Corales y otros organismos marinos en la zona del crepúsculo (40–115 m)

- Otro tesoro escondido en la isla de San Andrés

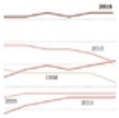
Juan Armando Sánchez, Ph.D.
Uniandes - Biommar

SCIENCE

2015 Was Hottest Year in Historical Record, Scientists Say

By JUSTIN GILLIS JAN. 20, 2016

RELATED COVERAGE



2015 Likely to Be Hottest Year Ever Recorded OCT. 21, 2015

Extreme Weather

2016 was the hottest year on record -- again

By **Brandon Miller**, CNN Meteorologist

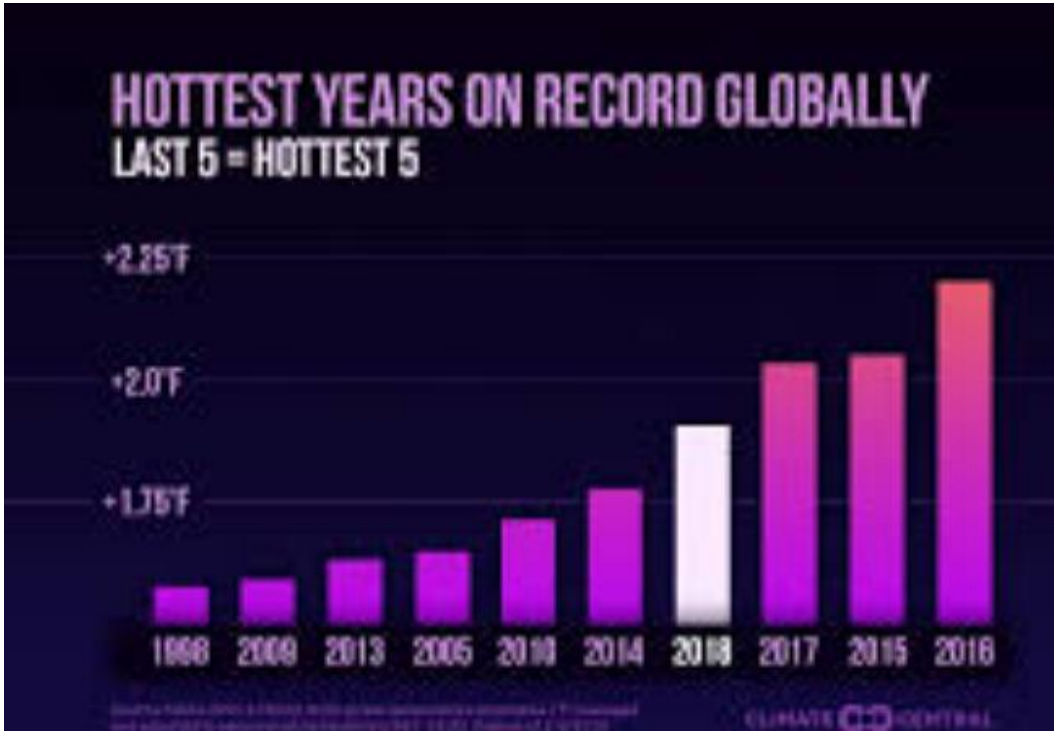
Updated 2152 GMT (0552 HKT) January 18, 2017

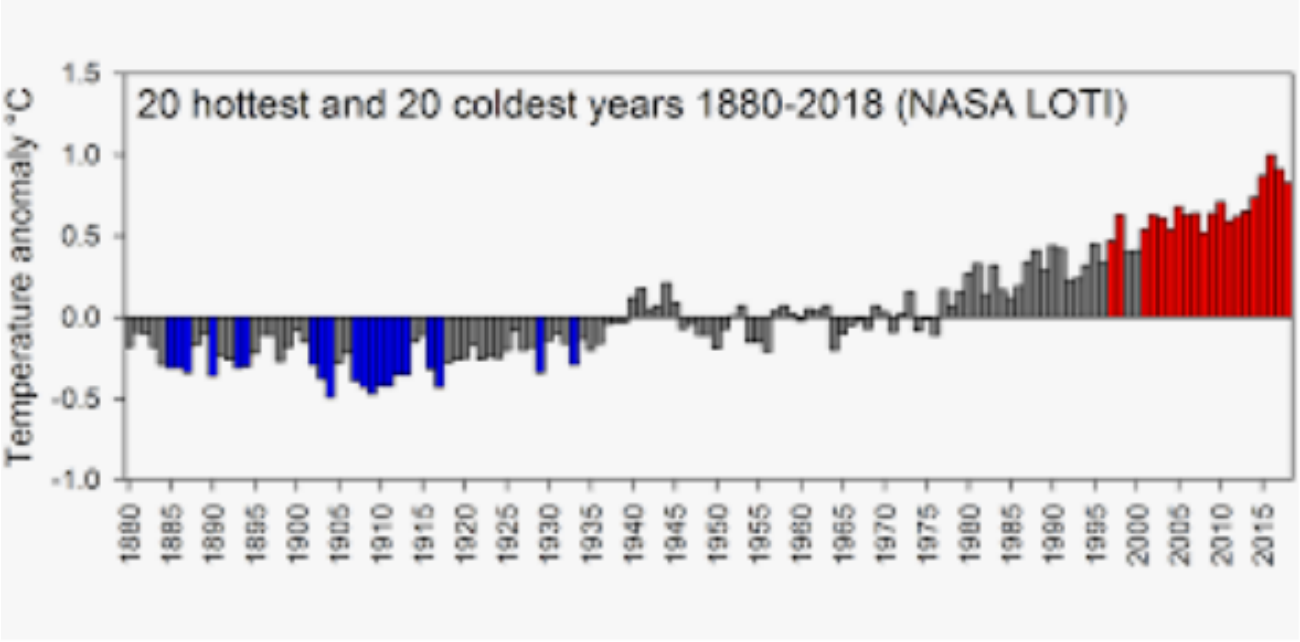
E&E NEWS

CLIMATE

Surprising Scientists, 2017 Could Be among Hottest on Record

Global temperatures this year have been 1.64 degrees Fahrenheit above the 20th-century average

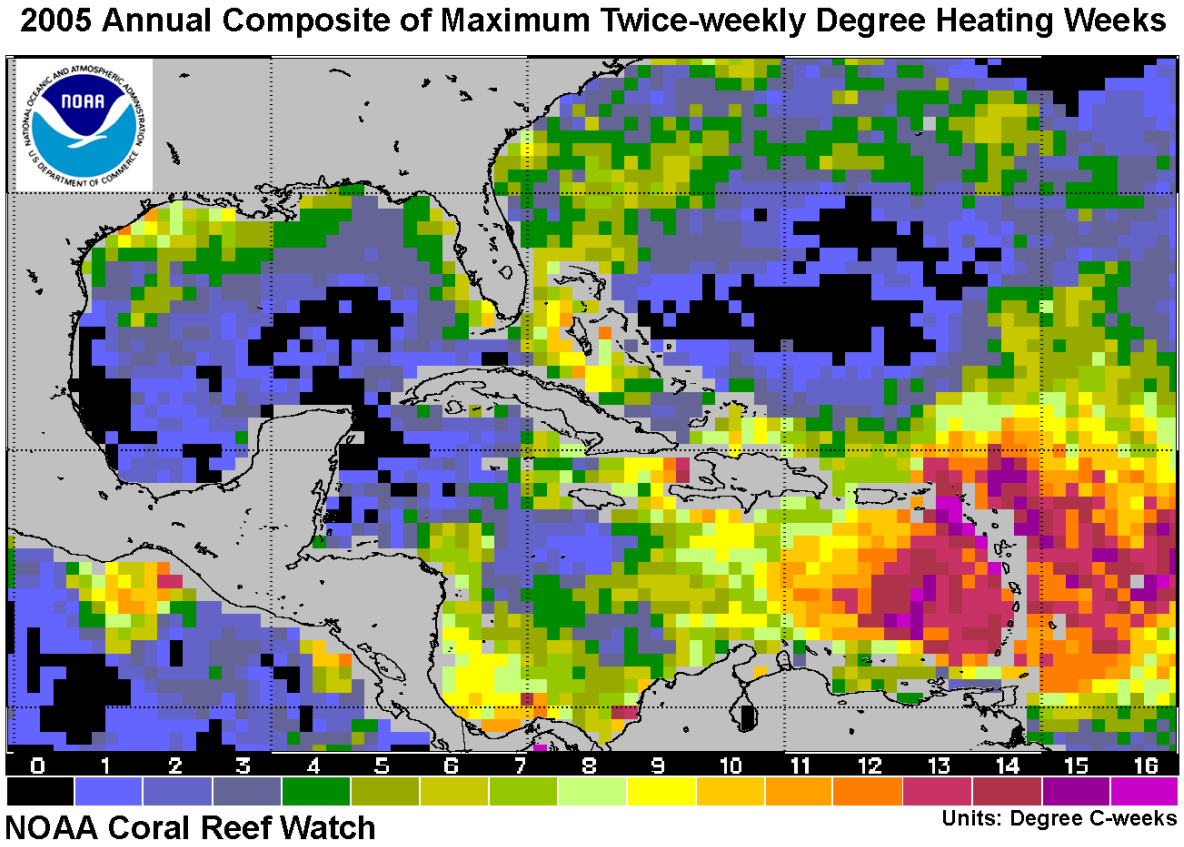

HOTTEST YEARS ON RECORD GLOBALLY
LAST 5 = HOTTEST 5
+2.25°F
+2.0°F
+1.75°F
1998
2009
2013
2005
2010
2014
2018
2017
2015
2016


20 hottest and 20 coldest years 1880-2018 (NASA LOTI)
Temperature anomaly °C
1.5
1.0
0.5
0.0
-0.5
-1.0
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

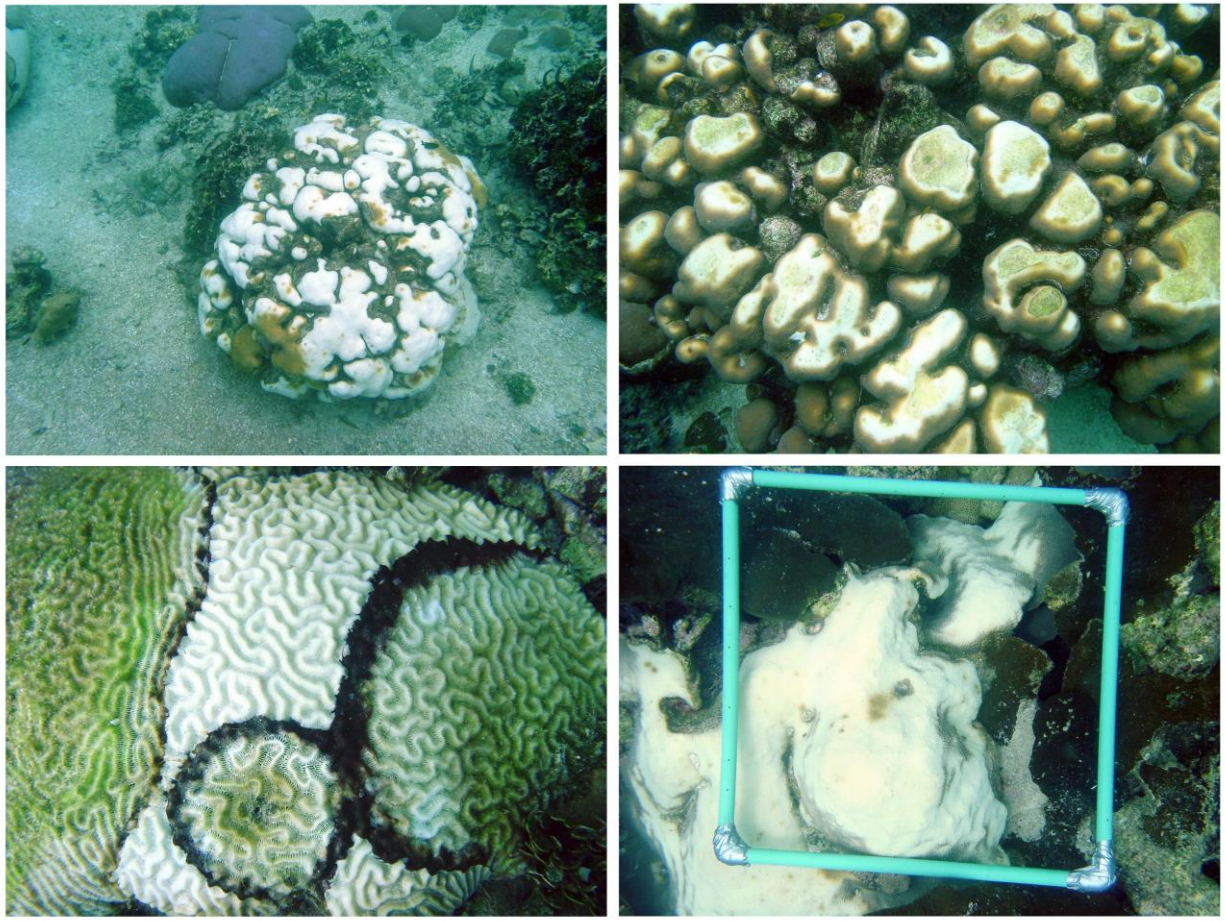
Ruptura de la Simbiosis

CAMBIO CLIMÁTICO

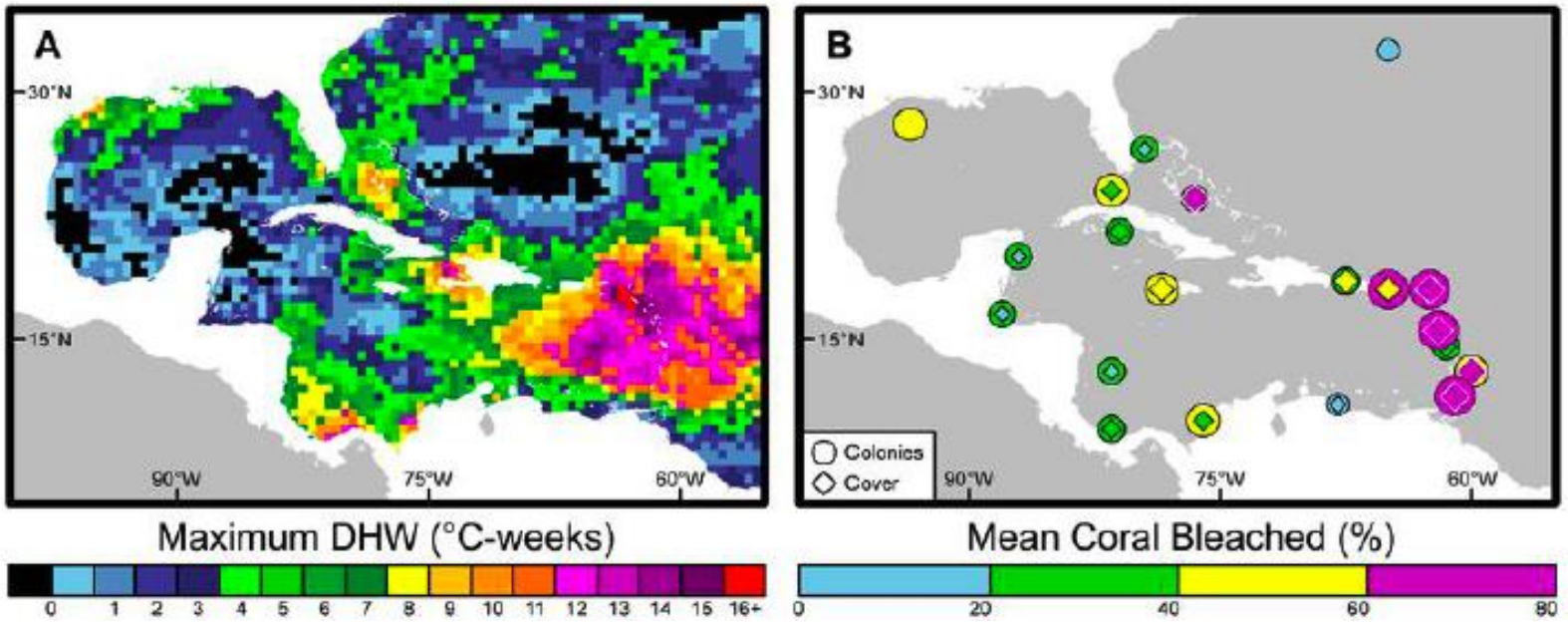
- Aumento de dióxido de carbono → Temperatura de la tierra ha aumentado 0.6° C en los últimos 100 años.

