the mesophotic bioconstructions on the Apulian coast (Mediterranean, southern Adriatic Sea) along approximately 400 km of coastline. Access to these data is crucial to evaluate spatiotemporal changes in biodiversity patterns and could be used by the scientific community in further research studies, as well as by stakeholders and policymakers to set conservation priorities and improve monitoring programs. Detailed information on species occurrence can also improve our ability to assess ecological changes in time and enable scientists to develop appropriate strategies for the conservation and management of these important ecosystems.

2. Data Description

Here, we provide the dataset of records of the benthic species found in the bioconstructions built by both algae (hereafter called Mesophotic Algae Bioconstructions = MAB) and invertebrates (hereafter called Mesophotic Invertebrate Bioconstructions = MIB) along the Apulian coast. When the two bioconstructions coexist at the same site, the MIBs are always deeper than the MABs.

The list includes 1718 records associated with taxonomic information (i.e., phylum, class, order, family, genus, species) and sampling details, including the location with geographical coordinates and type of substrate.

2.1. Geographic Coverage

The dataset includes records gathered from 6 sites along the Apulian coast (Southeastern Italy), where our research [12–14] revealed the occurrence of large bioconstructions. The sites, located from north to south, are as follows: the Tremiti Islands (TRM); Monopoli (MON); Capitolo (CAP); San Foca (SFC); Otranto (OTR); and Santa Maria di Leuca (SML) (Figure 1). At each study site, the samples were collected in the mesophotic zone at depths between 25 and 65 m.

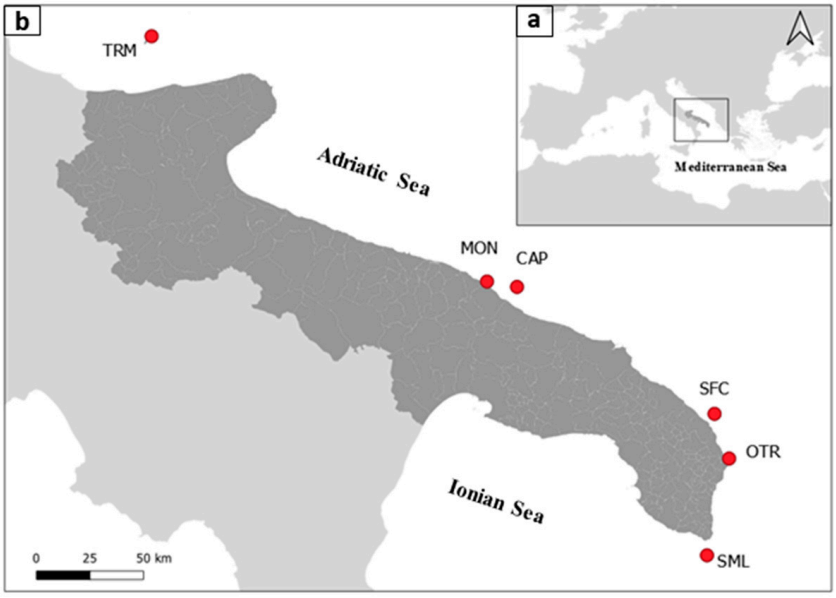

Figure 1. Map of the six study sites included in the dataset: (**a**) Geographic location of the study area; (**b**) sampling sites TRM: Tremiti; MON: Monopoli; CAP: Capitolo; SFC: San Foca; OTR: Otranto; SML: Santa Maria di Leuca.

Bounding Coordinates

- North: 42.1382530;
- East: 15.52244;
- South: 39.73114575;
- West: 18.347193;
- The geographic coordinate system is WGS84.

