

# ANA M. PALACIO-CASTRO

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## EDUCATION

- Ph. D** in Marine Biology and Ecology (2019) University of Miami, RSMAS (USA). Dissertation: *Abiotic Controls on Endosymbiotic Algal Communities and Their Implications for Coral Bleaching Susceptibility and Recovery*. Award of academic merit.
- B.S.** in Biology (2010) Universidad de Antioquia (Colombia). **Thesis:** *Comparison of methods for monitoring sessile benthic communities in “La Azufrada”, coral reef, Gorgona Island National Natural Park*. 75 pp.
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## RESEARCH INTEREST

I am an Assistant Scientist at the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) and NOAA’s Atlantic Oceanographic and Meteorological Laboratory (AOML). My focus of research has been how ocean warming, acidification, diseases, and land-based sources of pollution affect corals and disrupt the coral-algal symbiosis, causing coral bleaching and mortality. I also investigate environmental and genetic factors that enhance coral resilience in the face of multiple stressors and rapid environmental changes. I use a combination of field data, controlled laboratory experiments and molecular techniques to understand corals’ susceptibility and tolerance to these stressors.

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## PROFESSIONAL EXPERIENCE

<b>Assistant Scientist</b> – UM-CIMAS, NOAA-AOML	2023-current
<b>Postdoctoral Researcher</b> – UM-CIMAS, NOAA-AOML	2022-2023
<b>Postdoctoral Fellow</b> - National Research Council	2019-2021
<b>Graduate Research Assistant</b> – University of Miami (UM) - RSMAS	2013-2018
<b>Research Assistant</b> – Universidad del Valle	2011-2012
<b>Research Assistant</b> – Universidad de Antioquia	2010-2011

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## PUBLICATIONS

### Refereed Journal Articles

- Serrano X, Rosales S, Miller M, **Palacio-Castro AM**, Williamson O, Gomez A, Baker A. Sediment source and dose influence the larval performance of the threatened coral *Orbicella faveolata*. Accepted to PlosOne.
- Webb AE, **Palacio-Castro AM**, Cooke K, Eaton KR, Chomitz B, Soderberg N, Chakraborty M, Zagon Z, Boyd A, Kiel PM, DeMerlis A, Perry CT, Enochs IC (2024) Rubble persistence under ocean acidification threatened by accelerated bioerosion and lower-density coral skeletons. *Glob Change Biol* 30 (6) doi: 10.1111/gcb.17371
- Enochs IC, Soderberg N, **Palacio-Castro AM**, and Eaton K (2024) Sequential Treatment Application Robot (STAR) for high-replication marine experimentation. *HardwareX*. doi: 10.1016/j.ohx.2024.e00524
- Palacio-Castro AM**, Enochs IC, Besemer N, Boyd A, Jankulak M, Kołodziej G, Hirsh HK, Webb AE, Towle EK, Kelble K, Smith I, Manzello DP (2023) Coral Reef Carbonate Chemistry Reveals Interannual, Seasonal, and Spatial Impacts on Ocean Acidification Off Florida. *GBC*. doi: 10.1029/2023GB007789
- Connelly MT, Snyder GA, **Palacio-Castro AM**, PR Gillette, AC Baker, N Traylor-Knowles (2023) Antibiotics reduce *Pocillopora* coral-associated bacteria diversity, decrease holobiont oxygen consumption, and activate immune gene expression. *Molecular Ecology*. doi: 10.1111/mec.17049