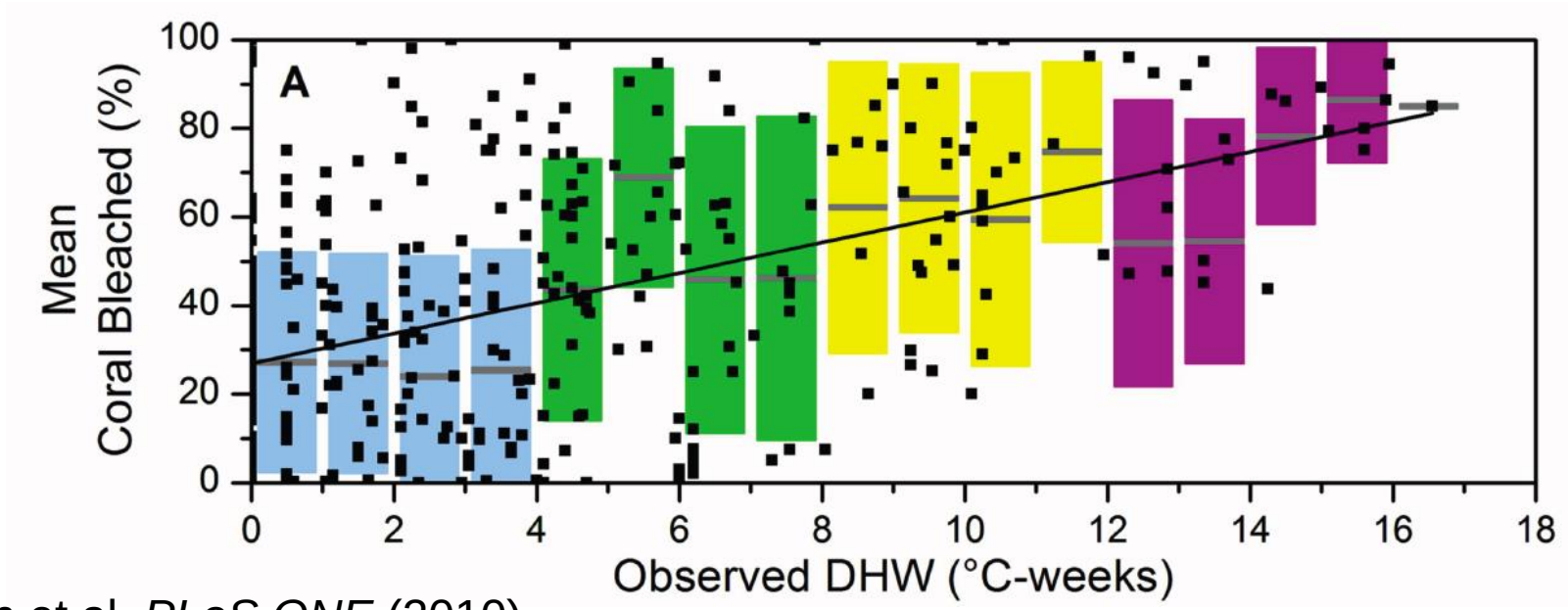


Blanqueamiento coralino, islas del Rosario, 2005

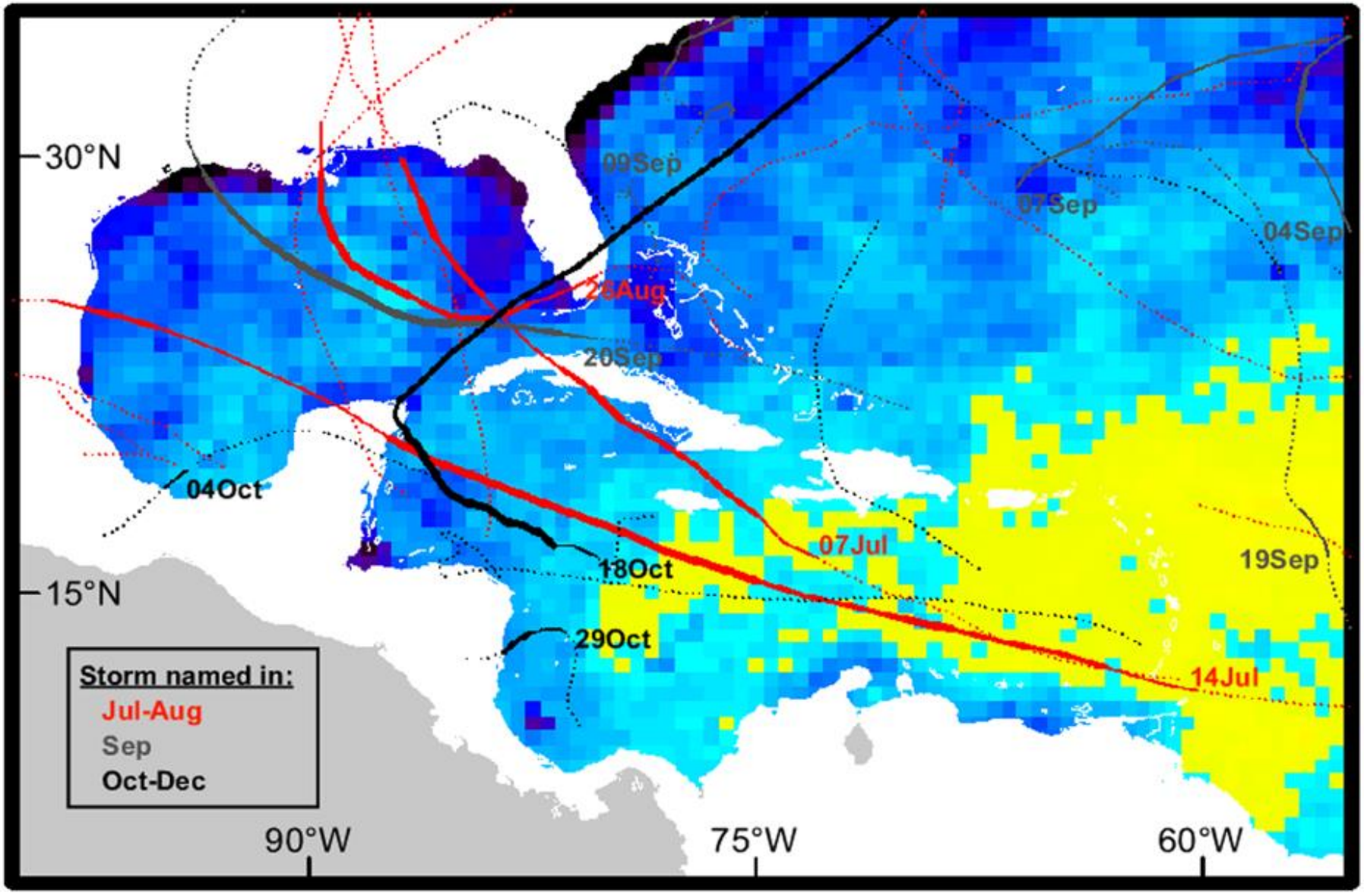


Blanqueamiento coralino, islas del Rosario, octubre, 2005





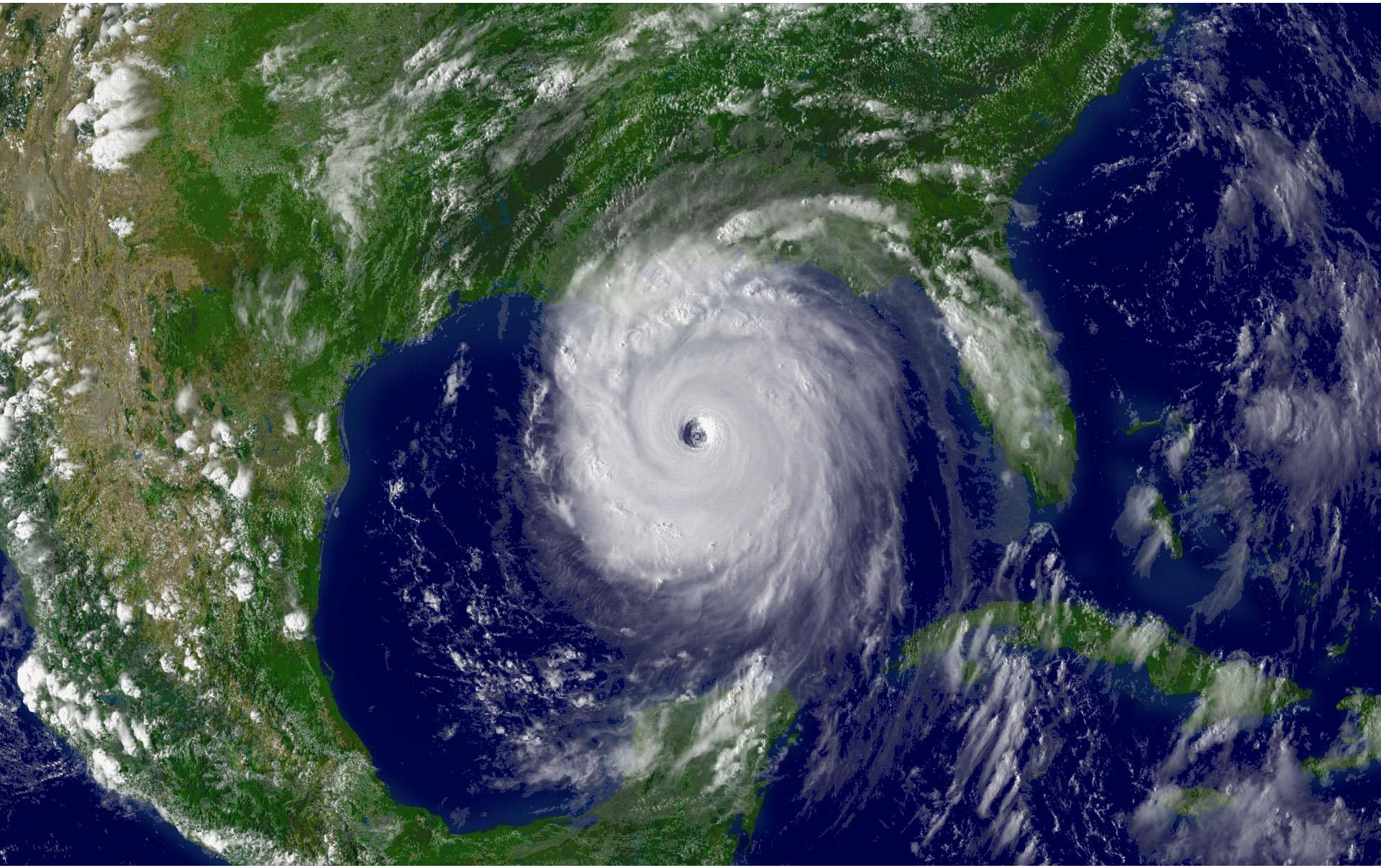
Eakin et al. *PLoS ONE* (2010)



Eakin et al. *PLoS ONE* (2011)

SST Anomaly (°C)

-5 -4 -3 -2 -1 0 1



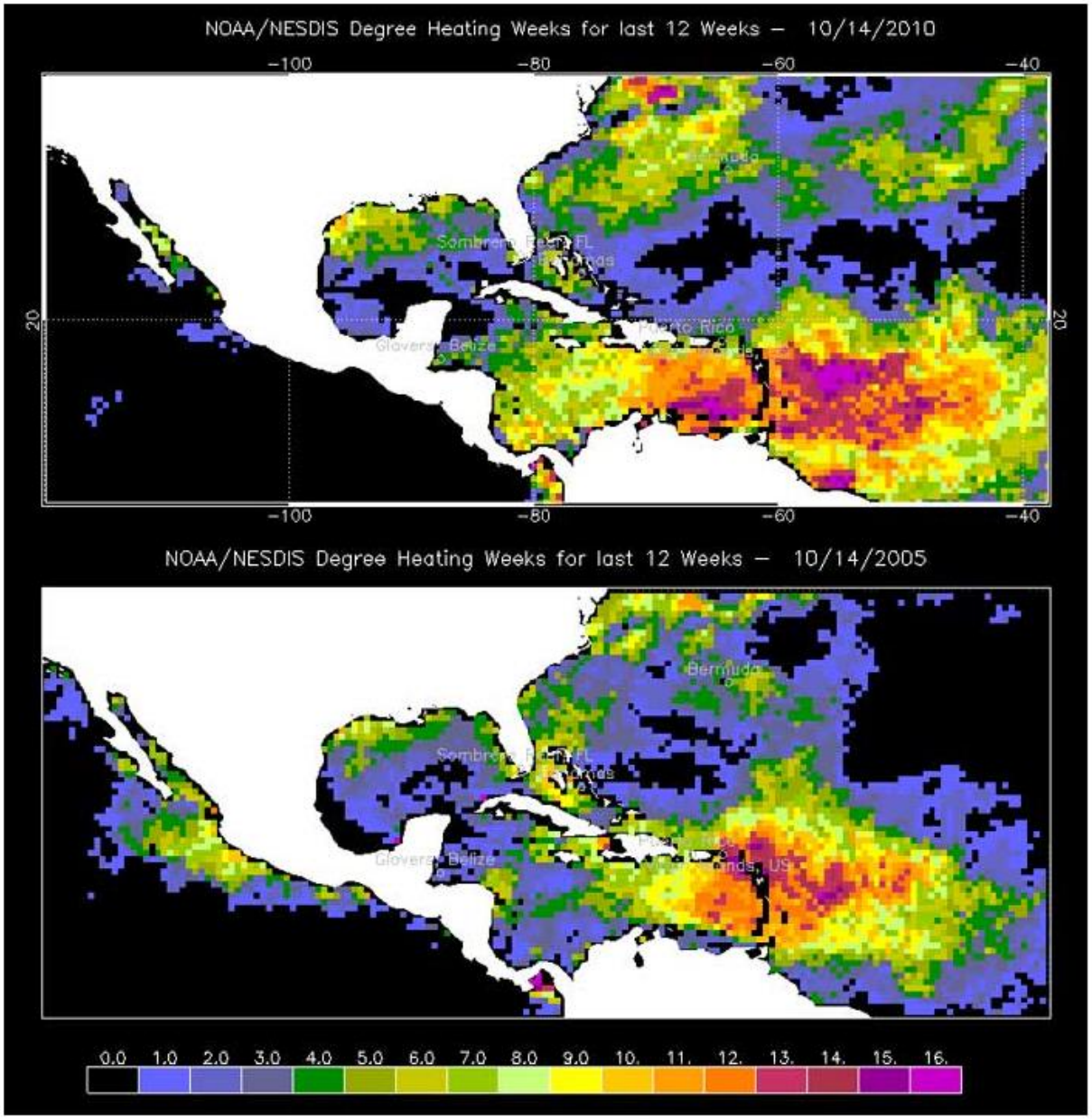
Katrina, agosto, 2005 (NOAA)