2.2. Taxonomic Coverage

The dataset contains 1716 records belonging to 648 taxa (580 identified to the species level) grouped as eleven phyla, three algae (Chlorophyta, Ochrophyta, and Rhodophyta), and eight animals (Porifera, Cnidaria, Mollusca, Annelida, Arthropoda, Bryozoa, Echinodermata, Chordata). A total of 27 taxa of algae were recorded, 15 of which belonged to Rhodophyta, 6 to Chlorophyta, and 6 to Ochrophyta. Regarding animals, the highest number of species was recorded in the Phylum Porifera (n = 194), followed by Annelida (n = 150), Mollusca (n = 110), Bryozoa (n = 71), and Arthropoda (n = 49) (Figure 2). Among the Porifera, 185 taxa appertained to the Class Demospongiae, 5 to the Class Homoscleromorpha, and 4 species to the Class Calcarea. Annelida was mainly represented by the Polychaeta class, which presented 143 taxa. Regarding mollusks, 67 taxa appertained to the Class Gastropoda, 39 to the Class Bivalvia, 3 species to the Class Cephalopoda, and 1 to the Polyplacophora. Among Bryozoa, the Class Gymnolaemata and Class Stenolaemata included 69 and 2 taxa, respectively. The other represented phyla were Arthropoda, with 49 taxa (44 Malacostraca, 3 Pycnogonida, 1 Copepoda and 1 Thecostraca); Cnidaria with 28 taxa (19 Anthozoa and 9 Hydrozoa); Echinodermata with 13 species (5 Asteroidea,

3 Echinoidea, 2 Holothuroidea, 2 Ophiuroidea and 1 Crinoidea,); and finally 5 species of Chordata, all belonging to the Class Ascidiacea.

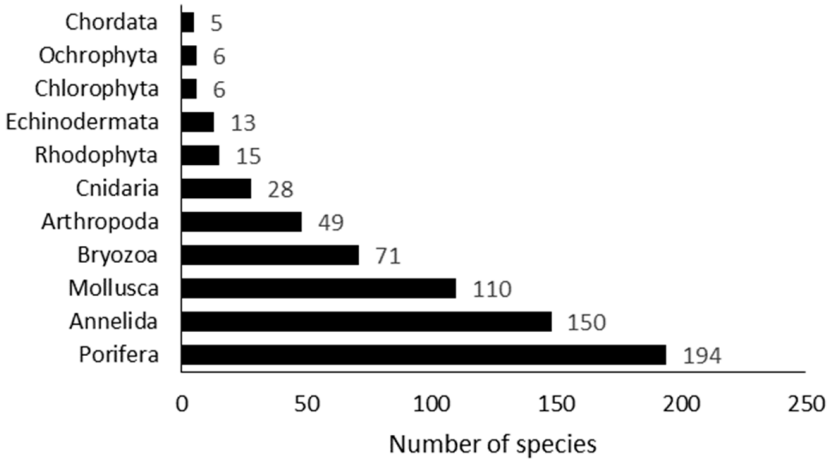

Figure 2. Number of species per phylum included in the dataset.

Of the total number of species, 450 were found in MAB and 416 in MIB. In MAB, Porifera represented the Phylum with the highest number of taxa (n = 131), followed by Annelida (n = 101) and Mollusca (n = 83) (Figure 3a), while for MIB, the highest values were found for Porifera (n = 140), Annelida (n = 117) and Bryozoa (n = 56) (Figure 3b).

