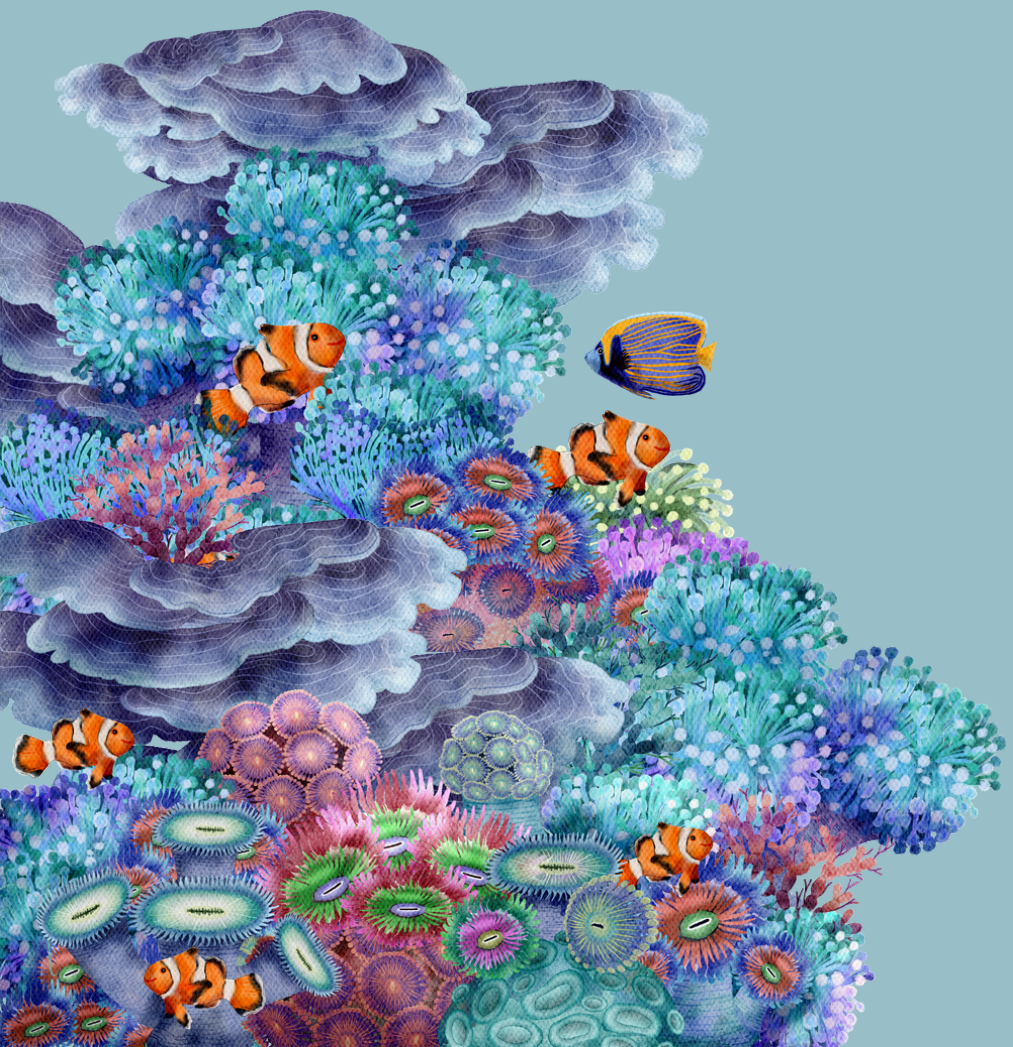
INTERNATIONAL FOSSIL CORAL AND REEF SOCIETY

Fifth Early Career Research Symposium

ABSTRACT BOOKLET | NOVEMBER 19TH 2026



Content

Code of conduct 3
Digital images and social media policy 4
Joining the symposium 4
Letter from the IFCRS president 5
Note from the organiser 8
Time zone converter 9
Schedule 10
Meet the labs 13
Abstracts 23
- Plenary 21
- Invited talks 24

Code of Conduct

The International Fossil Coral and Reef Society (IFCRS) was created to connect individuals interested in fossil corals, sponges and reef ecosystems in the broadest sense. Researchers and students are the core of our Society, but general enthusiasts are also warmly encouraged to join our growing community. We strive to foster a safe, inclusive, and respectful community that values the diverse perspectives and experiences of all members. Harassment or disrespectful behaviour of any kind is not tolerated. By participating in IFCRS activities, you agree to adhere to the following code of conduct at all times. The IFCRS council will enforce this code as necessary to ensure that all participants feel welcome, and we reserve the right to remove those who are found to be negatively contributing to the society and its activities. The IFCRS is committed to diversity, inclusion, and accessibility for all, and expects members of the society to uphold these values, and treat all equally.