http://www.mymodernmet.com/profiles/blogs/25-most-haunting-photos-from

http://www.mymodernmet.com/profiles/blogs/25-most-haunting-photos-from

http://www.mymodernmet.com/profiles/blogs/25-most-haunting-photos-from

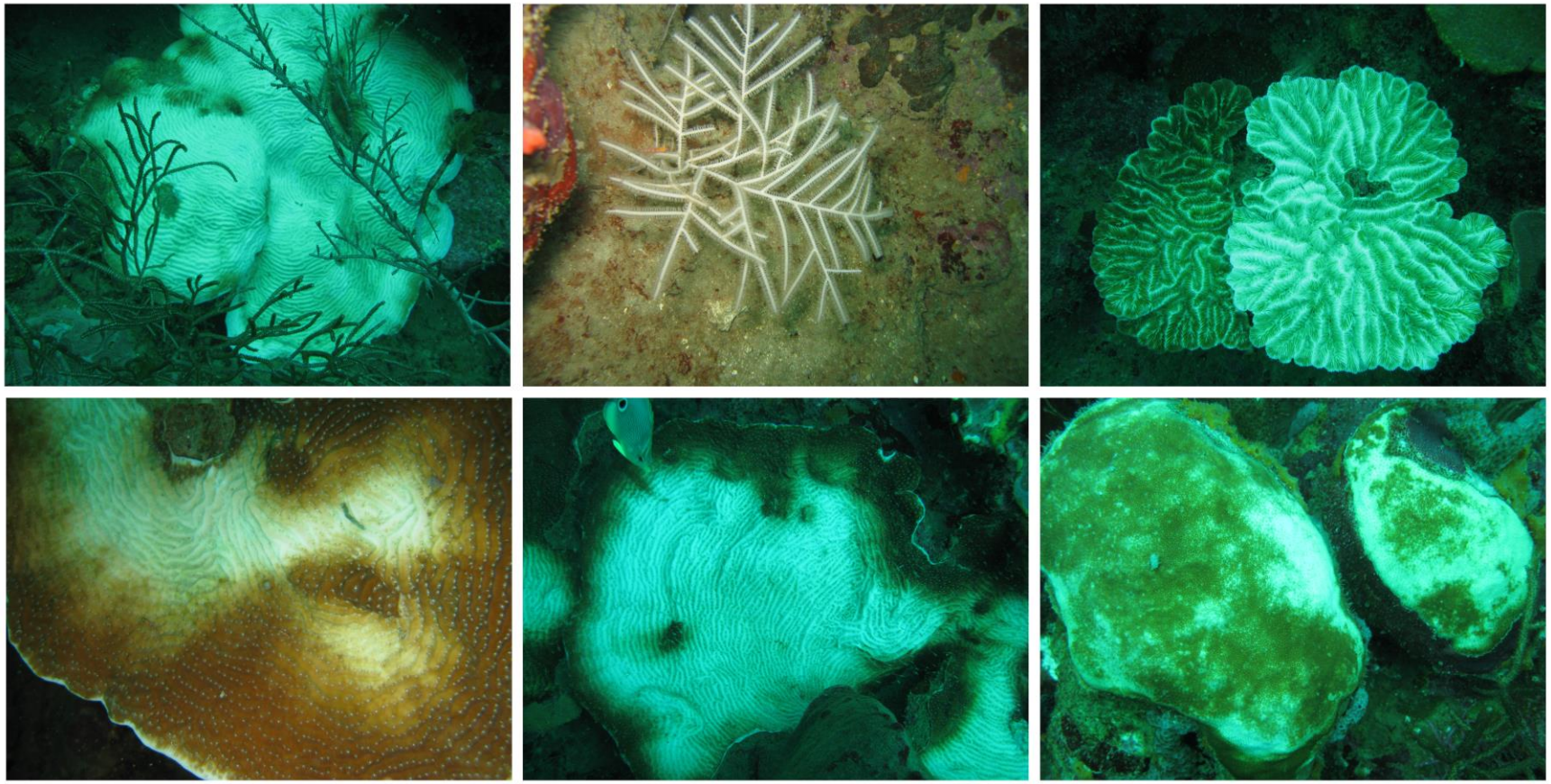
2010



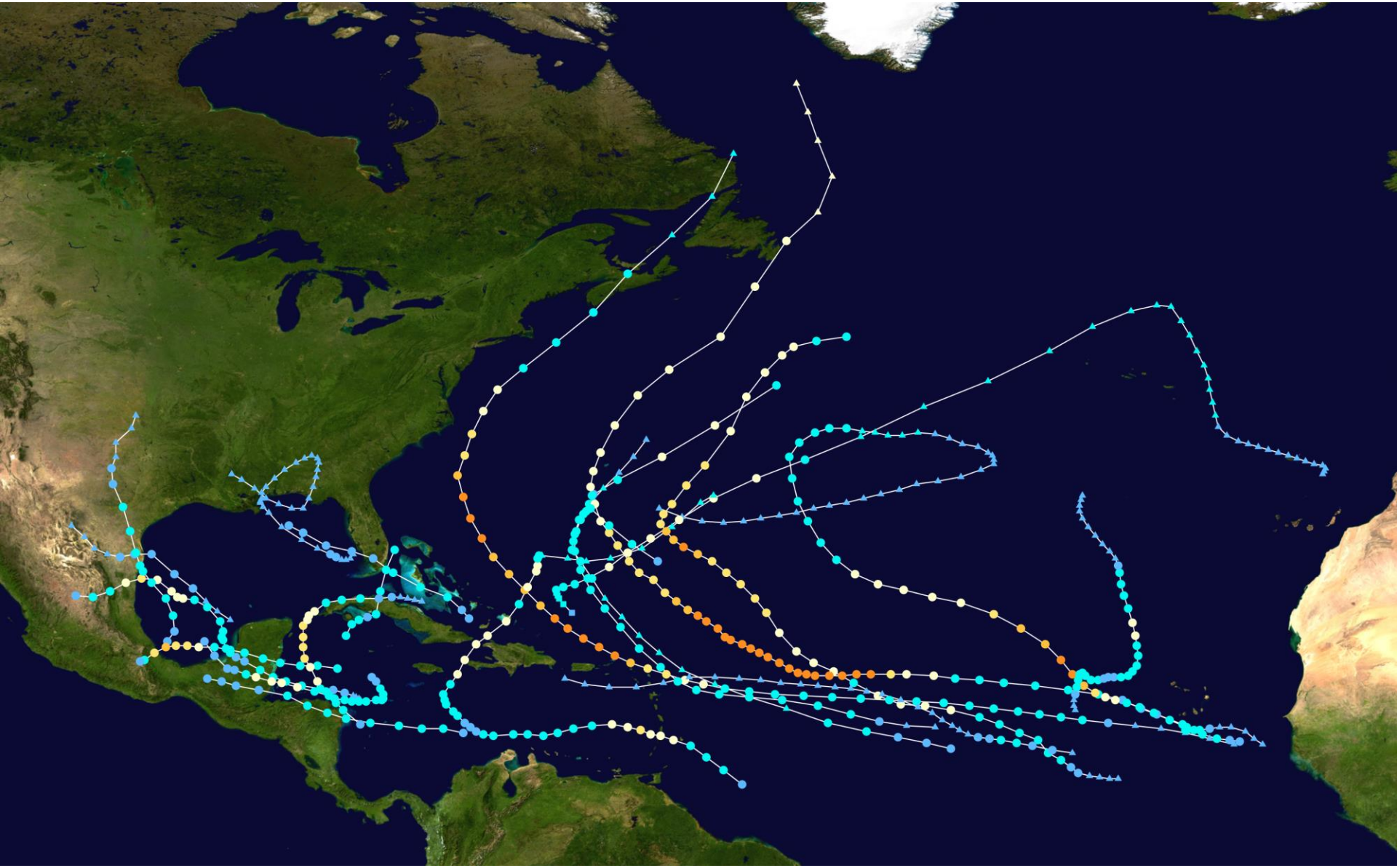
2005

Hot times. The extent of warming in the Caribbean is more devastating in 2010 than in 2005, previously the worst year for bleaching there.
Credit: NOAA

CLOSE ✕



Septiembre 30, La Montañita, isla Barú (20 – 30 m) (31˚ -32˚ C)



2010: tercer año con mayor incidencia de huracanes en el Atlántico (NOAA)

Así quedó el Instituto Terapéutico de la Conducta (INTECI) tras el desbordamiento del rió Bogotá en Chia. Carlos Ortega / CEET

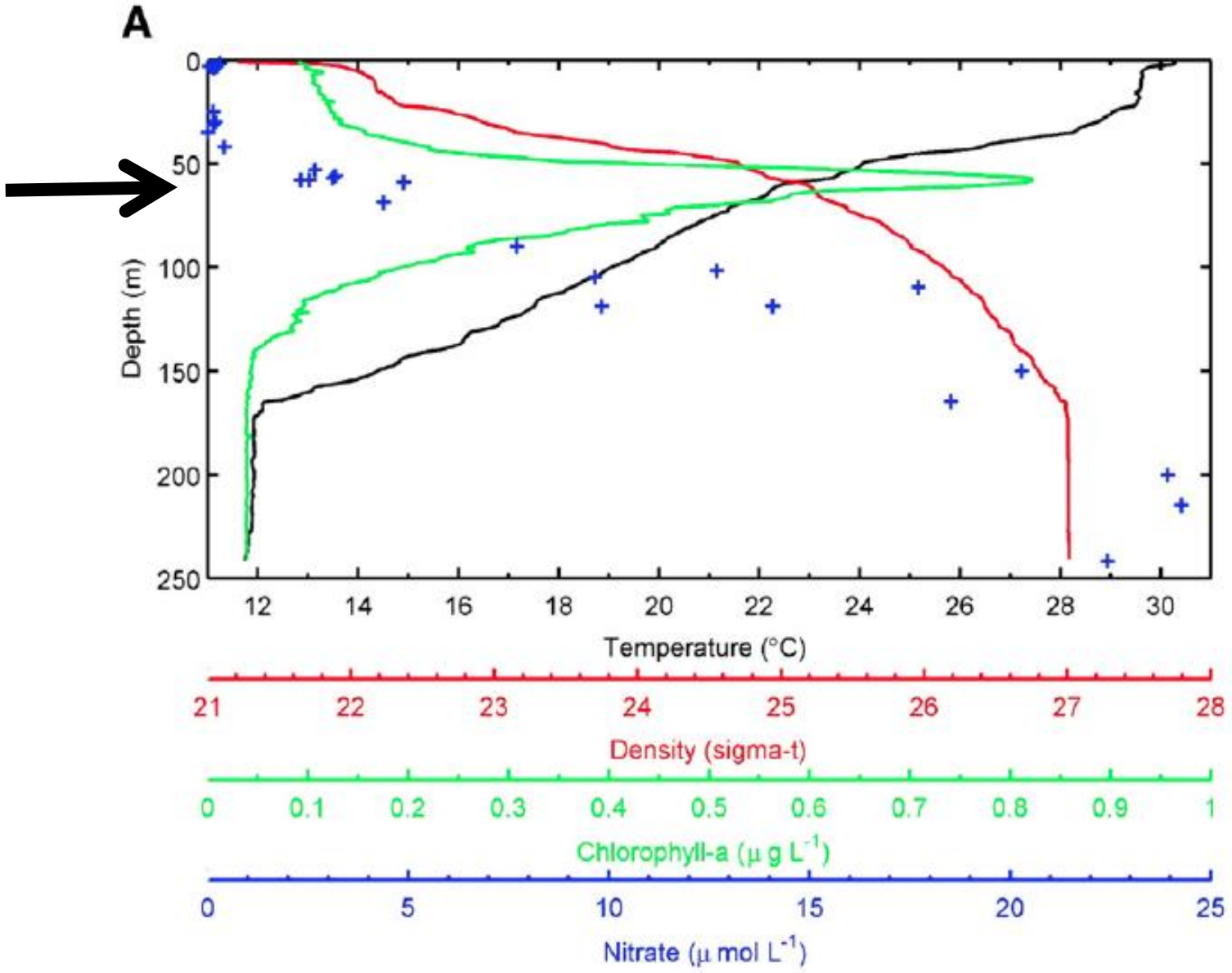
El Tiempo

Corales:
¿el canario del cambio climático?

About The Cover

COVER A diver photographs fish as she looks up the water column off Hawaii. Advances in diving technology are helping researchers to explore little-known deep reef habitats, where sunlight fades but invertebrates and fishes thrive in a complex ecosystem. Ichthyologist Richard Pyle of Hawaii's Bishop Museum is a pioneering explorer of this twilight realm. See page 900
Photo: © Richard L. Pyle

Zonas profundas del arrecife (60-150 m) se han sugerido como el refugio de los corales ante el cambio climático



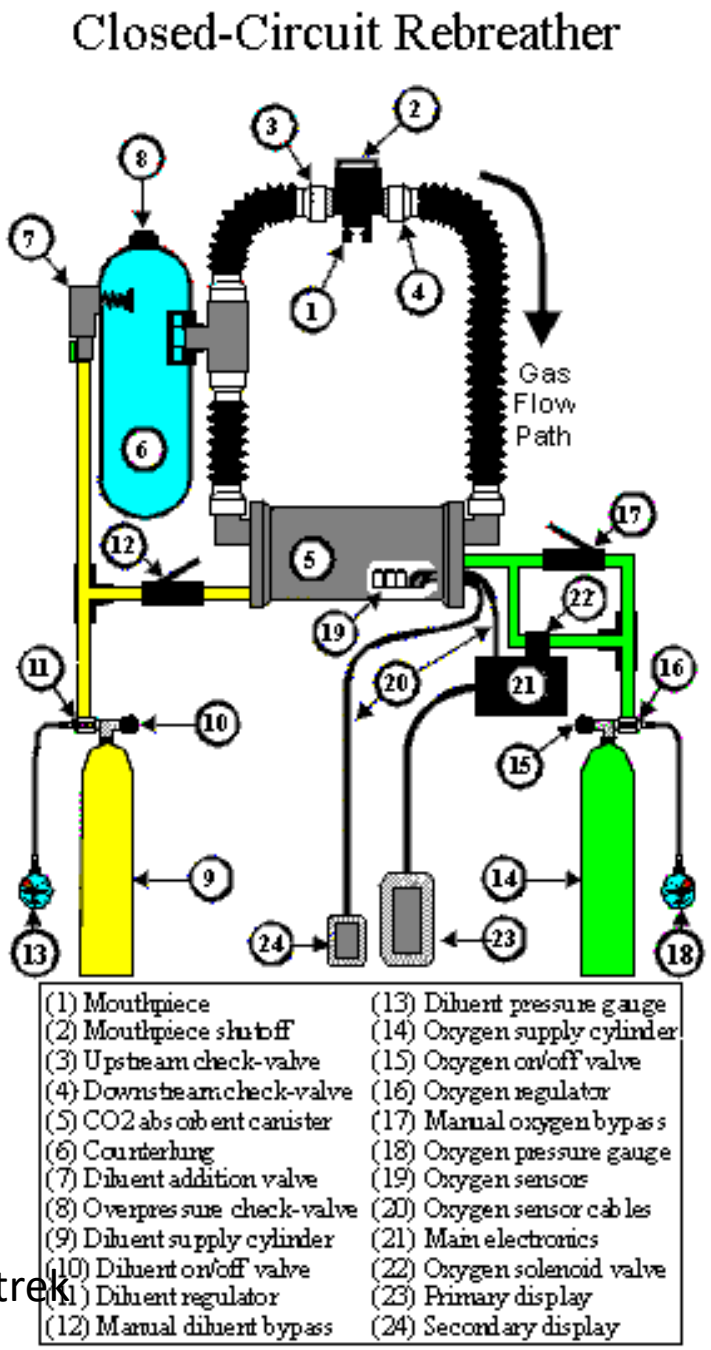
Lesser et al. (2009) *JEMBE*

Rebreather

- SODA LIME (HIDROXIDO DE SODIO + SODA CAUSTICA)
- Tanque de oxigeno puro

Figure 1-23. Loading the MkVI Discovery Cartridge Top Cap into the replacement SofnoDive® 797 cartridge

