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Humboldt
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Latinoamericano de Biogeografía

Biogeographic distribution of octocorals of the *Muricea* and *Leptogorgia* genera on the equatorial front of the Tropical Eastern Pacific

Distribución biogeográfica de octocorales de los géneros *Muricea* y *Leptogorgia* en el frente ecuatorial del Pacífico Tropical Oriental

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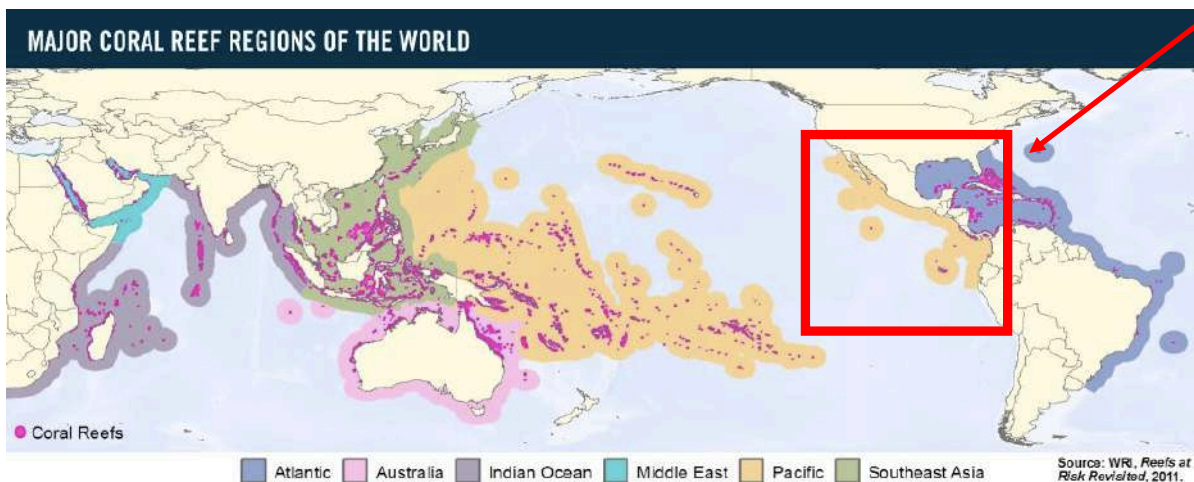
August 8th, 2019

INTRODUCTION

GLOBAL CONTEXT

Reduction of coral populations globally

Distribution



Tropical Eastern Pacific (TEP)

Causes of disappearance?

Climate change
Anthropogenic impacts

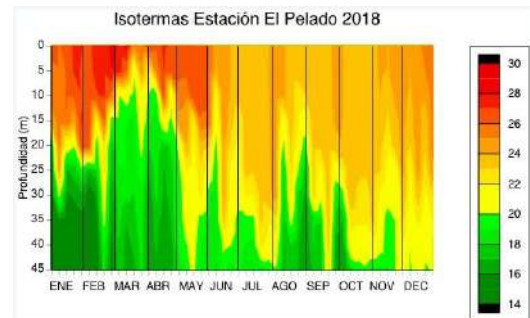
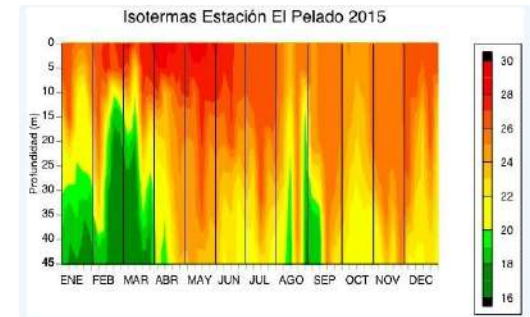
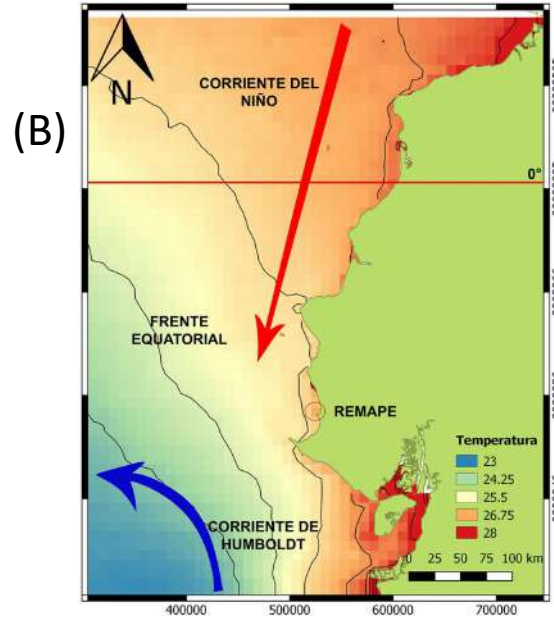
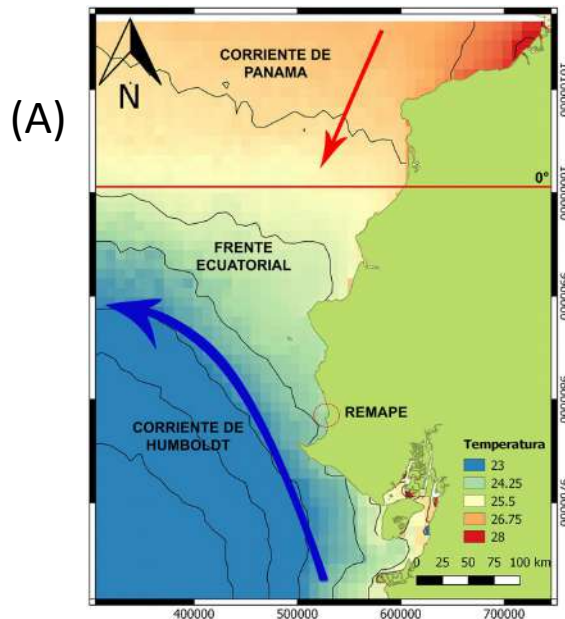