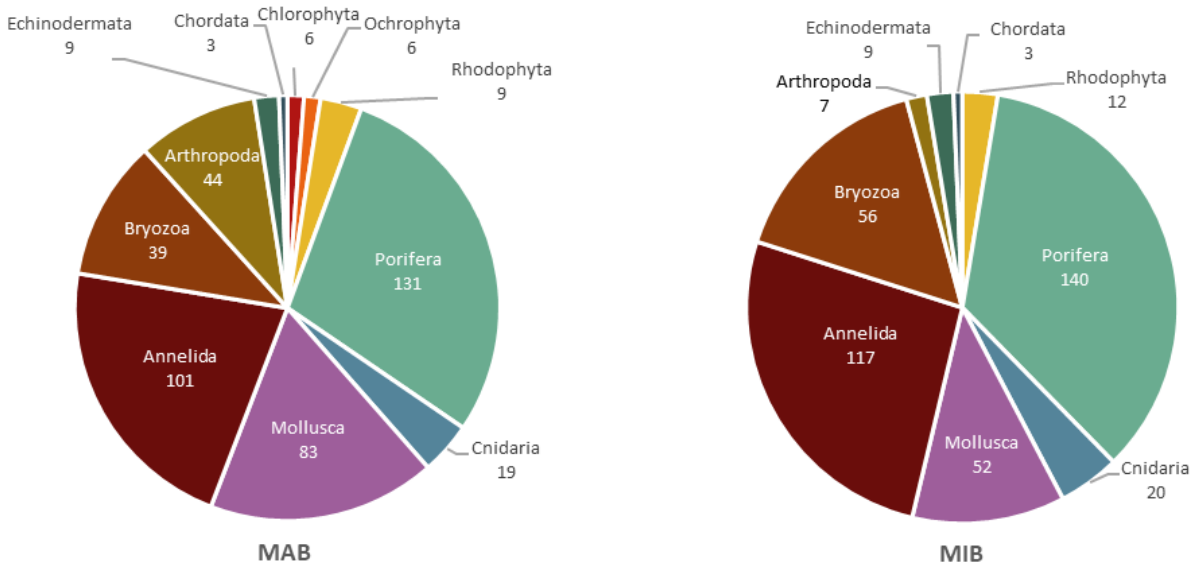

Figure 3. Total number of taxa per phylum found in the Mesophotic Algae Bioconstructions (MABs) (**a**); and Mesophotic Invertebrate Bioconstructions (MIBs) (**b**).

2.3. Data Resources

2.3.1. Data File

The dataset shown in Supplementary Materials Table S1 is an *xlsx.* file named "Benthic species from mesophotic bioconstructions on the Apulian coast", and it was realized according to Darwin Core terms defined by TDWG (2022).

2.3.2. Column Labels File

Column labels are shown in Supplementary Materials Table S2. Labels in the Darwin Core were taken from the TDWG website (https://dwc.tdwg.org/terms/; accessed on 10 January 2024).

3. Methods

This dataset includes previously published information [12–14] complemented by more recent data presented here for the first time, with an overall sampling period ranging from 2017 to 2023. The six study sites were selected based on preliminary geophysical investigations and ROV images resulting from a previous research project (BIOMAP) aimed at studying bioconstructions along the Apulian coast. At each site, sampling was carried out by scuba divers at two bathymetric ranges (Table 1) by randomly collecting fragments of bioconstruction for at least 3 L in volume. The collected material was stored in a 70% ethanol solution and transported to the laboratory, where it was sorted under a stereomicroscope Leica DMLS.

Table 1. List of sampling sites with the indication of the type of bioconstruction and depth. TRM: Tremiti; MON: Monopoli; CAP: Capitolo; SFC: San Foca; OTR: Otranto; SML: Santa Maria di Leuca. MIB: Mesophotic Invertebrate Bioconstructions, and MAB: Mesophotic Algae Bioconstructions.

Site	Type of Bioconstruction	Depth
TRM	MAB MIB	25–30 m 45–55 m
MON	MAB MIB	25–35 m 50–55 m
CAP	MAB MIB	25–35 m 53–64 m
SFC	MAB MIB	25–35 m 53–64 m
OTR	MAB MIB	25–35 m 45–64 m
SML	MAB MIB	25–27 m 45–65 m

Samples were identified to the lowest possible taxonomic level following procedures specific to each taxonomic group. The identification of coralline algae was based on thallus morphology, following Bressan & Babbini [20]. The taxonomic identification of sponges was based on Systema Porifera [21] and the World Porifera Database (WPD) [22]. The nomenclature used for cnidarians was based on Bouillon et al. [23,24]. The systematic arrangement of mollusks followed Bouchet et al. [25] for the gastropods and Bouchet et al. [26] for the bivalves. The nomenclature refers to Molluscabase.org [27]. The identification of bryozoans was carried out according to Zabala and Maluquer [28], Rosso and Di Martino [29], and Chimenz Gusso et al. [30].

To complement direct sampling, additional dives were conducted at each site at depths of approximately 25 to 35 m to shoot videos of the bioconstruction on at least 3 linear transects. Technical divers were equipped with high-definition video cameras (Sony PMW-EX1 and Sony Alpha 7III) and high-performance LED strobe illuminators (EasyDive, 13,000 lumens). A Remotely Operated Vehicle (ROV) Mariscope FO III Meerestechnik (Kiel, Alemania), equipped with high-definition video cameras, was used to obtain video images at depths between approximately 45 and 65 m.

The taxonomic nomenclature referring to each species identified was checked and, when necessary, updated using the World Register of Marine Species (WoRMS, http://www.marinespecies.org, accessed on 28 December 2023).

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/data9030045/s1; Table S1: "Benthic species from mesophotic bioconstructions on the Apulian coast"; Table S2: Darwin core labels used for the data paper.

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Data Availability Statement: The original contributions presented in this study are available in Supplementary Materials [Table S1], and further inquiries can be directed to the corresponding author. The dataset is an integral part of this work, and the CC-BY license is also valid for it.

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Conflicts of Interest: The authors declare no conflicts of interest.

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