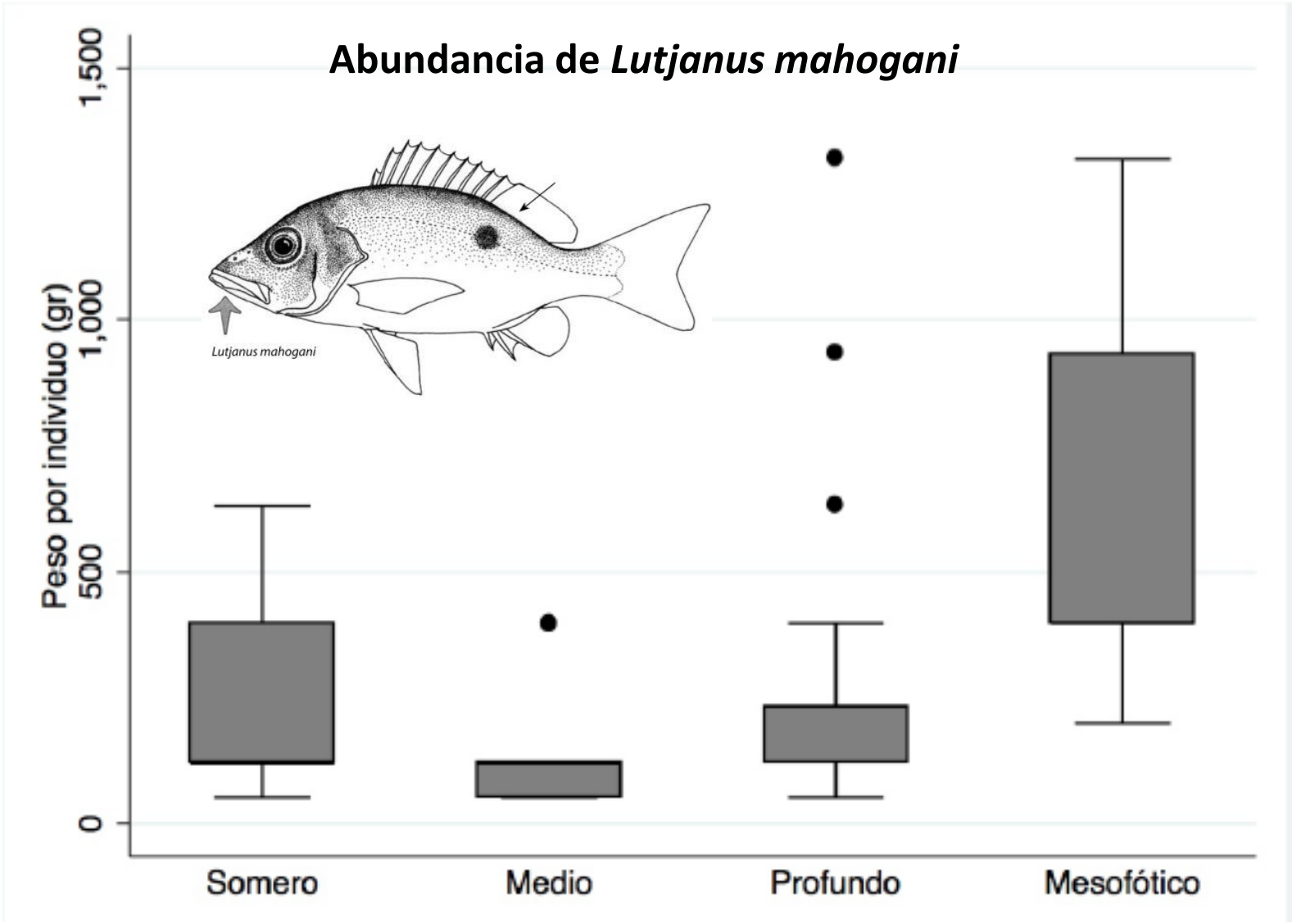
re,



http://www.bishopmuseum.org/research/treks/palautz97/rb.html

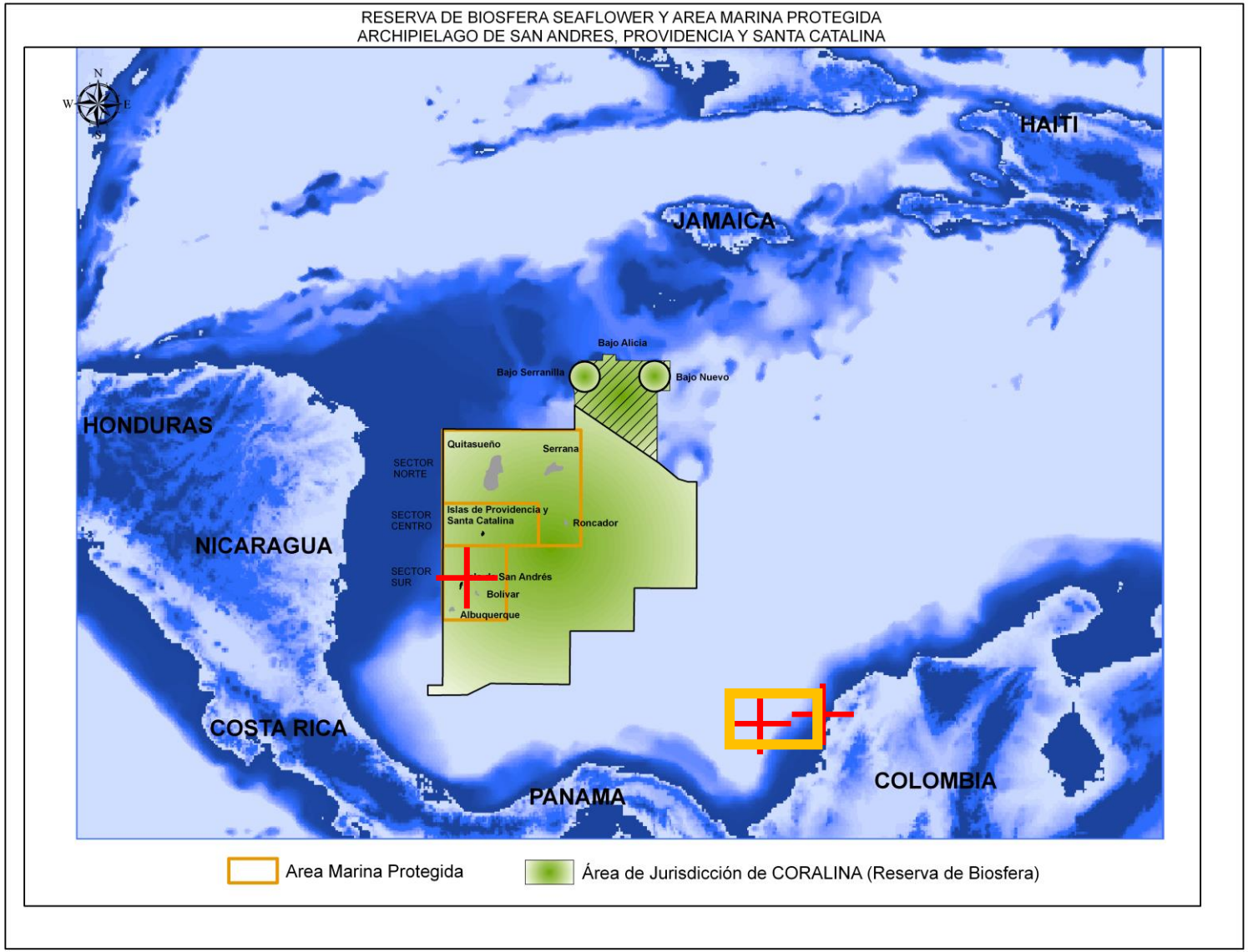

TETRADON

BUZOS CERTIFICADOS CCR, BIOMMAR, UNIANDES



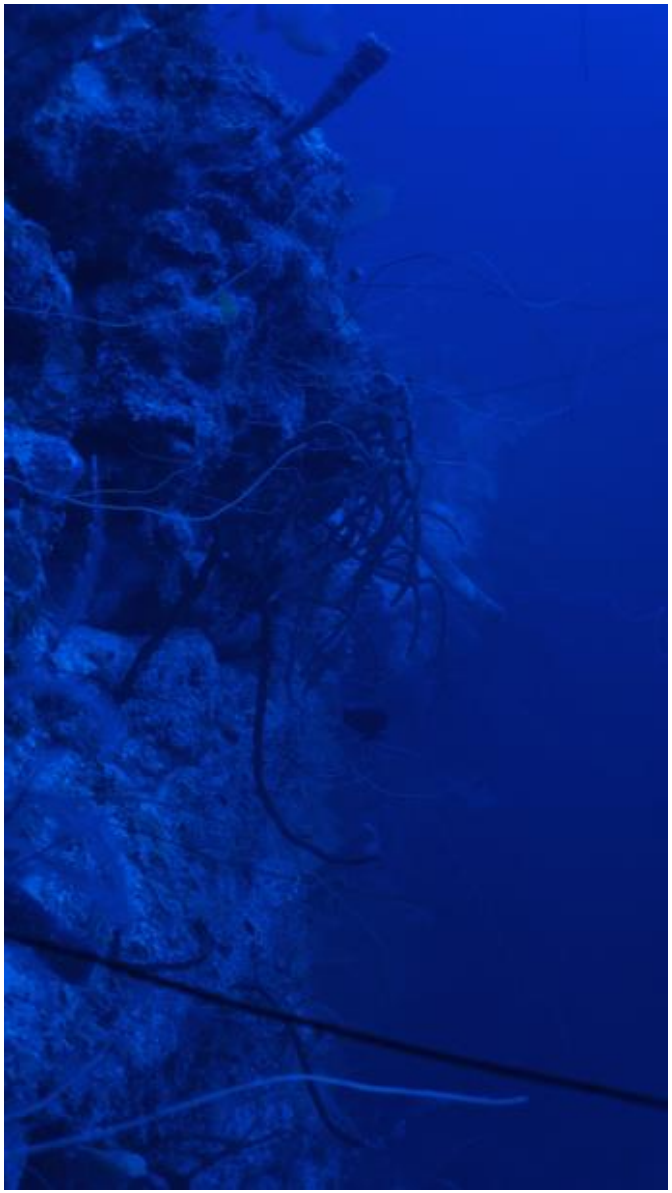
Andrade & Sánchez (en prep.)

$P<0.05$



Study Area: Three Marine Protected Areas

SeaFlower: San Andres Island, Cartagena: PNNCrP & PNNCRSB



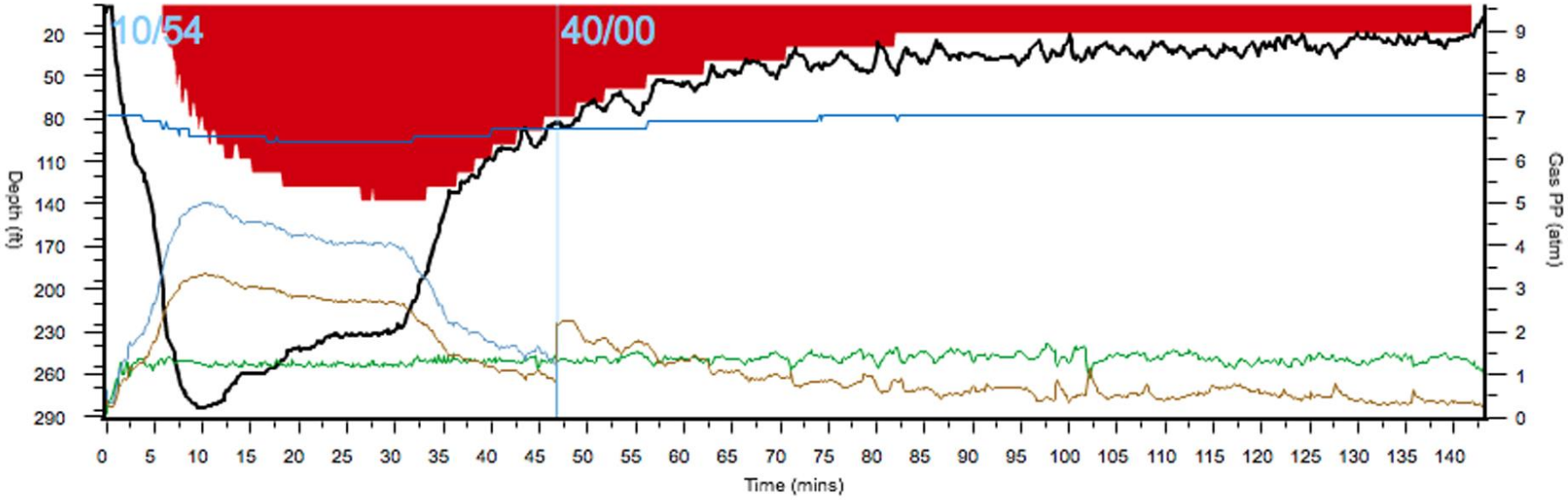
San Andrés island, pared típica con escalones a 66, 80, 90 y 115 m

Surface Interval: 4h 0m
Dive Type: CC
Battery: 1.4V to 1.3V

Total Length: 143 min
Petrel Firmware: v27

Max Depth: 285.43 ft
GF: 30 / 75

Average Depth: 87.93 ft
CNS: 0% to 106%



CCR & Trimix hipóxico (100 m)

Agaricia undata, 80 m

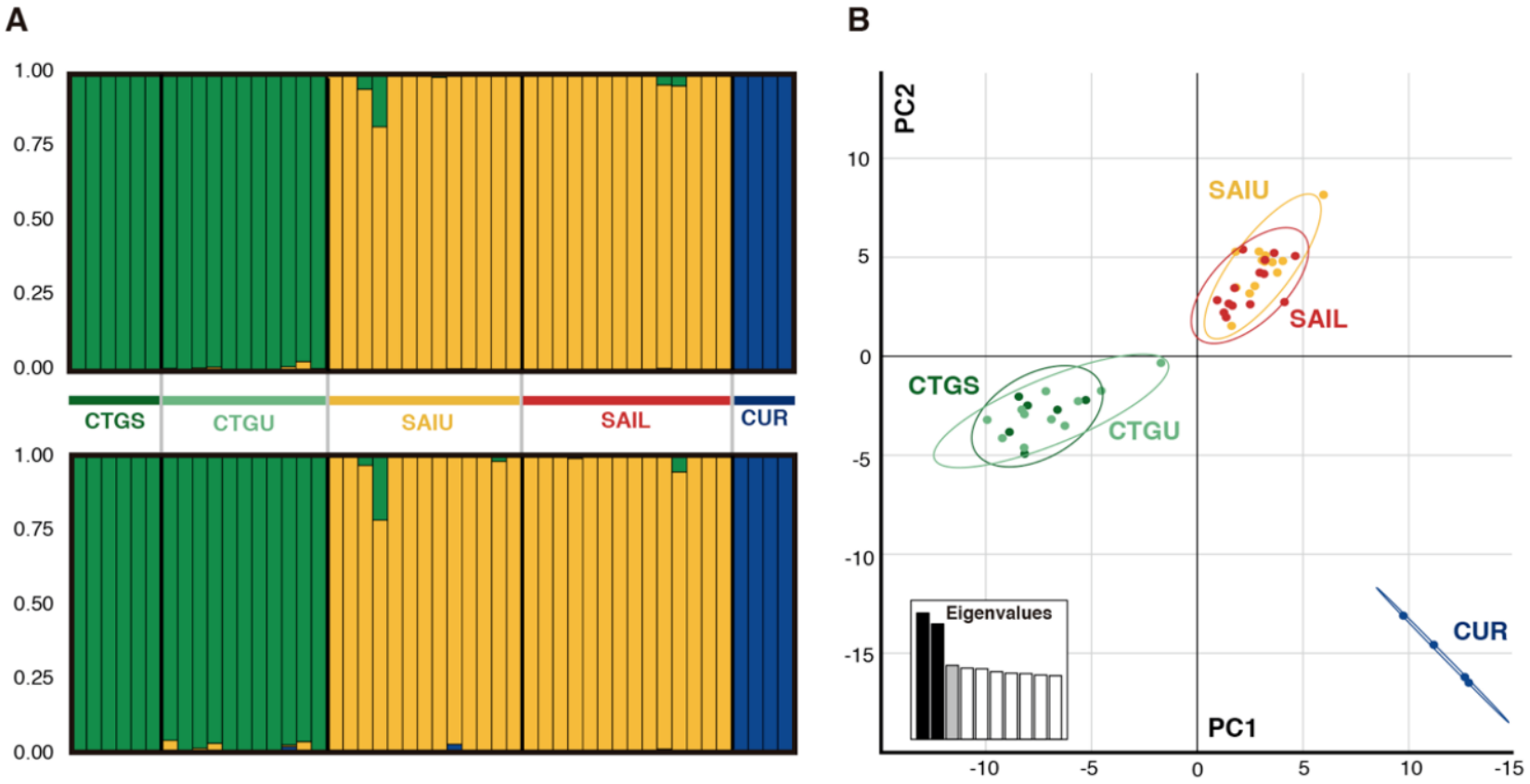


Figure 1. Genetic structure across locations and depths for the coral host *Agaricia undata*. (**A**) STRUCTURE diagrams (K= 3) for *A. undata* inferred from the all-inclusive loci (top) and "neutral" (bottom) data sets. (**B**) Principal component analysis (PCA) inferred from the overall data set, where individual samples are represented by dots and color code corresponding to the locations: CTGS (Cartagena shallow) - dark green, CTGU (Cartagena upper) – light green, SAIU (San Andrés I. upper) – yellow, SAIL (San Andrés I. lower) – red and CUR (Curaçao) – dark blue.