INTRODUCTION

CONTINENTAL COAST OF ECUADOR

Environmental conditions

- Convergence zone (Humboldt and Panama)
- Thermohaline gradient
- “El Niño Southern Oscillation” (ENSO) and “La Niña” climate phenomenon
- Extreme climate conditions



- A. Equatorial front: June to November
B. Equatorial front: December to May

http://www.cenaim.espol.edu.ec/biodiversidad_REMAPE_amb

INTRODUCTION

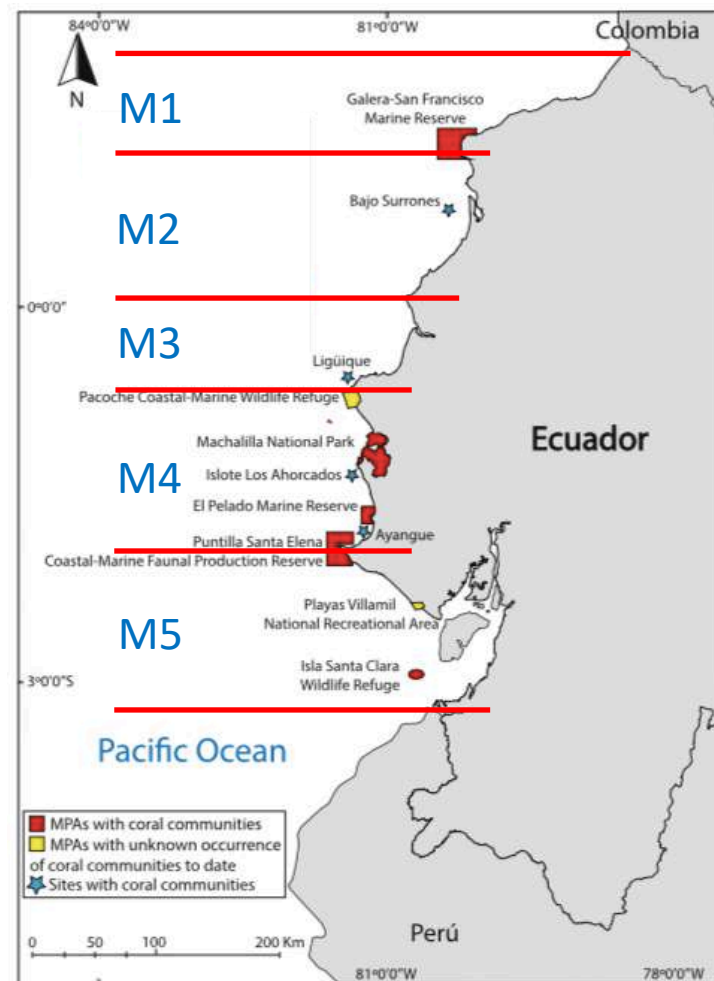
BIOGEOGRAPHIC REGIONS OF THE ECUADORIAN CONTINENTAL COAST

- Oceanographic and hydrographic criteria
- 5 delimited macrozones on the continental coast of Ecuador
- Scientific-technical studies for the investigation of the adjacent sea

Technical Secretariat of the Sea (“Estudios de caracterización del mar territorial continental del Ecuador, bases para lograr la zonificación marina”).