Members of the IFCRS and participants in its activities are expected to treat one another with respect and dignity regardless of gender, gender identity and expression, sexual orientation, marital or parental status, age, immigration status, disability, physical appearance, body size, race, ethnicity, nationality, religion (or lack thereof), socioeconomic background, educational background, career stage, career trajectory, or scientific opinions.

We believe all members of our society and participants in activities have:

- The right to be safe from harassment or discrimination in all its forms
- The right to fully engage in all the activities on offer
- The right to have any complaints or concerns investigated, regardless of career position

We ask everyone to help us maintain an inclusive and safe Society for all by agreeing to the common principles of our code of conduct:

- being courteous, respectful and professional towards others
- valuing the diversity of participants, their views and opinions

If you are being harassed, notice that someone else is being harassed, or have any other concerns, please contact this year's meeting organisers via ifcrs.ecrs.2026@gmail.com and/or contact the IFCRS council via fossilcoralreef@gmail.com.

Ultimately, please remember why we are here: to network, diversify our knowledge, meet new people, and above all, to enjoy science!

Digital images and social media policy

During the symposium, do not photograph or record a talk without the author's express permission. While the default assumption is to allow open discussion of presentations on social media, attendees are expected to respect any request by an author not to disseminate the contents of their talk.

We request that authors indicate at the start of their talk whether they are happy for the presentation to be shared on social media or not.

Joining the Symposium

The symposium will be conducted fully online. When registering via this link (or https://ifcrs.org/meetings/2026-ecr-meeting), you will receive an email with a link to join the symposium. Please note, this link will be sent to the email address you registered for the symposium. For the symposium, we will make use of the platform Zoom. If you are unfamiliar with Zoom, you may familiarise yourself via the following link: https://zoom.us.

Contacting the Organizers

If for any reason you would like to contact the organizing team, please email us at ifcrs.ecrs.2026@gmail.com. We will be closely monitoring our inbox for any incoming messages. Alternatively, you may message any of us privately on Zoom when the Sympsoium is in session.

Dear participants of the IFCRS Early Career Researcher Symposium,

We meet at a time when the boundary between living coral reefs and the fossil record feels uncomfortably thin. Modern reefs are undergoing rapid and profound environmental change, while palaeontology reminds us that reef ecosystems have repeatedly experienced crises, reorganizations, and recoveries throughout Earth history. Understanding this long perspective is therefore no longer only a matter of reconstructing the past. It is increasingly relevant to understanding the present and considering what the future of reefs may look like.

The contributions to this year's symposium illustrate particularly well how many different kinds of evidence are needed to address these questions.

Some presentations explore how reefs have responded to environmental change on very different timescales. Mike Hynes uses Holocene reef cores from the Spermonde Archipelago to examine how reefs and low-lying islands adjusted to sea-level rise and environmental stress. Matthew Rahamut investigates how late Pleistocene Jamaican reefs maintained diverse coral communities under contrasting carbonate and siliciclastic regimes, while Katherine Faulkner combines the fossil history of the Coral Triangle with observations of modern bleaching to understand why some reef communities may be more resilient than others.

Other studies ask where corals persist when conditions become unfavorable. Danijela Dimitrijevic examines the deep-time history of reef refugia, including deeper, turbid and higher-latitude environments, reminding us that survival through a crisis and recovery of a complete reef ecosystem are very different processes. Samantha Hartzell approaches resilience from another direction, asking whether skeletal traits inherited from ancient scleractinian lineages persist in modern solitary and deep-water corals and whether these long-lived evolutionary strategies may be relevant to their survival today.

Several contributions also demonstrate how strongly our reconstruction of the past depends on the quality and interpretation of the geological record itself. Charlotte Spruzen shows that preservational processes may preferentially erase thrombolitic textures and thereby distort our perception of early microbial ecosystems. Jonathon Leonard uses the distribution of fossil Scleractinia to test competing reconstructions of Mesozoic and Cenozoic temperatures, illustrating that biological distributions can provide an important independent constraint on geochemical and model-derived estimates.