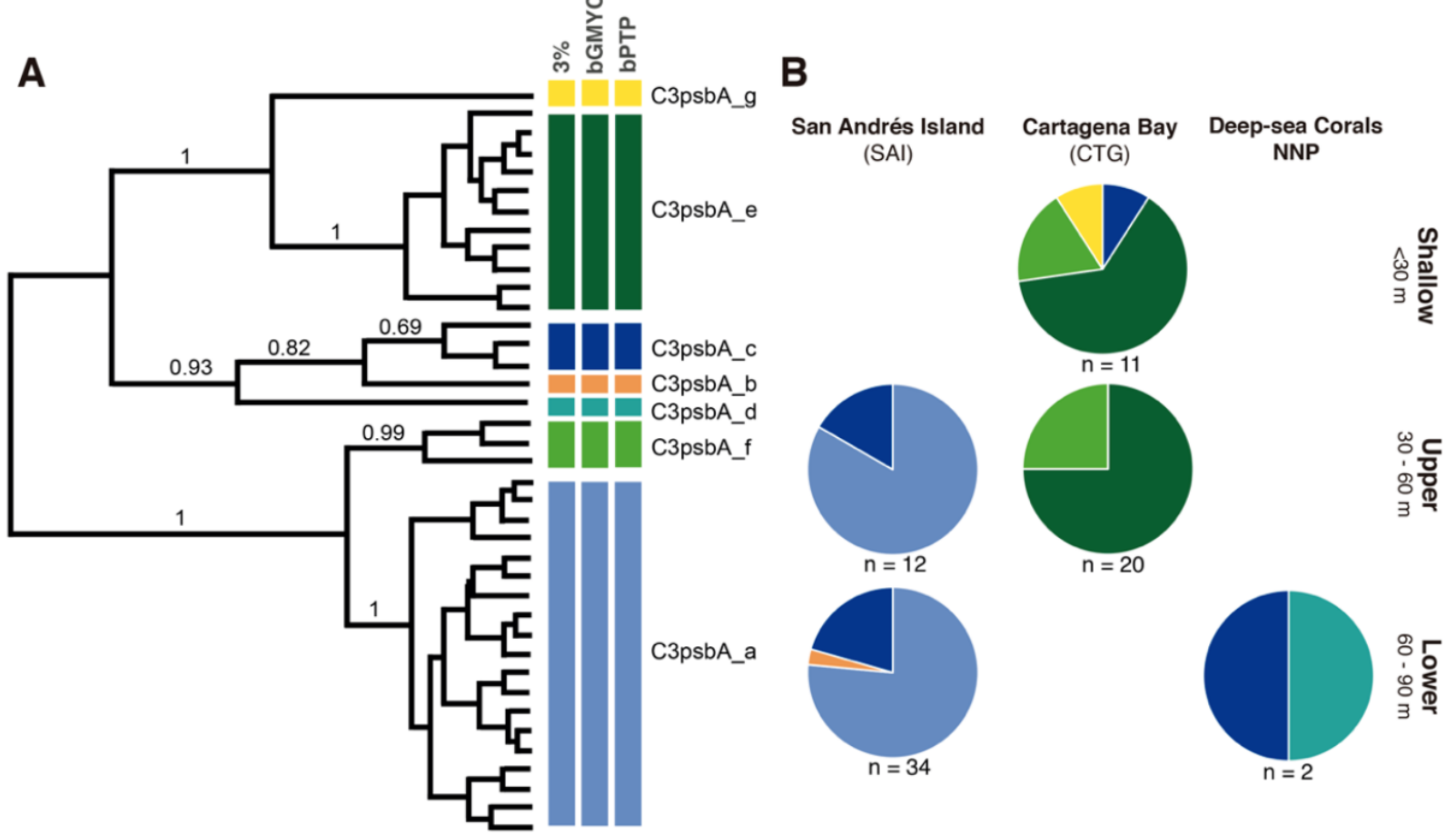


Figure 2. Genetic diversity and distribution of *Symbiodinium* OTUs in *Agaricia undata* across depths and locations. (**A**) Bayesian MCMC phylogenetic tree of *Symbiodinium* zooxanthellae OTUs based on non-coding region of the plastid minicircle *psbA*^{ncr}. Colored bars to the right of the phylogeny represent OTUs grouping based on genetic distance thresholds (3%), bGMYC and bPTP with their corresponding nomenclature. Bootstrap values are based on Bayesian analyses, with only probabilities over 60% shown (**B**) Pie charts summarizing diversity and distribution of zooxanthellae OTUs across depth range per locality, which colors correspond to the clades defined in (A).

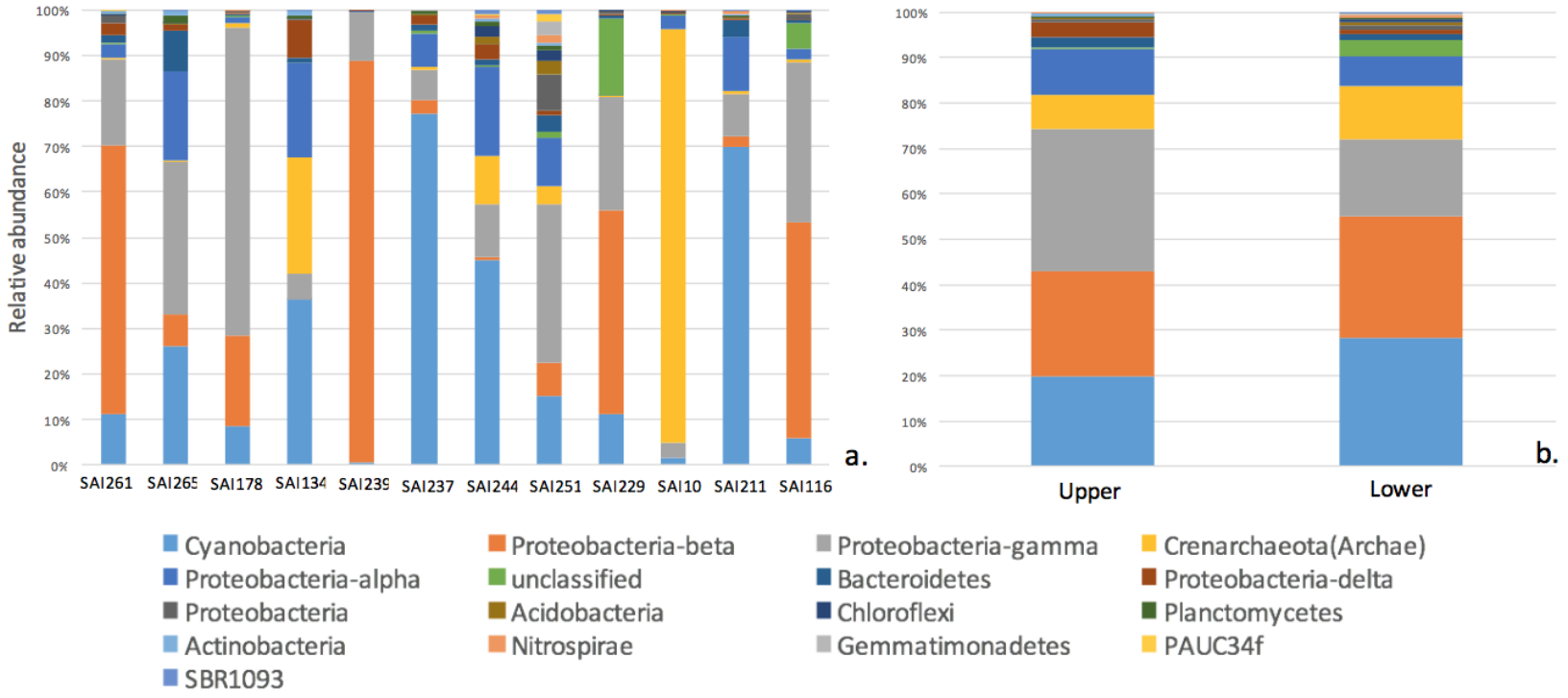


Figure S1. Relative abundance of each bacterial and archaeal phyla in a least three *A. undata* samples with an overall abundance of ≥1%. A. The first four samples were collected in the upper mesophotic zone and the rest in the lower mesophotic zone. **B**. Mean sequence abundance for upper (37-45m) and lower (60-80m) zone.

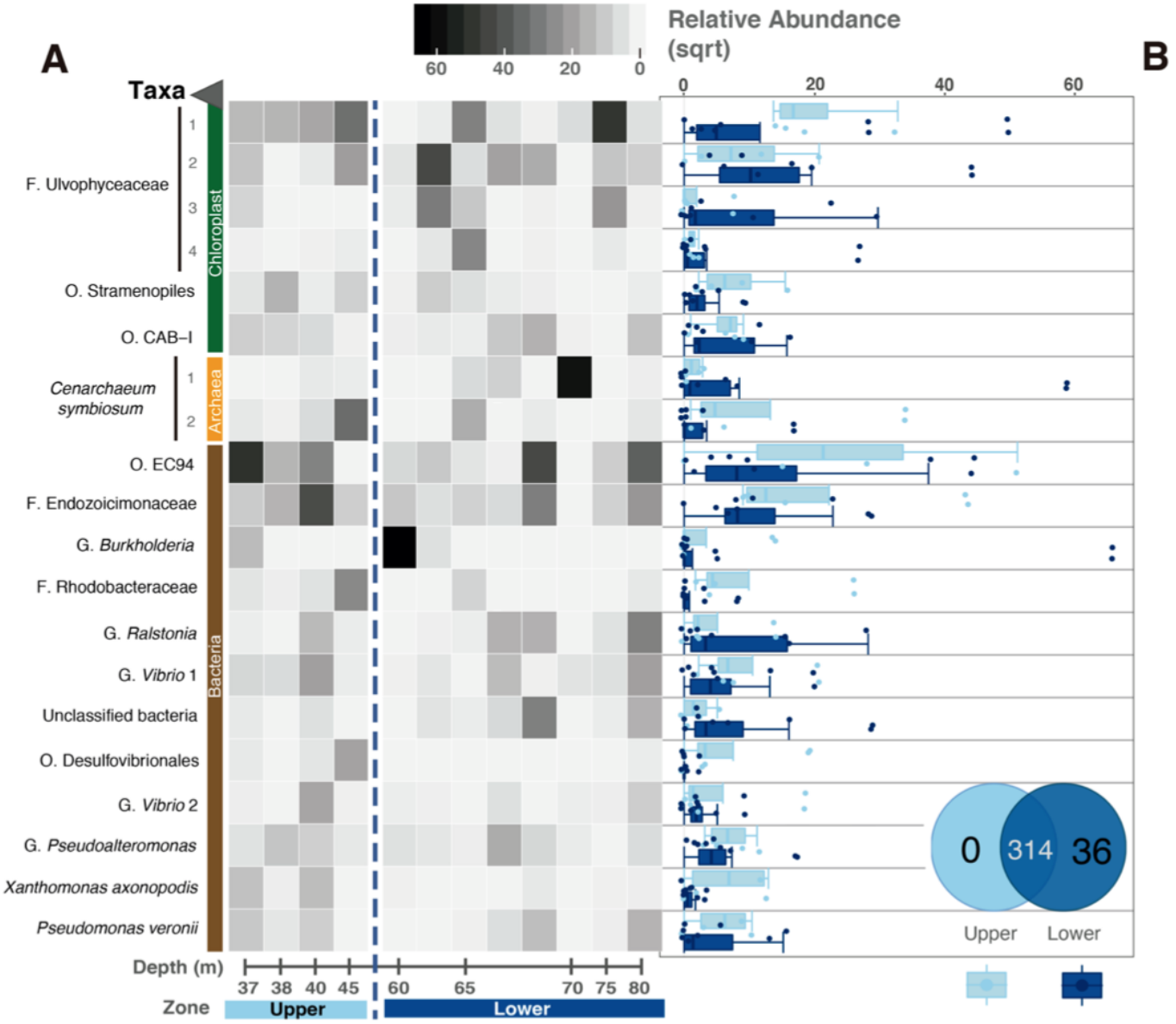


Figure 3. Distribution of relative abundances of microbial OTUs in *Agaricia undata* samples along a depth range. (**A**) Heatmap depicting the variation of microbial abundances at OTU level (y-axis) across *A. undata* colonies (x-axis) distributed along a broad bathymetric spectrum (37-80 m). Chloroplast derived sequences are clustered separately from other 16S defined OTUs (Bacteria and Archaea) and within each group OTUs are ordered from top to bottom in relation

Agaricia undata, 80 m

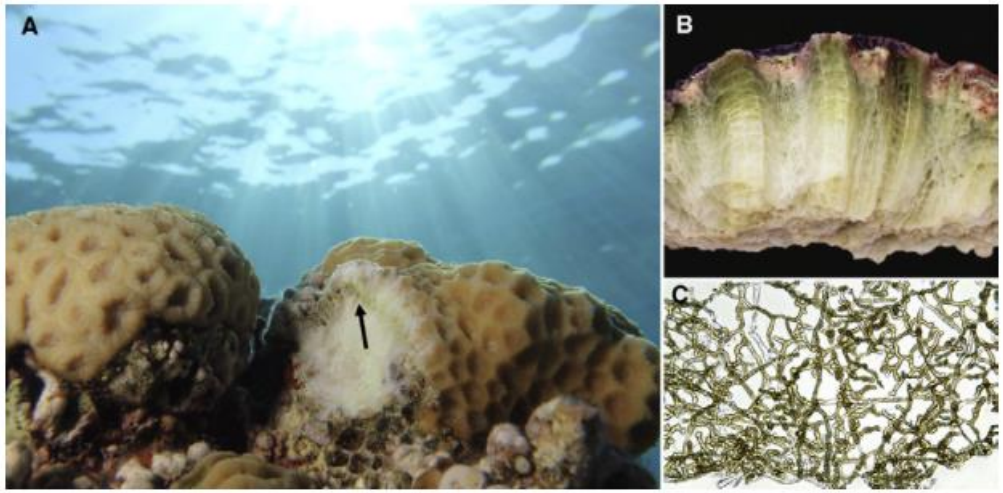
Ostreobium spp.

"light microclimate"

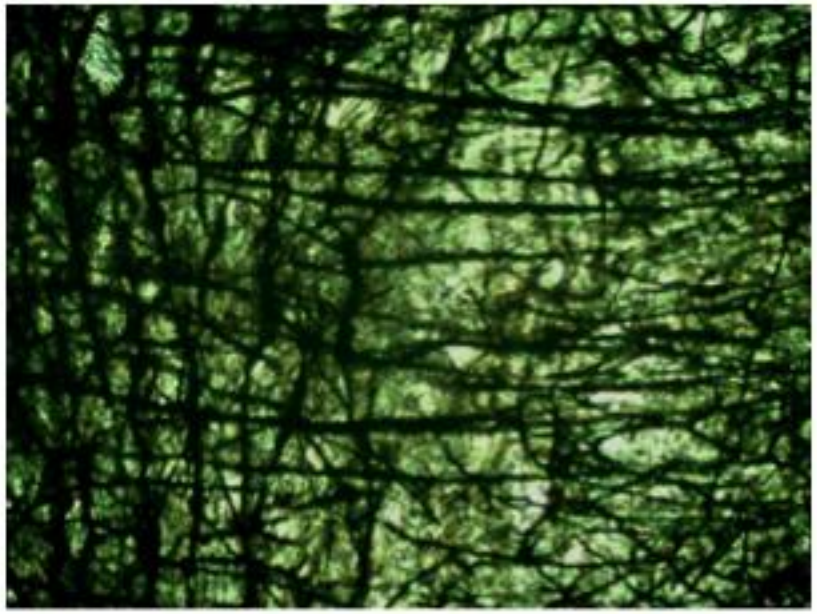
"bloom during bleaching"

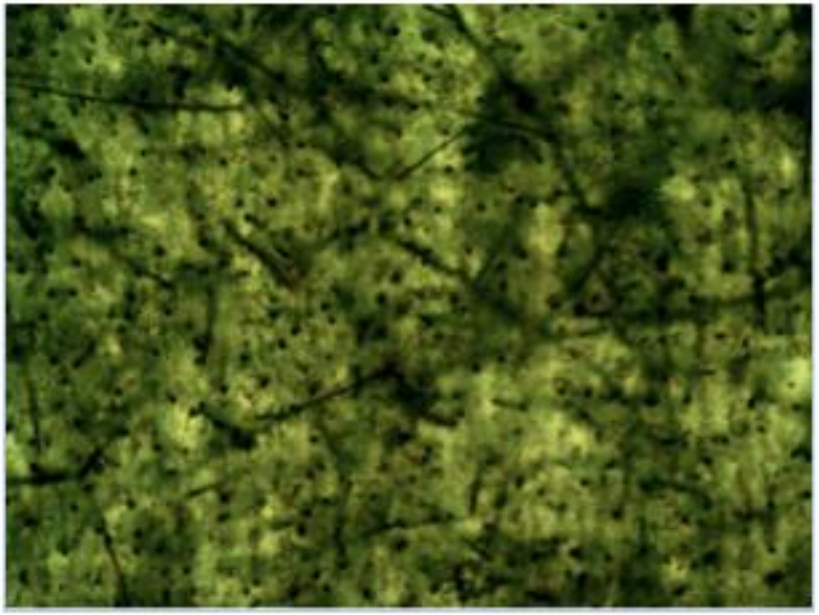
Fine et al. (2006) *Coral Reefs*, Magnusson et al. (2007) *MEPS*