How they were established:

- Analysis of primary (phytoplankton) and secondary (zooplankton) productivity at 2 depths
- 61 sampling stations in the 5 macrozones of the territorial sea and the inland waters of the continental shelf of Ecuador



Alvarado *et al.*, 2017



METHODOLOGY

DATA AND ESTABLISHMENT OF GEOGRAPHICAL POINTS

2 genera of octocorals more abundant and conspicuous in tropical waters: *Leptogorgia* and *Muricea* (Alcyonaceae).

Structure	Recognition
Axis: Support and flexibility (gorgonin)	Sclerites
Cenenchyme: Structure of calcium carbonate (sclerites)	Ramifications
	Molecular and chemical analysis

Muricea fruticosa



Leptogorgia alba

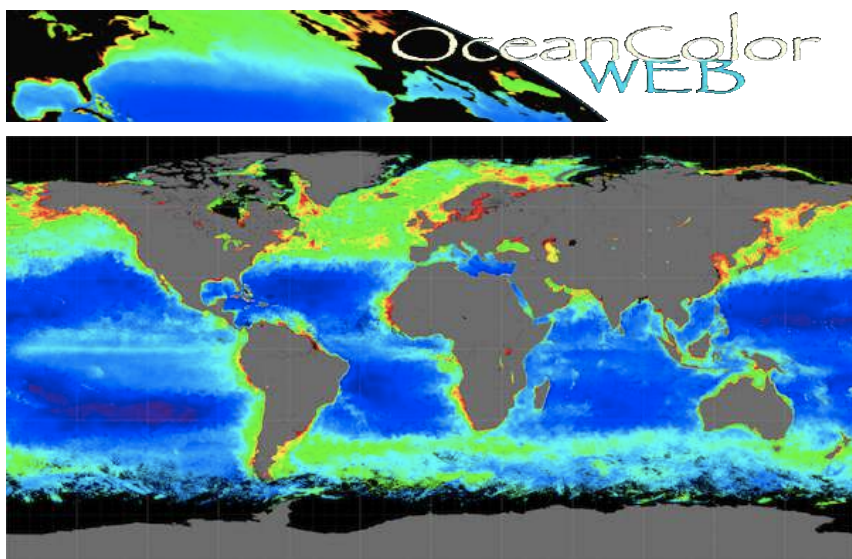




METHODOLOGY

DATA AND ESTABLISHMENT OF GEOGRAPHICAL POINTS

- Repository samples of PUCE QCAZ and CENAIM museums. Records from the 80's until today
- 247 records
- Database generation
- Geographic Information Systems (QGIS 3.2)
- Satellite determination of environmental and oceanographic patterns with NASA Ocean Color WEB



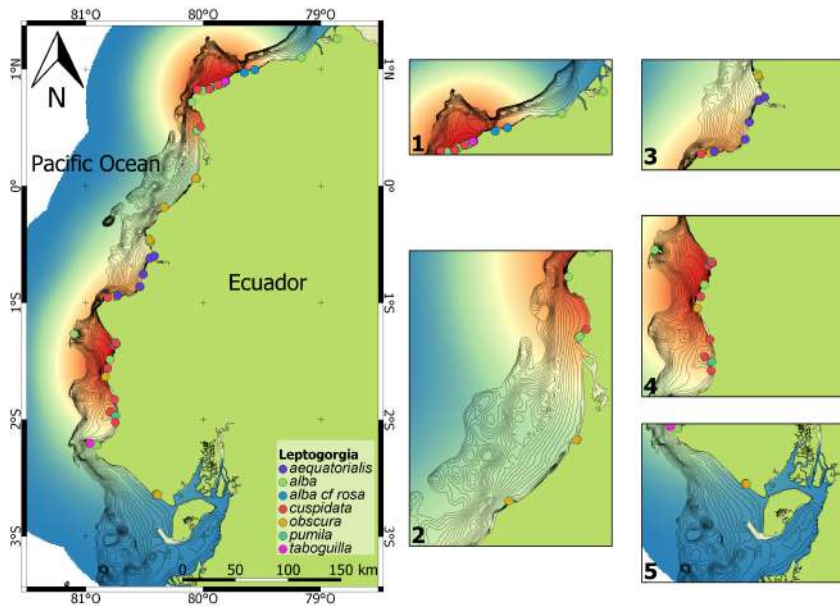
- ❖ Bathymetry
- ❖ Surface temperature
- ❖ Chlorophyll a