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Ajani Bissick explores how environmental conditions controlled microbialite architecture on an Ediacaran carbonate platform, while Zaid Qureshi combines detailed morphology with computational fluid-dynamic and structural modelling to test functional interpretations of Cambrian archaeocyaths.

Finally, Catherine Lee Hing's contribution on institutional memory after Stony Coral Tissue Loss Disease raises a question that reaches beyond reefs themselves: how do we preserve observations, datasets, expertise and experience so that knowledge gained during one environmental crisis is not lost before the next one arrives? This is especially relevant to a society such as IFCRS, whose strength lies precisely in connecting observations made today with records extending millions of years into the past.

There is another reason why I think this emphasis on observation, evidence and continuity of knowledge is particularly important today. We are entering an era in which artificial intelligence can assist us with literature searches, data processing, modelling, image analysis and even scientific writing. These tools will undoubtedly become increasingly useful. But they also make it more important than ever that science remains grounded in reliable observations, careful measurements, reproducible data and genuine expertise.

Scientific interpretation is not produced simply by assembling information. It grows from years of looking at specimens, sections, outcrops and datasets; from making measurements ourselves; from recognizing when something does not fit expectations; and from developing the intuition to distinguish an interesting signal from an artefact. This kind of scientific intuition cannot be generated if we progressively outsource the process of thinking itself. AI may help us work more efficiently, but it should not replace the intellectual experience through which a researcher learns how to ask good questions and how to judge whether an answer is credible.

This is particularly important for early-career researchers. Your greatest scientific asset will not be the ability to obtain an instant answer, but the ability to recognize when an answer is wrong, incomplete or genuinely surprising. That ability develops through direct engagement with evidence and through discussions with other scientists.

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This is exactly why meetings such as the IFCRS Early Career Researcher Symposium matter. They allow us to compare approaches, question interpretations and connect researchers studying modern and fossil reef ecosystems across very different temporal and spatial scales. They also help maintain the continuity of knowledge between generations of scientists.

One of the primary goals of IFCRS is to support early-career researchers working on corals, reefs and reef-related ecosystems and to encourage them to become active members of our scientific community. We hope that many of the researchers presenting here will continue to develop these ideas, collaborations and friendships, and that we will meet again at future IFCRS events, including the 15th International Symposium of Fossil Cnidaria and Reefs in Toulouse in 2027.

I would like to extend my sincere thanks to the organizers of this event Alison Cribb, Amanda Godbold, Claire Williams and Jood Al Aswad for the time and effort they have put into its organization.

I wish you an inspiring symposium, stimulating discussions, and above all the confidence to trust your observations, your data and your developing scientific intuition.

Jarosław Stolarski
President
International Fossil Coral and Reef Society

Note from the organisers

Dear Delegates,

A warm welcome to the Fifth IFCRS Early Career Researcher Symposium! We are delighted to host this event once again and to bring together a vibrant community of early-career scientists who are shaping the future of fossil coral and reef research.

This symposium was first envisioned as a space by and for early career researchers – a platform to present exciting new work during the years between the main IFCRS meetings. Since its inception, thanks to the dedication of previous organisers and the enthusiasm of our growing community, the symposium has continued to flourish, drawing in participants from a range of institutions, labs, and research backgrounds.

This year, we are thrilled to feature a diverse programme of talks that span an impressive temporal and thematic range: from ancient to modern reef ecosystems, and from corals and sponges to broader reef-associated environments. We are also honoured to welcome our plenary speaker, Dr Aaron O'Dea, and research group representatives, who will provide broader perspectives and spark new discussions across career stages.

We encourage you all to take full advantage of this opportunity: ask questions, share ideas, and connect with fellow researchers. Whether you are presenting, listening, or simply curious, your engagement contributes to a supportive and inspiring atmosphere.

Above all, we aim to maintain a respectful, inclusive, and encouraging environment where open dialogue and collaboration can flourish. Please be kind, be inquisitive, and enjoy the day!

Thank you for being a part of this symposium. We are excited to share this experience with you.