Agaricia undata



Verbruggen & Tribollet (2011*) Curr. Biol.*





***Ostreobium* sp.**

Euendolithic boring green algae

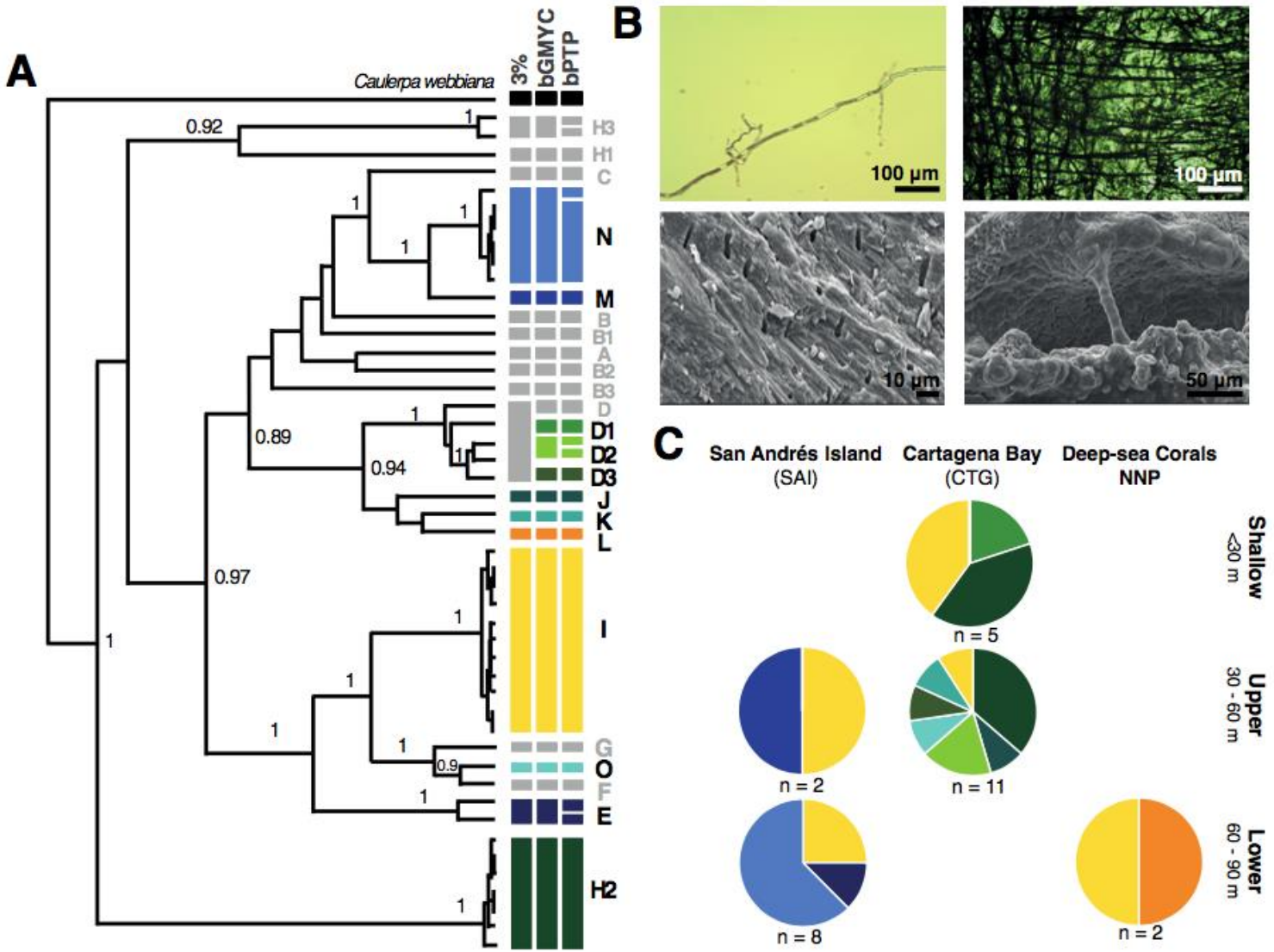
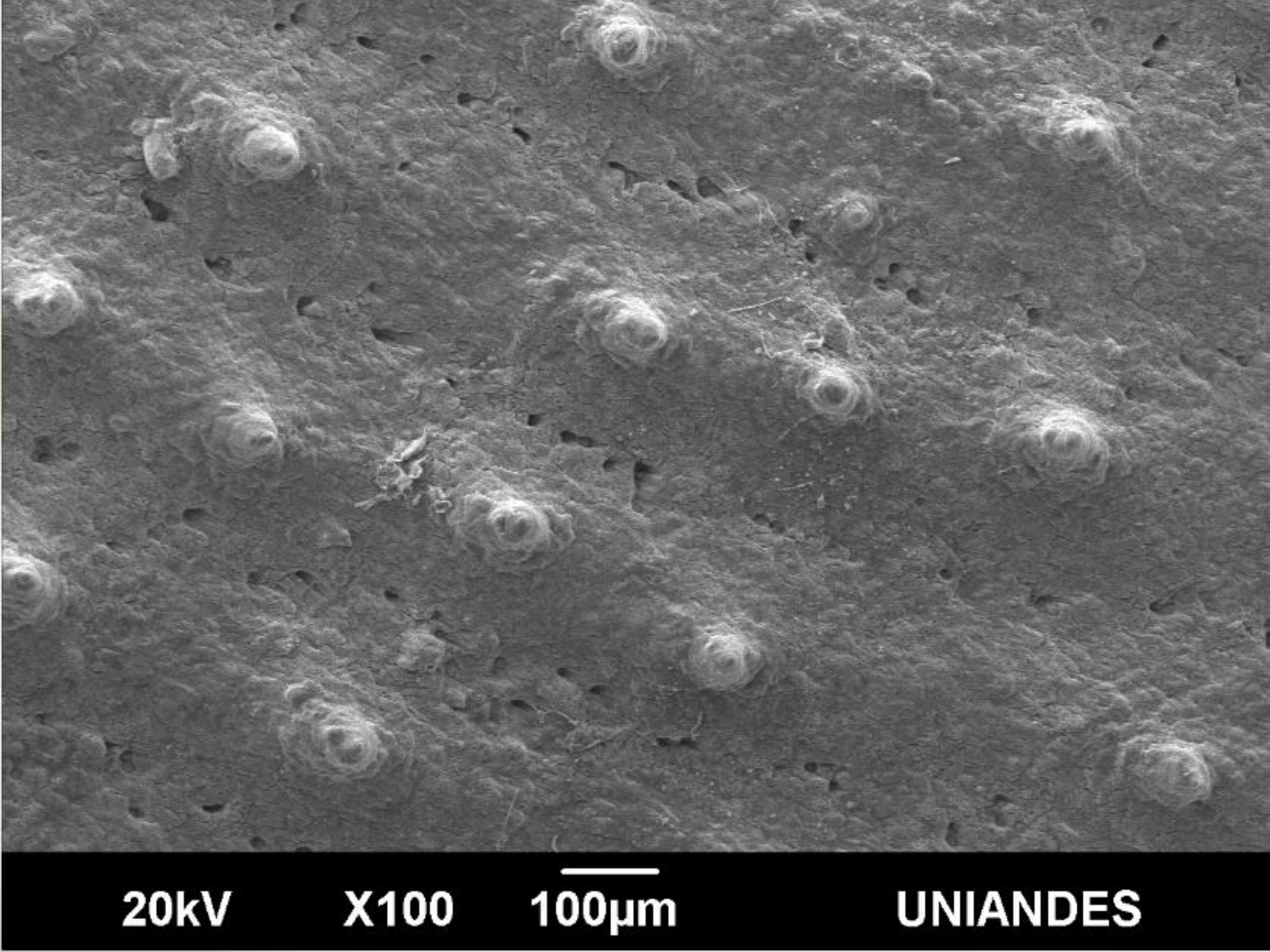
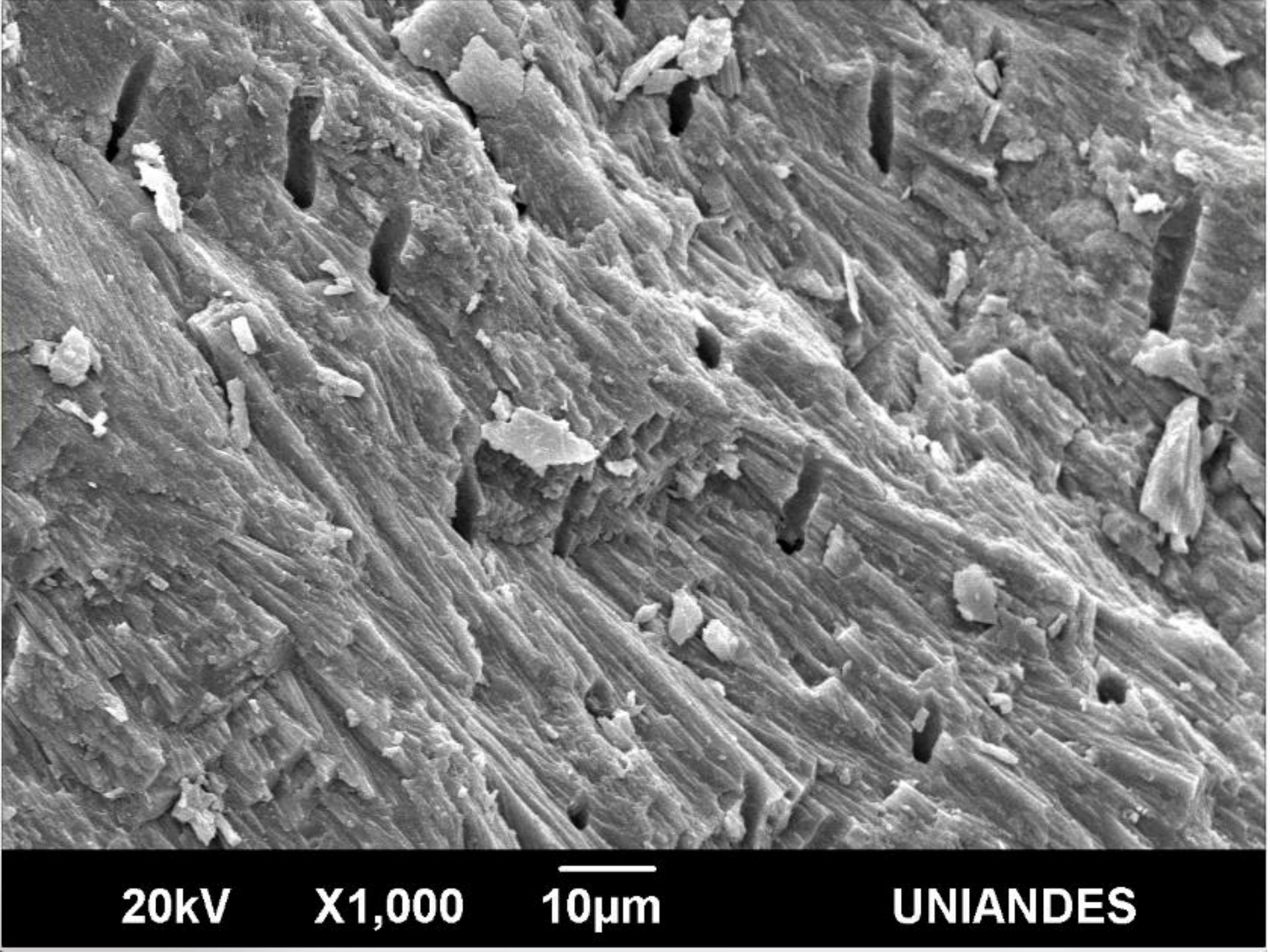
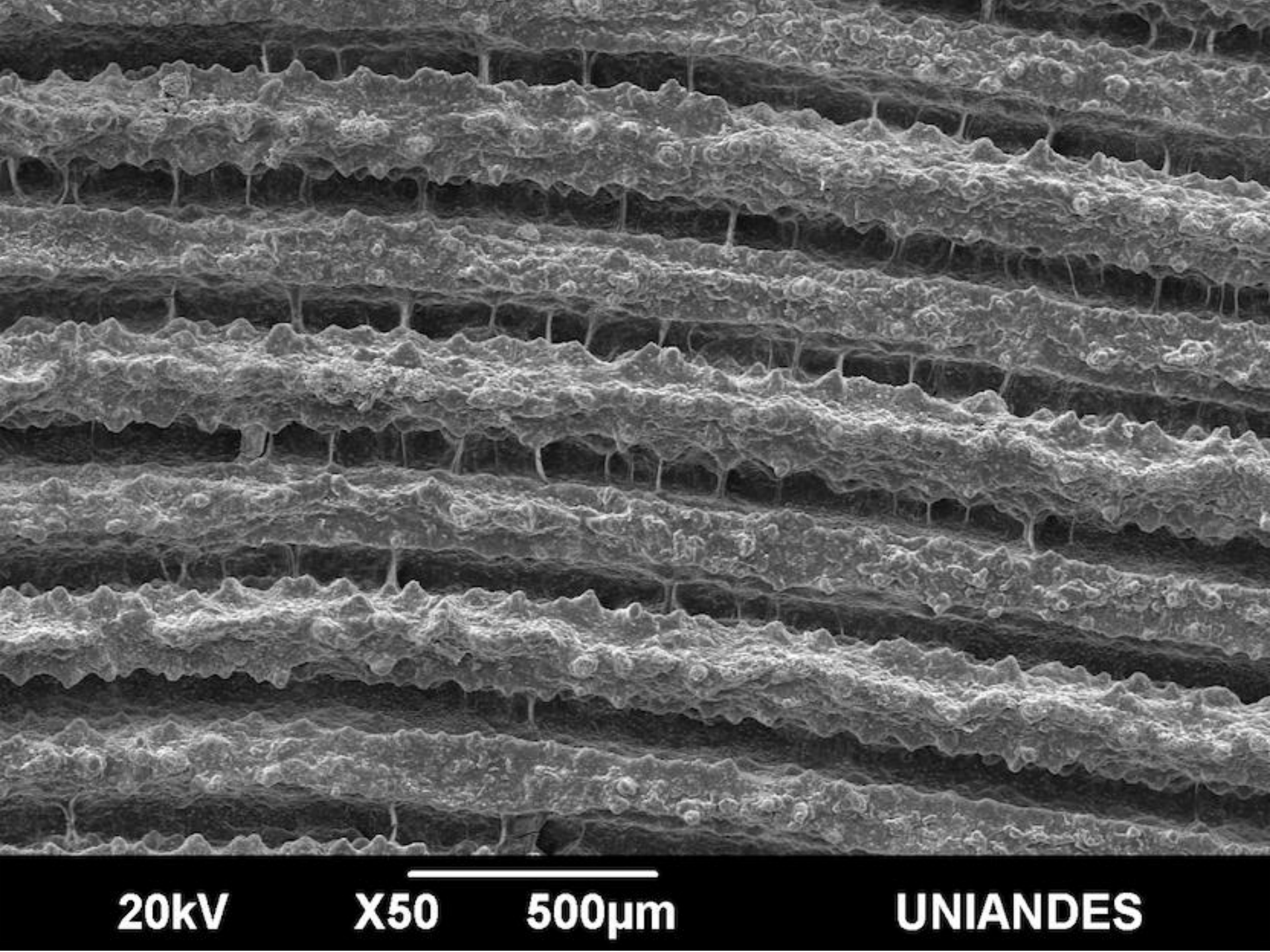
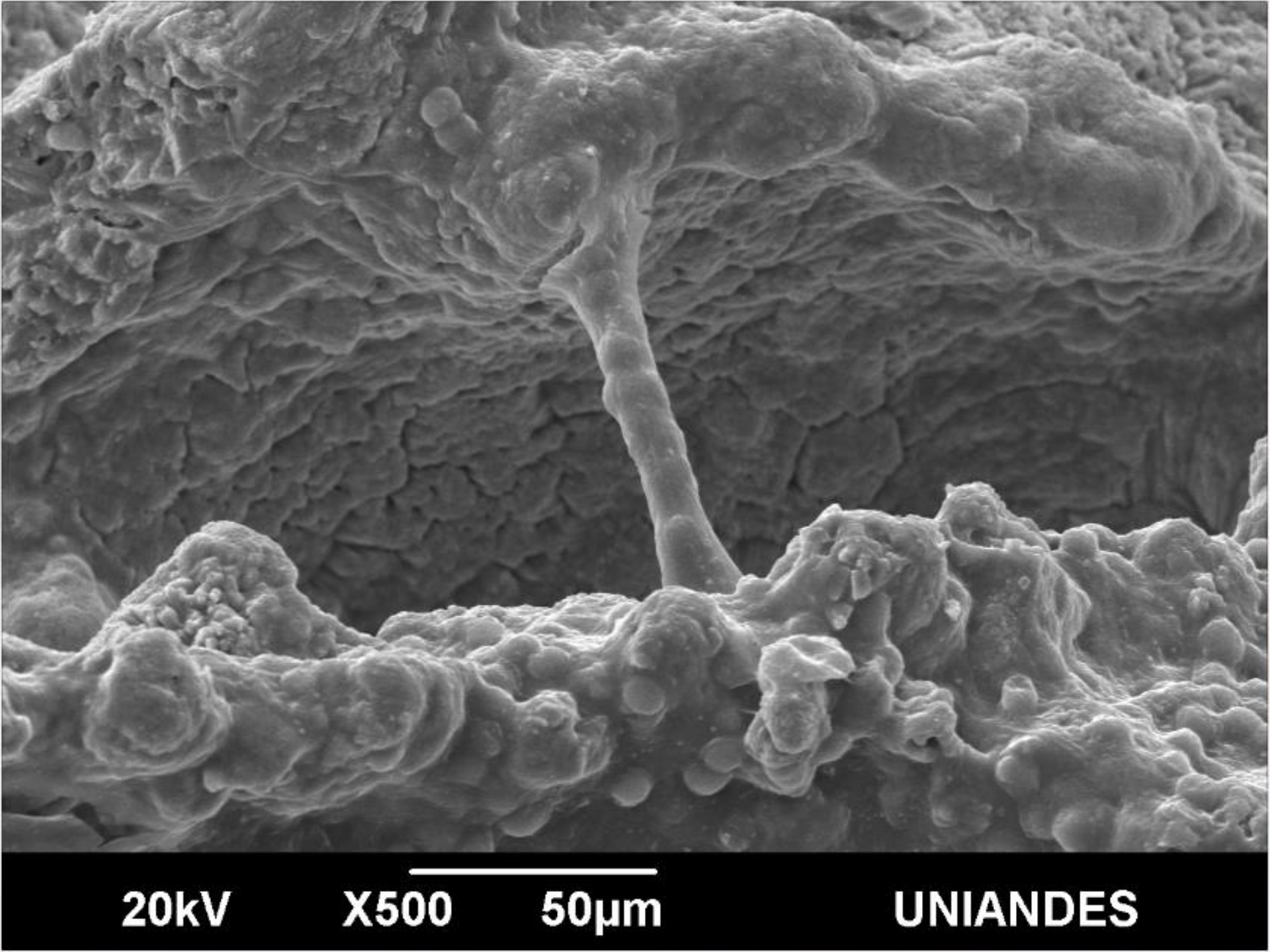