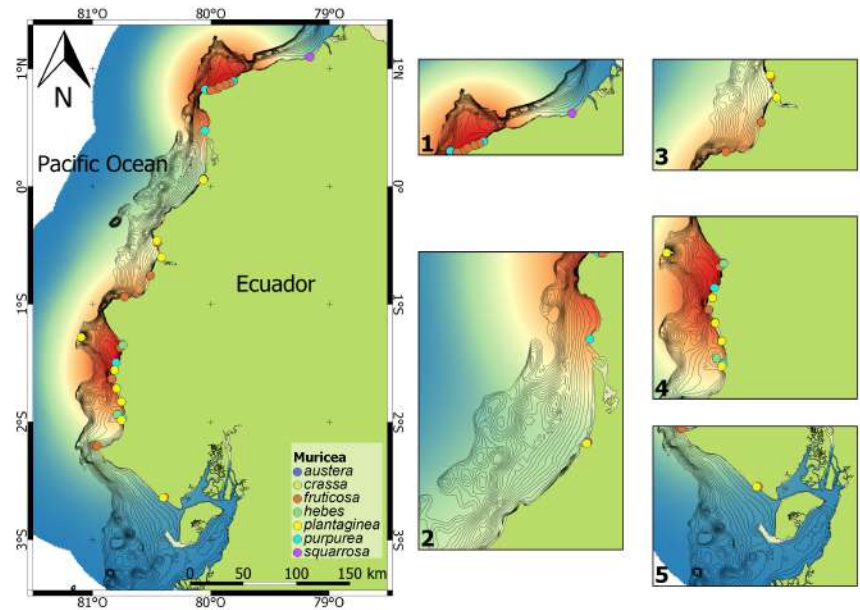
RESULTS

BATHYMETRY

Leptogorgia



Muricea



- 14 species (*Leptogorgia* 7, *Muricea* 7)
- Heat distribution map
- 2 defined areas of abundance