With warmest regards,
Amanda Godbold, Alison Cribb, Claire Williams, and Jood Al Aswad



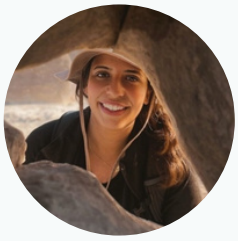
Dr. Amanda Godbold



Dr. Alison Cribb



Dr. Claire Williams



Dr. Jood Al Aswad

Time zone converter

Below, we provide a time zone converter for the day of the meeting for your convenience. If you have any queries about your specific time zone, please do let us know. The following is also a very useful resource:

https://www.worldtimebuddy.com/

Location	UTC offset	Start	End
UTC (Coordinated Universal Time)	0	15:00 Thu, Nov 19	22:45 Thu, Nov 19
Los Angeles, United States	−8	07:00 Thu, Nov 19	14:45 Thu, Nov 19
Chicago, United States	−6	09:00 Thu, Nov 19	16:45 Thu, Nov 19
Bogotá, Colombia	−5	10:00 Thu, Nov 19	17:45 Thu, Nov 19
Panama City, Panama	−5	10:00 Thu, Nov 19	17:45 Thu, Nov 19
Kingston, Jamaica	−5	10:00 Thu, Nov 19	17:45 Thu, Nov 19
New York / Toronto / Montréal	**−5**	**10:00 Thu, Nov 19**	**17:45 Thu, Nov 19**
London / Dublin / Lisbon	0	15:00 Thu, Nov 19	22:45 Thu, Nov 19
Berlin / Frankfurt / Vienna / Zurich	1	16:00 Thu, Nov 19	23:45 Thu, Nov 19
Amsterdam / Brussels / Paris	1	16:00 Thu, Nov 19	23:45 Thu, Nov 19
Madrid / Rome / Belgrade	1	16:00 Thu, Nov 19	23:45 Thu, Nov 19
Warsaw / Prague / Budapest	1	16:00 Thu, Nov 19	23:45 Thu, Nov 19
Stockholm / Oslo / Copenhagen	1	16:00 Thu, Nov 19	23:45 Thu, Nov 19
Athens / Helsinki / Bucharest	2	17:00 Thu, Nov 19	00:45 Fri, Nov 20
Istanbul / Moscow	3	18:00 Thu, Nov 19	01:45 Fri, Nov 20
Sydney, Australia	11	02:00 Fri, Nov 20	09:45 Fri, Nov 20

The symposium schedule is given in Eastern Standard Time (EST, highlighted).

Schedule

Thursday 19th November 2026 (Time zone: EST, UTC−5)
See the time chart on the previous page for time zone guidance.

10:00 – 10:10	**Welcome address**
Session 1	
10:10 – 10:30	**Where do corals go when the oceans heat up? Coral reef refugia over the Phanerozoic** Danijela Dimitrijević *Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*
10:30 – 10:50	**Coral Reef Time Machine: Holocene reef geomorphology and paleoecology of the Spermonde Archipelago** Mike Hynes *Naturalis Biodiversity Center, The Netherlands*
10:50 – 11:10	**The Coral Triangle in the Past and Present** Katherine Faulkner *University of Oxford, United Kingdom*
11:10 – 11:15	**Break and introductions**
11:15 – 11:20	Meet the lab: **Mikołaj K. Zapalski** *University of Warsaw, Poland*
11:20 – 11:25	Meet the lab: **Aaron O'Dea** *Smithsonian Tropical Research Institute, Panama*
11:25 – 11:30	Meet the lab: **Carly Kinkle** *University of Southern California, United States*
11:30 – 11:35	Meet the lab: **Wolfgang Kiessling** *Friedrich-Alexander University, Germany*
11:35 – 12:00	**Coffee chat: Career development Q&A**
Plenary talk	
12:00 – 13:00	**Reefs in the changing tropics: Perspectives from the fossil record** Aaron O'Dea *Smithsonian Tropical Research Institute, Panama*
13:00 – 14:30	**Lunch break**

Schedule

Thursday 19th November 2026 (Time zone: EST, UTC−5)
See the time chart on the previous page for time zone guidance.

Session 2

14:30 – 14:50 **Scleractinia distribution helps constrain the huge range of Mesozoic-Cenozoic paleotemperature estimates**
Jonathon Leonard
The University of Sydney, Australia

14:50 – 15:10 **Persistent Ancestral Morphologies: Can solitary corals with 200 million year old skeletal structures survive the modern biodiversity crisis?**
Samantha Hartzell
Indiana University, United States

15:10 – 15:30 **Reassessing the Function of Thorny Corolla Ornamentation in the Archaeocyath Yukonensis yukonensis**
Zaid Qureshi
University of Toronto Mississauga, Canada

15:30 – 15:50 **A Refined Facies Distribution model for the microbialites of the late Ediacaran Schwarzrand Platform**
Ajani Bissick
McGill University, Canada