Figure 2. Genetic diversity, morphology and relative abundance of endolithic boring algae in *Agaricia undata* across depths and locations. (A) Bayesian MCMC phylogenetic tree of *Ostreobium*-like algae OTUs based on chloroplast gene *rcbL* and clades previously reported by 22. Colored bars to the


20kV
X100
100µm
UNIANDES


20kV X1,000 10µm UNIANDES


20kV
X50
500µm
UNIANDES

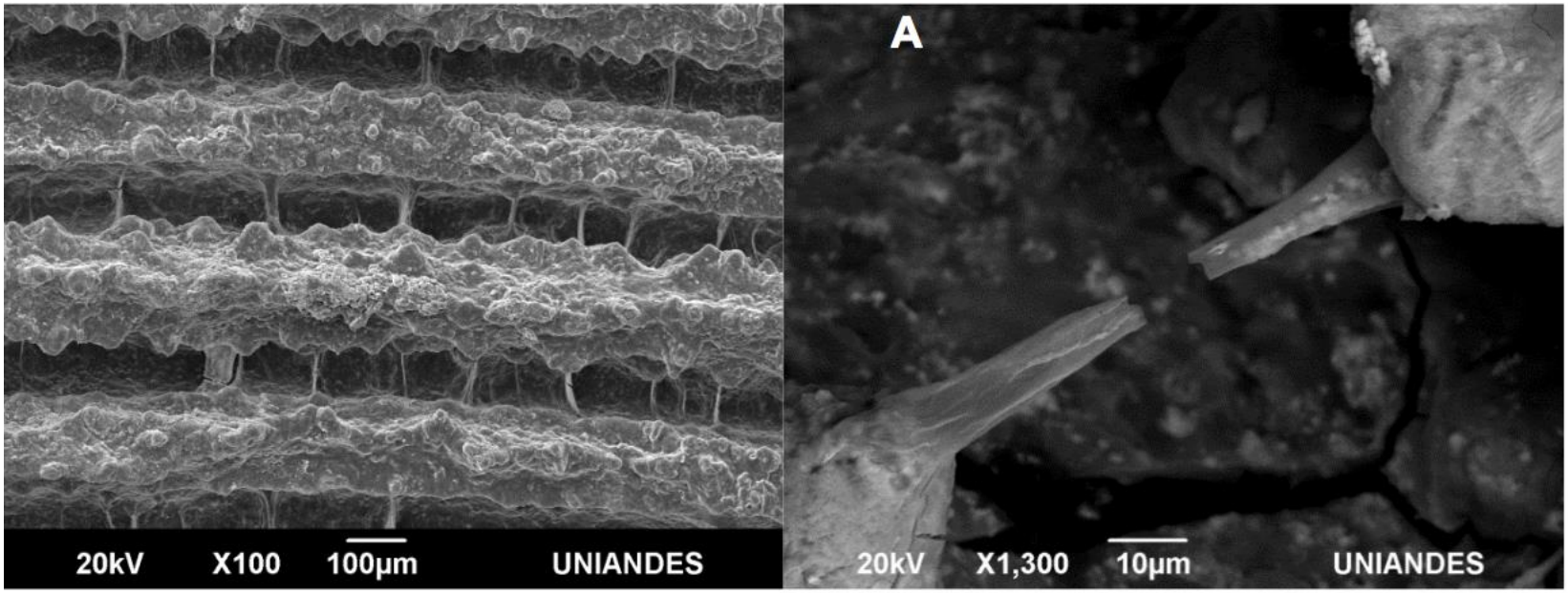

20kV
X500
50µm
UNIANDES

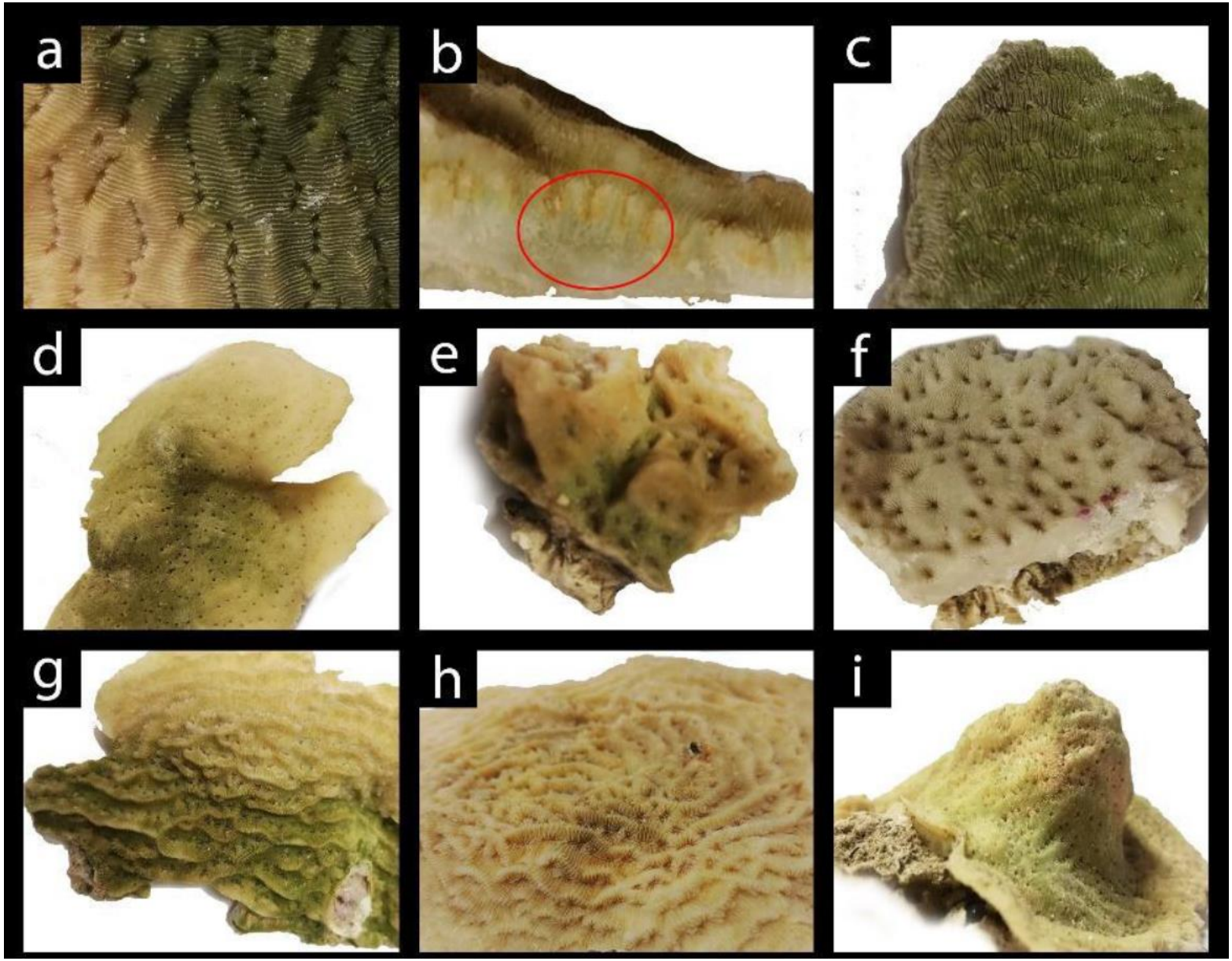
Coral Reefs
https://doi.org/10.1007/s00338-018-1695-9

NOTE

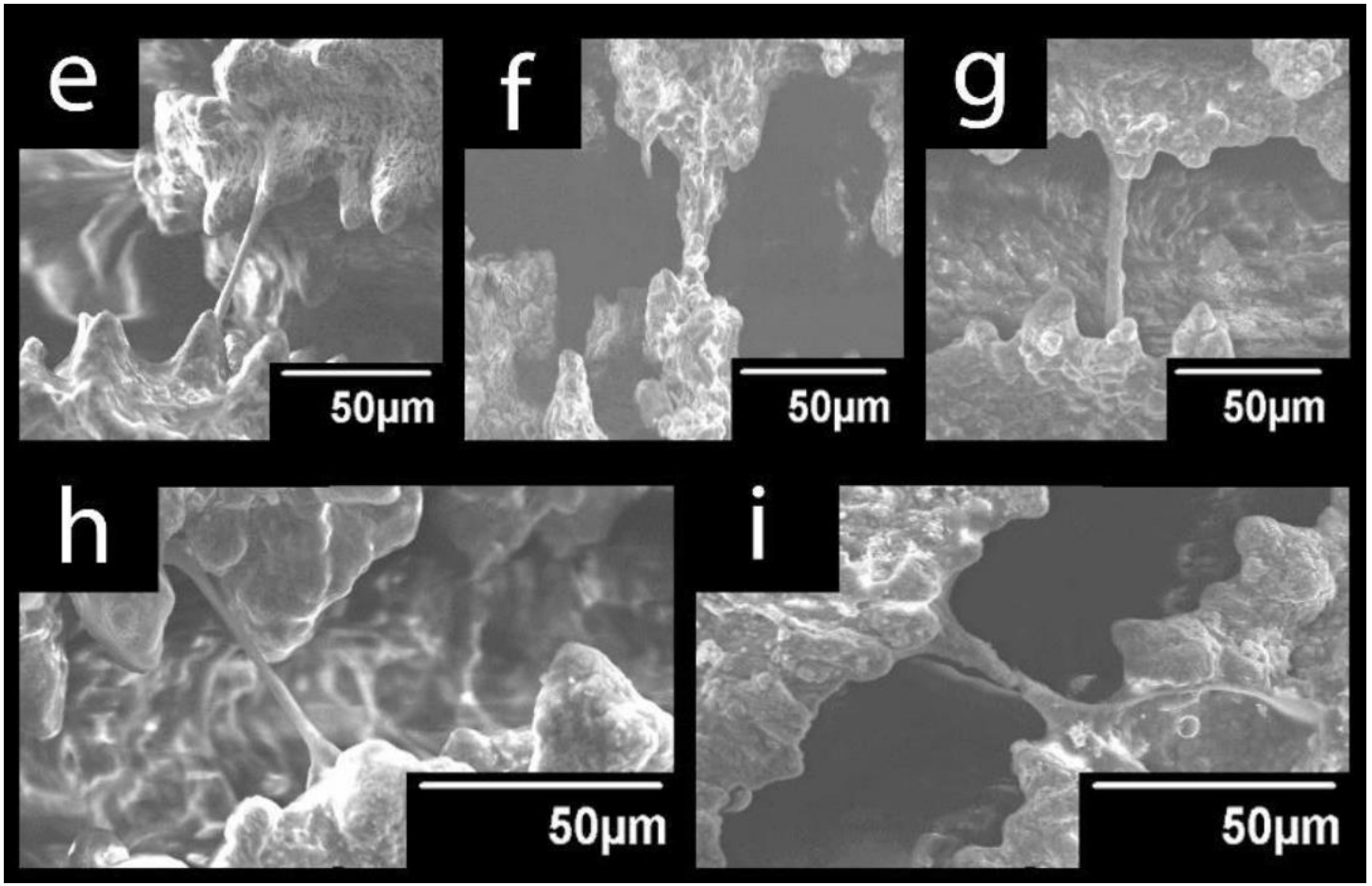
Conspicuous endolithic algal associations in a mesophotic reef-building coral

Fanny L Gonzalez-Zapata[1] · Sebastián Gómez-Osorio[1] · Juan Armando Sánchez[1]