6. **Palacio-Castro AM**, Smith TB, Snyder GA, Brandtneris V, van Hooidonk R, Maté JL, Manzello D, Glynn PW, Fong P, Baker AC (2023). Increased dominance of heat-tolerant symbionts create resilient coral reefs in near-term ocean warming. *PNAS* doi:10.1073/pnas.2202388120
7. Johnston MA, Studivan MS, Enochs IC, Correa AMS, Besemer N, Eckert RJ, Edwards K, Hannum R, Hu X, Nuttall M, O'Connell K, **Palacio-Castro AM**, Schmahl GP, Sturm AB, Ushijima B, Voss JD (2023) Coral disease outbreak at the remote Flower Garden Banks, Gulf of Mexico. *Frontiers in Marine Science* doi:10.3389/fmars.2023.1111749
8. **Palacio-Castro AM**, Rosales SM, Dennison CE, SM, Baker AC (2022) Microbiome signatures in *Acropora cervicornis* are associated with genotypic resistance to elevated nutrients and heat stress. *Coral Reefs* doi: 10.1007/s00338-022-02289-w
9. **Palacio-Castro, AM**, Dennison CE, Rosales SM, Baker AC (2021) Variation in susceptibility among three Caribbean coral species and their algal symbionts indicates the threatened staghorn coral, *Acropora cervicornis*, is particularly susceptible to elevated nutrients and heat stress. *Coral Reefs* 40:1601–1613. doi: 10.1007/s00338-021-02159-x
10. Fuess LE, **Palacio-Castro AM**, Butler CC, Baker AC, Mydlarz LD (2020) Increased algal symbiont density reduces host immunity in a threatened Caribbean coral species, *Orbicella faveolata*. *Frontiers in Ecology and Evolution* 8:369. doi: 10.3389/fevo.2020.572942
11. Romero-Torres M, Acosta A, **Palacio-Castro AM**, Trembl EA, Zapata F, Paz-García D, Porter JM (2020) Coral reef resilience to thermal stress in the eastern tropical Pacific. *Glob Change Biol* 26: 3880-3890. doi: 10.1111/gcb.15126
12. Towle EK, **Palacio-Castro AM**, Baker AC, Langdon C (2017) Source location and food availability determine the growth response of *Orbicella faveolata* to climate change stressors. *Regional Studies in Marine Science* 10

## Book Chapters

1. **Palacio-Castro AM**, Zapata FA (2023) Comparación de métodos para el estudio y monitoreo de arrecifes coralinos. In: JA Sánchez, EM Alvarado, LF Barrios & E Ochoa (Ed.). *Manual de Procedimientos y Metodologías para Buceo Científico*. Academia Colombiana de Ciencias Exactas, Físicas y Naturales (ACCEFYN), Bogotá, Colombia. ISBN 978-626-95506-9-6

## In review

- Palacio-Castro AM**, Kroesche D, Enochs IC, Kelble C, Smith I, Baker A, Rosales S. Genotypes of *Acropora cervicornis* in Florida show resistance to either elevated nutrients or disease, but not both in combination. Submitted to *PlosOne*.

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## FIRST-AUTHOR PRESENTATIONS

- 2022 **Palacio-Castro AM**, Kroesche D, Enochs I, Kelble C, Rosales S. “Disease resistance in *A. cervicornis* is lost under elevated nutrients”. *Reef Futures 2022*, Key Largo, USA.
- 2022 **Palacio-Castro AM**, Enochs IC, Besemer N, Jankulak M, Boyd A, Kołodziej G, Webb AE, Hirsh HK, Towle EK, Smith I, Kelble C, Manzello D. “Carbonate system along the Florida Reef Tract: Interannual trends, seasonality, and regional variation”. *5th Symposium on the Ocean in a High-CO2 World*, Lima, Perú.
- 2022 **Palacio-Castro AM**, Enochs IC, Besemer N, Jankulak M, Boyd A, Kołodziej G, Webb AE, Hirsh HK, Towle EK, Smith I, Kelble C, Manzello D. “Carbonate system along the Florida Reef Tract: Interannual trends, seasonality, and regional variation”. *15th International Coral Reef Symposium (ICRS)*, Bremen, Germany.
- 2021 **Palacio-Castro AM**, Dennison, CE, Rosales, SM, Baker AC. “Combined effects of elevated nutrients and temperature on the threatened Caribbean staghorn coral, *Acropora cervicornis*”. *14th International Coral Reef Symposium (ICRS)*, Bremen, Germany (Online).
- 2018 **Palacio-Castro AM**, Snyder GA, Dennison C, Baker AC. “Multiple bleaching events in *Siderastrea siderea* increase the abundance and persistence of thermotolerant algal symbionts (*Symbiodinium trenchii*), with positive effects on subsequent bleaching response”. *Reef Futures 2018: A Coral Restoration and Intervention-Science Symposium*, Key Largo, USA.
- 2018 **Palacio-Castro AM**, Snyder GA, Dennison C, Baker AC. “Symbiodiniaceae community dynamics in the starlet coral (*Siderastrea siderea*) during two experimental bleaching and recovery events”. *Colombia 2018: International Conference on Marine Science*, Medellín, Colombia.