15:50 – 15:55 **Break and introductions**

15:55 – 16:00 Meet the lab: **Isaiah Bolden**
Georgia Institute of Technology, United States

16:00 – 16:05 Meet the lab: **Rowan Martindale**
The University of Texas at Austin, United States

16:05 – 16:35 **Coffee chat: Themed breakout groups**

Session 3

16:35 – 16:55 **Preservational variation of a middle Tonian microbialite reef and implications for the under-recognition of ancient thrombolites**
Charlotte Spruzen
McGill University, Canada

Schedule

Thursday 19th November 2026 (Time zone: EST, UTC−5)
See the time chart on the previous page for time zone guidance.

16:55 – 17:15 **Coral community composition and diversity of late Pleistocene reefs under contrasting sediment regimes (Jamaica)**
Matthew Rahamut
The University of the West Indies, Mona Campus, Jamaica

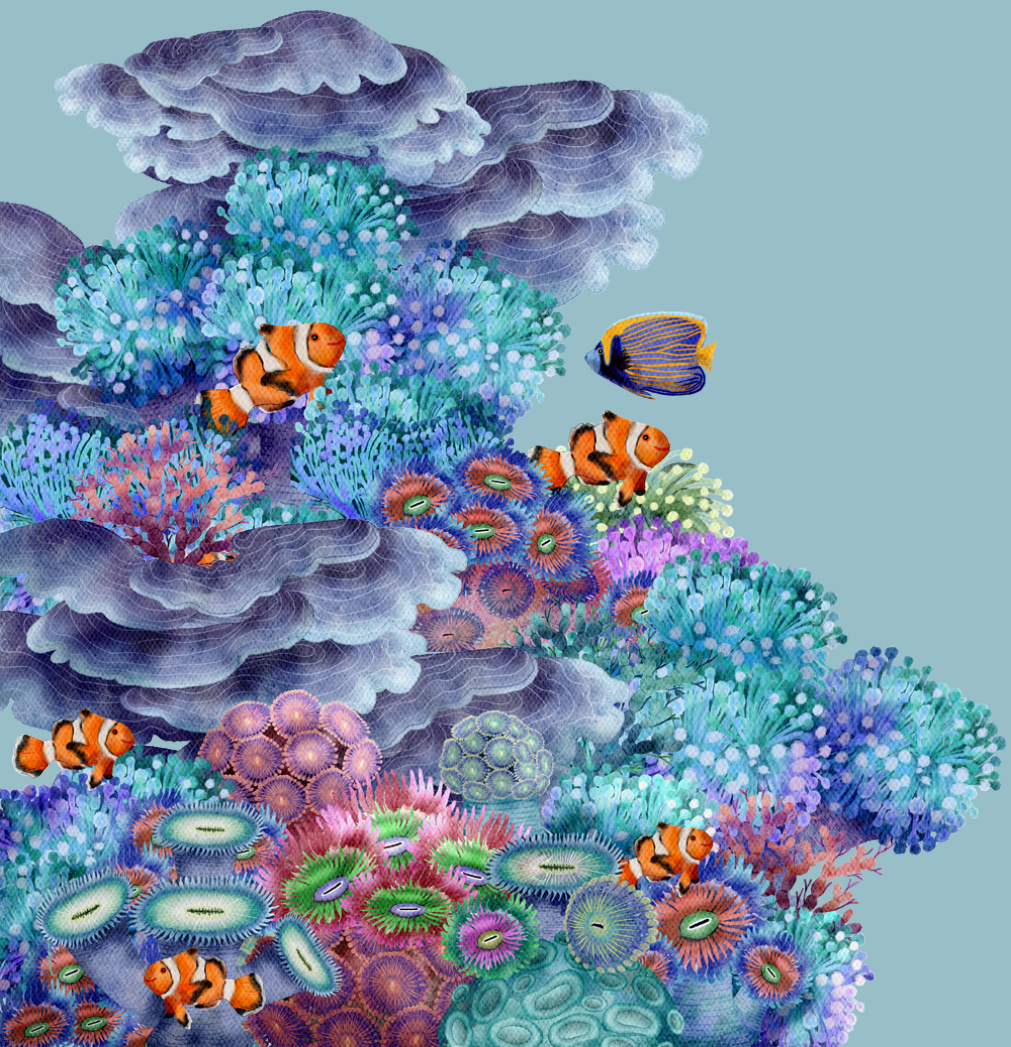
17:15 – 17:35 **Who Remembers the Reef? Incentives for Institutional Memory After SCTLD**
Cat Lee Hing
Stanford University, United States