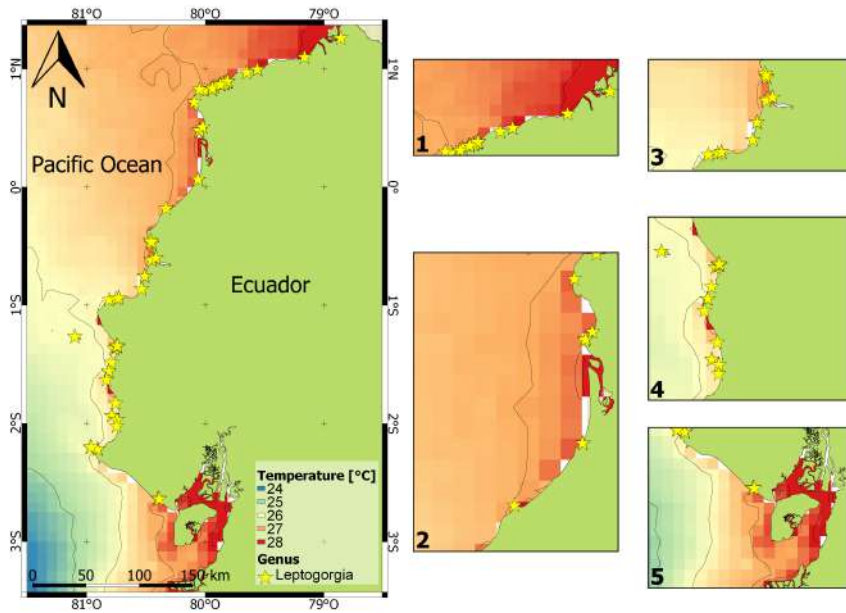
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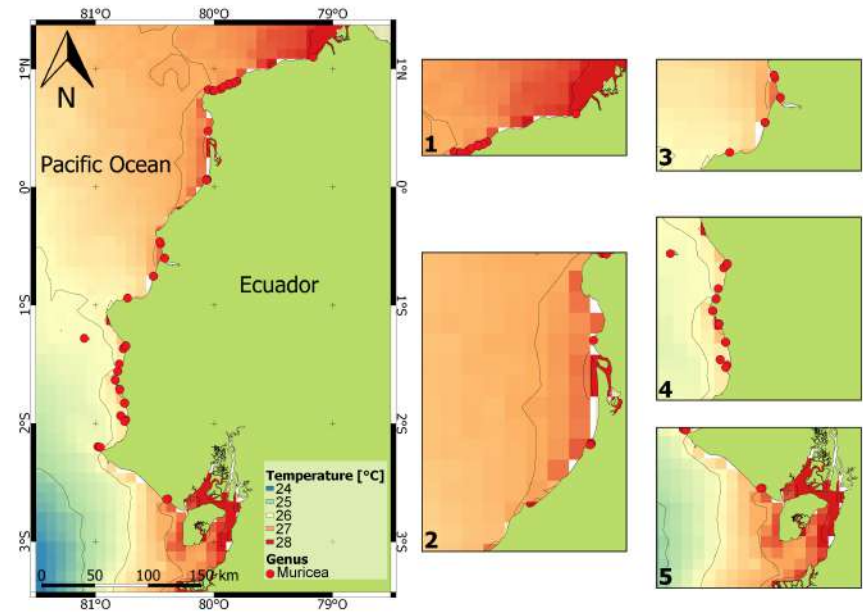
RESULTS

SURFACE TEMPERATURE (°C)

Leptogorgia



Muricea



Rainy season

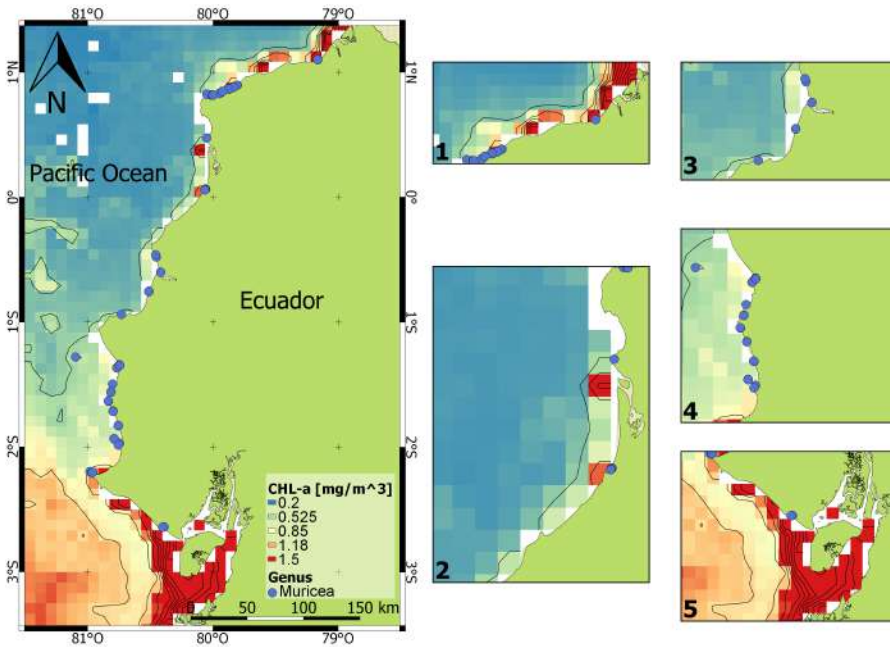
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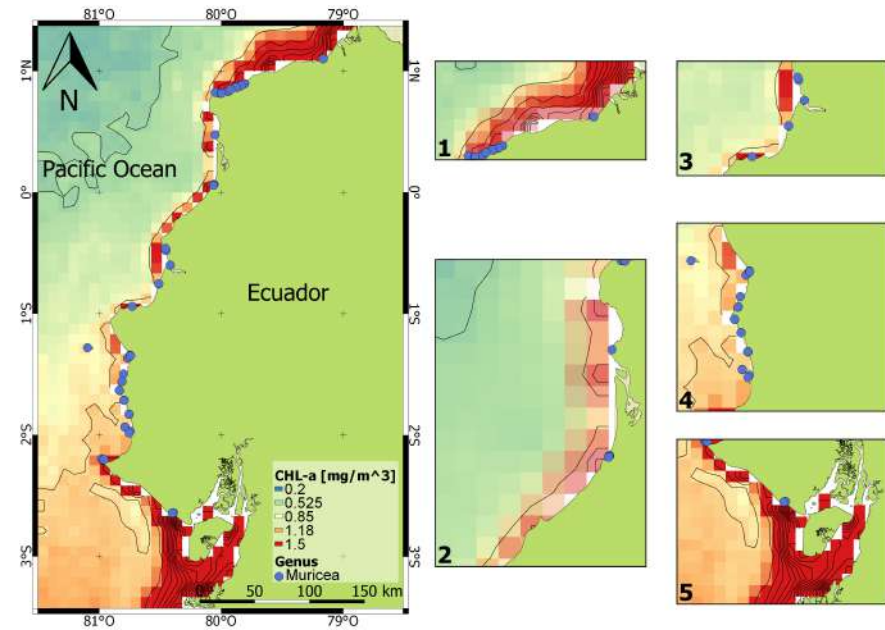
RESULTS