- 2016 **Palacio-Castro AM**, Snyder GA, Baker AC. “Effect of balanced and imbalanced nutrient enrichment on the bleaching response of two Caribbean corals during heat stress”. *13th International Coral Reef Symposium (ICRS)*, Honolulu, USA.
- 2013 **Palacio-Castro AM**, Zapata FA. “Comparison of three different methods for monitoring sessile benthic communities on coral reefs”. 7<sup>th</sup> Mexican and 1<sup>st</sup> Pan-American Coral Reef Congress, Mérida, Mexico.
- 2010 **Palacio-Castro AM**, Palacios MM. “Characterization of the coral morphotypes of *Pocillopora* genus present in Malpelo Wildlife Sanctuary”. XIX National Seminar on Science and Technology of the Sea (SENALMAR), Cali, Colombia.
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## TECHNICAL REPORTS

- 2010 Zapata FA, **Palacio-Castro AM**, Jaramillo-G J, Palacios MM, Londoño E, Izquierdo V, Muñoz CG, Lemos I, Zambrano V, Lozano D. *Comparison of different methods used for assessing the status of coral reefs in the Tropical Eastern Pacific Seascape and preliminary analysis of the resilience of coral reefs within Gorgona Island National Natural Park (Colombia)*. Report to Conservation International-Colombia.
- 2009 Navas-Camacho R, Jaramillo-González J, Vega-Sequeda JC, Lozano-Cortés D, Zapata FA, **Palacio-Castro AM**, Palacios MM, Muñoz CG. *Coral Reef Monitoring in The National Coral Reef Monitoring Stations - Colombia (SIMAC)*. Gorgona Island Scientific Expedition.
- 2008 **Palacio-Castro AM**, Rodríguez-Ramírez A, Muñoz CG, Zapata FA. *Baseline Marine Biodiversity Assessment in Gorgona Island – PNN, under the Eastern Tropical Pacific Seascape. Chapter III: Corals*.
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## GRANTS, FELLOWSHIPS AND AWARDS

- (2023-2027) National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA): (\$4,080,792)  
*Characterizing and forecasting coastal ecosystem responses to multiple stressors for management applications in South Florida (Co-PI)*
  - (2023-2024) **Florida Department of Environmental Protection:** (\$380,553)  
*High-replication assessment of the effects of poor water quality on South Florida coral health and susceptibility to Stony Coral Tissue Loss Disease (PI)*
  - (2022-2023) **Florida Department of Environmental Protection:** (\$145,350)  
*Assessing the effects of environmental co-factors on SCTLD transmission and progression rates (PI)*
  - (2019-2020) **US National Research Council:** (\$115,000)  
Postdoctoral fellowship
  - (2017) **David Rowland Fellowship** (\$3,500)
  - (2012-2017) **COLCIENCIAS:** (\$210,000)  
Colombian Science and Technology Department full scholarship to study PhD program abroad
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## TEACHING EXPERIENCE

- 2018 **Guest Lecturer:** Universidad CES. Lecture: *Corales en el Antropoceno: Efectos del calentamiento climático en los corales pétreos*.
- 2016 **Guest Lecturer:** University of Miami - MBE 535/ 635: Practical Computing for Biologists. Lecture: *Version control and reproducible science*.
- 2016 **Teaching assistant:** University of Miami – Study abroad program. MSC422: Marine Ecology of The Galapagos.
- 2015 **Teaching assistant:** University of Miami, MSC232: Introduction to Marine biology Laboratory
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## RESEARCH EXPEDITIONS

- Gorgona Island- Colombia (2009, 2014).
  - Malpelo Island- Colombia (2010).
  - Gulf of Panama and Chiriquí - Panama (2014, 2015, 2016, 2018).
  - The Galapagos Islands - Ecuador (2015, 2017).
  - Flower Garden Banks - USA (2022)
  - Dry Tortugas – USA (2024)
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## MENTORING

### Committee member (Degree, year of graduation):

Master committee member:

- 1) Zach Zagon, University of Miami (MPS, 2023)
- 2) Danielle Kroesche, University of Miami (MPS, 2021)

### Thesis and dissertation advising (Degree, year of graduation):

Undergrad thesis co-director

- 1) Elizabeth Quiceno, Universidad de Antioquia (BS, 2020)