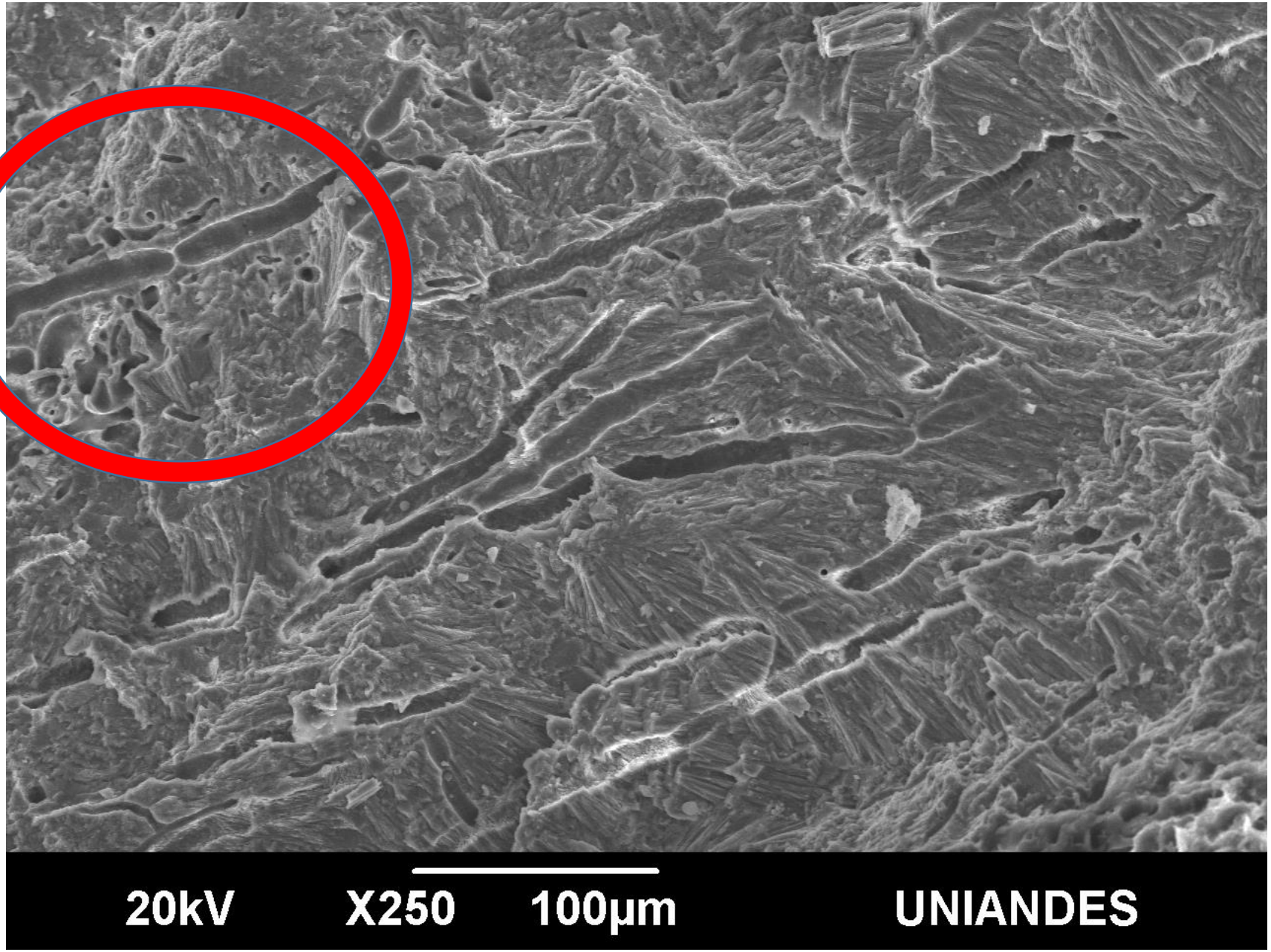




A. Murgueitio et al. (in prep)

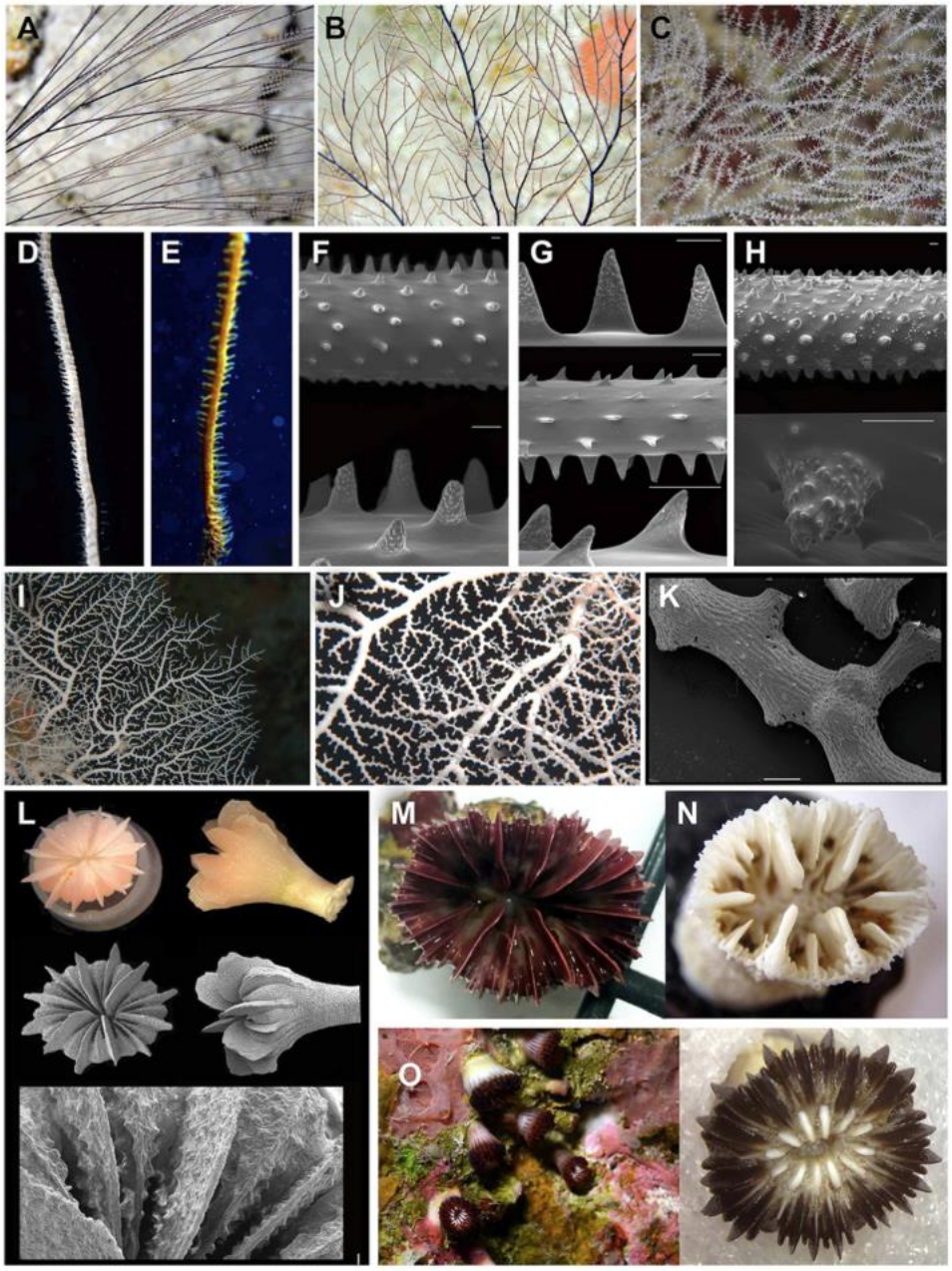


A. Murgueitio et al. (in prep)



A. Murgueitio et al. (in prep)

San Andrés island:
- 33 especies de corales Mesofóticos
- 8 corales negros,
- 1 lace coral,
- 8 corales duros
- 16 gorgonáceos
- Único arrecife del Caribe con dos especies de *Stylaster*
S. roseus & *S. Duchassangi*
- Dos posibles nuevas especies

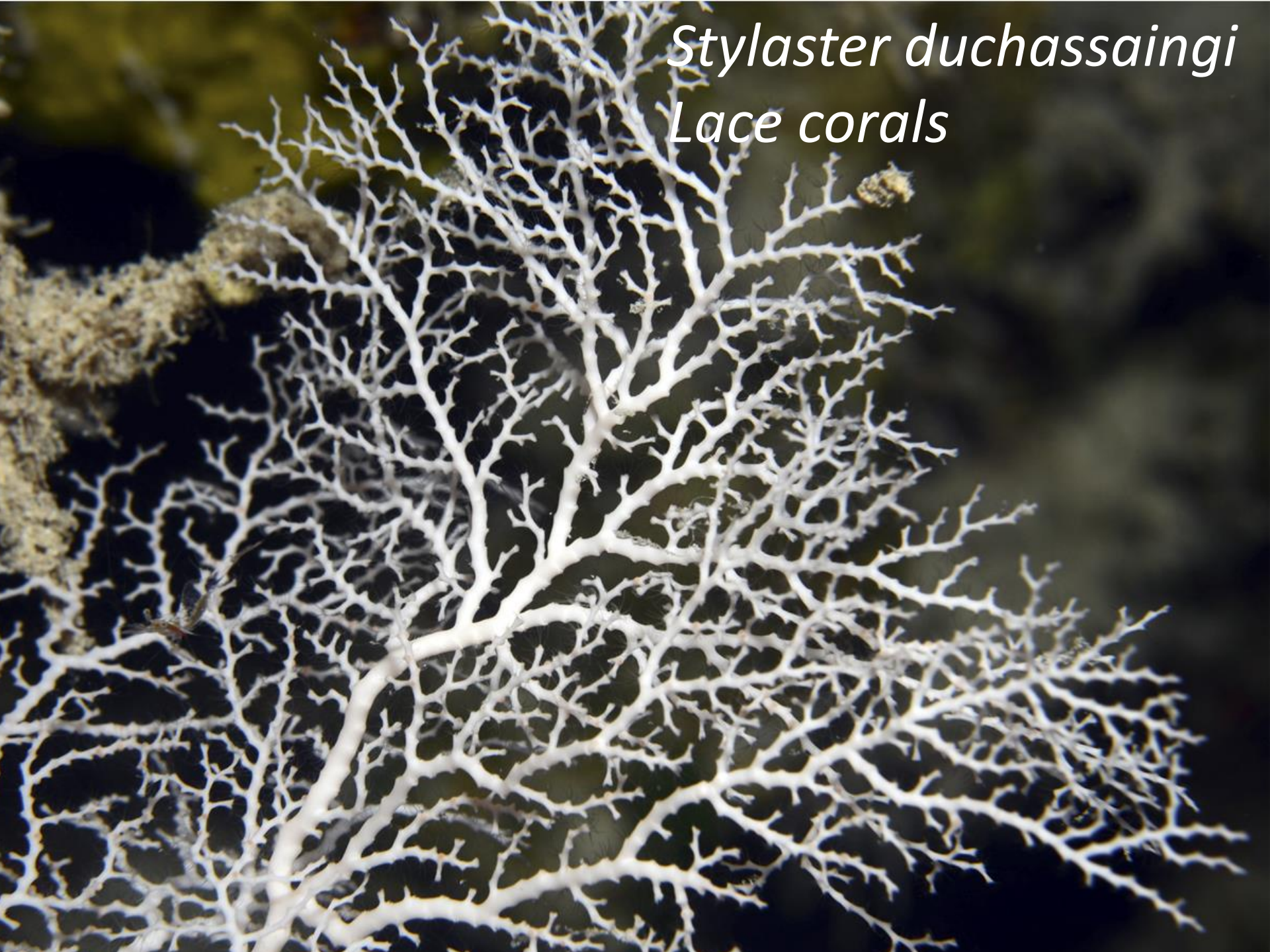


frontiers in Marine Science

DATA REPORT
published: 06 September 2019
doi: 10.3389/fmars.2019.00536

Corals in the Mesophotic Zone (40–115 m) at the Barrier Reef Complex From San Andrés Island (Southwestern Caribbean)

Juan Armando Sánchez[1], Fanny L. González-Zapata[1], Luisa F. Dueñas[2], Julio Andrade[1], Ana Lucía Pico-Vargas[1], Diana Carolina Vergara[1], Adriana Sarmiento[1] and Nacor Bolaños[3]*



Stylaster duchassaingi
Lace corals


Octocorals

“Upper Mesophotic zoxanthellate octocorals” harboring *Symbiodinium* clade B1 (ITS2)

Ellisellidae

Azooxanthellate

<u>Upper mesophotic</u> (above 60 m)

Ellisella schmitti

E. barbadensis

E. Elongata

<u>Lower mesophotic</u> (below 60 m)

N. goureaui

Nicella sp.

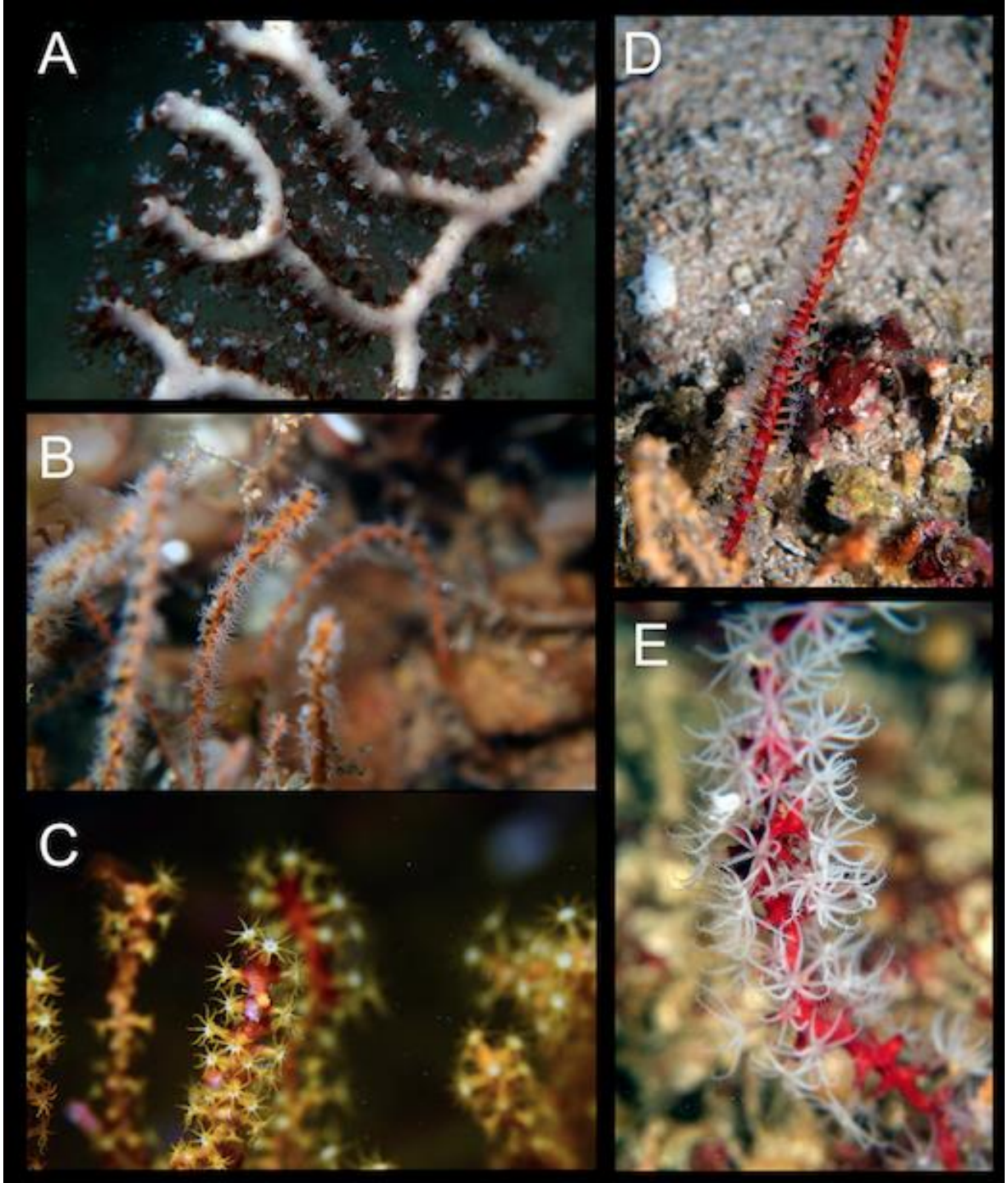
E. rosae

E. nivea

Ellisella spp.

Verrucella sp.

Miscellaneous
Iciligorgia schrammi
(30-100m)
***Leptogorgia* spp.**
(40-80m)
***Muricea* sp. (aposymbiotic)**
(70-80 m)



Plexauridae
Azooxanthellate
<u>Lower mesophotic</u>
(below 60 m)
***Thesea* spp.**
Swiftia
Caliacis nutans
Villogorgia nigrescens
Bebryce

Agradecimientos

- Buzos profesionales: Julio Andrade, Nacor Bolaños, Oscar Ruiz, Fabian García (Bluelife), Biommar students
- CORALINA (Nacor Bolaños & Erick Castro), Gobernación San Andrés, Providencia y Santa Catalina (Convenios 13-14 & 20-15)
- Gregg Stanton (Wakulla dive center)
- COLCIENCIAS - Vicerrectoría de Investigaciones, UniAndes

biommar
Biología molecular marina

COLCIENCIAS
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Thanks
Gracias