CHLOROPHYLL

Muricea



Dry season



Rainy season

Unpublished data

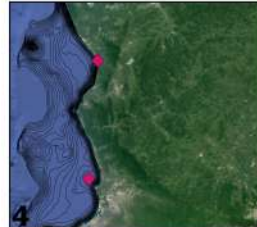
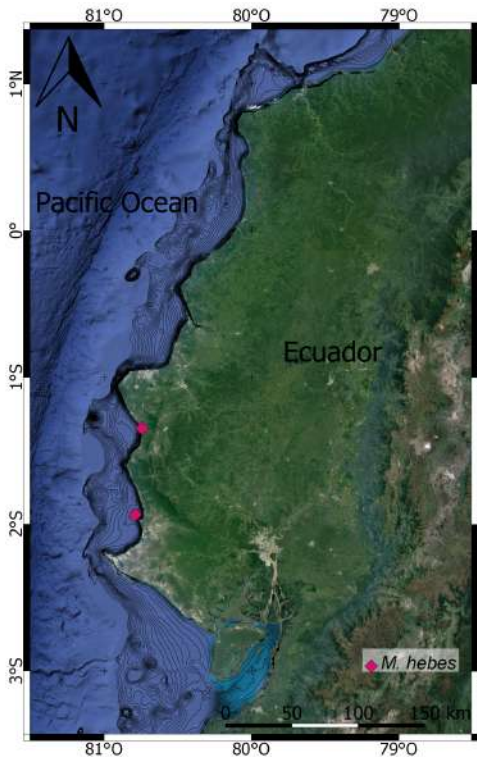
Areas of large amount of nutrient discharge decreases abundance



RESULTS

NEW RECORD

Muricea hebes



- Location: El Pelado and Puerto Cayo
- No records for Ecuador
- It is not abundant, although it is not discarded that there could be found in more locations

Unpublished data

Macrozone 4



DISCUSSION

- The use of GIS tools and remote sensors allow a deep understanding of the distribution of corals based on environmental conditions.
- The establishment of macrozones helps us to understand the distribution of octocorals and this methodology could be replicable in other sessile organisms.
- The most productive areas are found in macrozones 1, 3 and 4 and the least productive are 2 and 5.
- The temperature and chlorophyll ranges clearly show primary production throughout the year.
- The geography of the coasts determines that macrozones 3 and 4 have a great amount of slopes, which is associated with the biology of octocorals and light exposure.



CONCLUSIONS

- There are many gaps in research due to the lack of reef monitoring of Ecuador.
- This study serves as a baseline to determinate sessile marine species distribution patterns and to facilitate samplings in monitoring studies.
- There are 2 clearly marked areas of concentration of species where the abundance of octocorals is higher.
- Biological collections are crucial to keep records and incorporate new discoveries.
- The stablishment of macrozones helps to understand on smaller scales the distribution and oceanographic patterns.
- The influence of the currents has a key role in the distribution and stablishment of species.

THANK YOU FOR YOUR ATTENTION!
QUESTIONS WELCOMED!



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