### Research mentorship (Year of internship):

Master students

- 1) 2023 Zach Zagon (MPS)
- 2) 2019-2021 Danielle Kroesche (MPS)
- 3) 2015 Marine-Océane Guillermand (1 semester exchange program from France)
- 4) 2015 Juliene Beblo (MPS)

Undergraduate students

- 1) 2024: Kenzie Cooke
- 2) 2024: Corinne Renshaw (NOAA Hollings Scholar)
- 3) 2017 - 2018 Sofia Diaz de Villegas
- 4) 2017: Celia Leto
- 5) 2016 - 2017: Prati Rosen
- 6) 2016 - 2017: Rebecca Gilpin
- 7) 2015 – 2018: Caroline Dennison
- 8) 2016: Karim Primov
- 9) 2015: Elana Rusnak
- 10) 2014 - 2016: Grace Snyder
- 11) 2014: Patrick Nichols

High school students

- 1) 2014-2017: Hannah Waxman
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## REVIEWER ACTIVITIES

Journal reviewer: Global Change Biology, PeerJ, Ecology, Marine Ecology, Biodiversity and Conservation, PlosOne, Climatic Change, Aquatic sciences.

### Dissertation reviewer (Degree, year of graduation):

- University of Melbourne (PhD., 2024)
  - University of Bremen (PhD., 2023)
  - Universidad de Antioquia (MS., 2003, 2024)
  - Universidad del Valle (MS., 2024)
  - Universidad de la Amazonia (BS., 2023)
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## PROFESSIONAL SERVICE ACTIVITIES

2022-2024 Steering committee of NOAA-Miami early career and inclusion affinity group.

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## OUTREACH AND SCIENCE COMMUNICATION

### Presentations:

- 2017 3<sup>rd</sup> Coral Reef Ecology Workshop (CREWS). Instructor of *Coral Biology, Bonaire's coral reefs and Ocean Conservation*. Bonaire, September 24-29.
- 2016 *Coral reefs in Panama*. Presentation for the elementary school in Pixvae - Gulf of Chiriquí, Panama. April 20
- 2016 *El Niño effects on Galápagos marine ecosystems*. Presentation for the Park Rangers in the Galápagos National Park. February 12
- 2016 *El Niño effects on Galapagos marine ecosystems*. Workshop for the community (Familias Campesinas) in cooperation with IOI-Galapagos. February 11
- 2015 Instructor in the 1<sup>st</sup> Coral Reef Ecology Workshop (CREWS) series. Instructor of *Coral Biology and Symbiosis in Coral Reefs*. Cozumel, Mexico, November 7-14.

### Online:

- 2023 “Celebrating Women’s History Month with Ana Palacio”. <https://research.noaa.gov/2023/03/24/celebrating-womens-history-month-2023-with-ana-palacio/>

### Radio interviews:

- 2017 “Blanqueamiento coralino: Una amenaza inminente para el planeta” in Noticias ONU, January 6<sup>th</sup>, 2017. <https://news.un.org/es/audio/2017/01/1419031>

### Print media:

- 2015 “Research heats-up / Se calienta la investigación” in TRÓPICOS, September 2015. [https://issuu.com/strinewspanama/docs/tropicos\\_september\\_2015/8](https://issuu.com/strinewspanama/docs/tropicos_september_2015/8)

### Videos:

- 2014 “Coral rescue at Port of Miami” in YouTube, June 6<sup>th</sup>, 2014. <https://youtu.be/v1ZE9ixk5wk>
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## SKILLS AND CERTIFICATIONS

### Diving and boating (Agency, Year)

- American Academy of Underwater Sciences (AAUS) 100ft scientific diver (2013) - 400+ dives
- Enriched Air – Nitrox (TDI, 2022, 1293906)
- AWARE coral reef conservation (PADI, 2015, 15110U4056)
- First aid for professional divers (DAN, 2014-2024)
- Small motor boats (MOCC - US Geological Survey, 2013)
- Advanced open water diver (PADI, 2009)

### Software

Unix/Linux, statistics and database design (R, Python); spatial analysis (ArcGIS); image analysis (ImageJ, CPCe), figure preparation (GIMP, Inkscape)

### Languages:

Spanish (Native), English (Proficient)

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