17:35 – 17:45 **Closing remarks**

INTERNATIONAL FOSSIL CORAL AND REEF SOCIETY

MEET THE LABS

ABSTRACT BOOKLET | NOVEMBER 19TH 2026



Meet the labs

Chemical Oceanography, Observations, and Outreach at Georgia Tech (CO3@GT)

https://sites.gatech.edu/co3gt/



Isaiah Bolden | Assistant Professor
Georgia Institute of Technology, United States

iwb@gatech.edu

Key research topics: Marine Biogeochemistry, Coral Reefs, Biomineralization, Paleoclimatology, Sclerochronology, Trace Element Cycling, Stable Isotopes, Mass Spectrometry, Ocean Acidification, Carbonate Geochemistry

Coral reefs and coastal oceans are vital global "hubs," and provide critical economic and health benefits to billions of people. Yet, these environments are on the front lines of degradation and collapse due to accelerating climate change. Our group's research program is designed to meet this challenge by leveraging natural physical and biological interactions to investigate biogeochemical "fingerprints" of ecosystem health. We focus on three core areas: (1) developing novel geochemical tools for the early detection of environmental change; (2) using natural archives like corals, speleothems, and bivalves, to unravel historical and ancient records of environmental shifts; and (3) identifying mitigation strategies that best preserve biodiversity and ecosystem services. Crucially, we also engage deeply with coastal communities to translate our science into action. By providing environmental data for policymaking, education, and cultural preservation, we are fundamentally driven to use our science as a resource to catalyze environmental stewardship and resilience for coastal and historically marginalized populations.

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Chemical Oceanography, Observations, and Outreach at Georgia Tech (CO3@GT)

https://sites.gatech.edu/co3gt/

Isaiah Bolden | Assistant Professor
Georgia Institute of Technology, United States

iwb@gatech.edu

Do you have specific projects or positions to offer at the moment? We do! We are actively recruiting a PhD student to work on the mineralogy and geochemistry of rare earth elements (REEs) in sedimentary deposits along the Atlantic Seaboard. Research will focus on rapid-throughput characterization of a large surface and stratigraphic sample set - working across a wide range of analytical methods to generate records of major/trace elements in bulk samples and isotopic variability in individual mineral grains. The student will have 36 months of support through a recent US DoE CORE-CM grant: CM-MAP Critical Minerals in Atlantic Seaboard Plain and the opportunity to collaborate broadly across a range of academic, industry and agency partners. Read more about the broader scope of the project here: https://www.energy.gov/cmei/articles/does-office-critical-minerals-and-energy-innovation-launches-regional-consortia and here: https://sciences.gatech.edu/news/mining-new-possibilities-critical-minerals-mapping-stronger-us-supply-chain. The student would be based in the Georgia Tech School of Earth and Atmospheric Sciences in Atlanta, Georgia. You can read more about the EAS PhD program here: https://eas.gatech.edu/prospective-graduate-students the application deadline is January 1, 2027. Interested students should contact Dr. Karl Lang (karl.lang@eas.gatech.edu) and Dr. Isaiah Bolden (iwb@gatech.edu) via email for additional information. Otherwise, undergraduate students interested in research experiences with us are more than welcome to apply for our department's NSF REU Program: https://easreu.eas.gatech.edu/







Meet the labs



Paleoenvironments Group
@kiessl.bsky.social
gzn.nat.fau.eu/palaeontologie/team/professors/kiessling/

Wolfgang Kiessling | Professor
Friedrich-Alexander University, Germany

wolfgang.kiessling@fau.edu

The Paleoenvironments group at FAU Erlangen-Nürnberg investigates how reefs and other marine ecosystems have responded to environmental change through geologic time. We take a global, deep-time perspective. Our work builds on large, curated databases, notably the PaleoReefs Database (PARED) and the Paleobiology Database. With these, we quantify reef booms and declines, extinction risk, and the structure of ecological communities across millions of years. By linking fossil data at a global scale, we aim to learn from past reef crises and to inform conservation under ongoing climate change.



Meet the labs

Cnidarian Evolutionary Ecology Lab

https://dornsife.usc.edu/carlslab/

Carly Kinkle | Associate Professor
University of Southern California, United States

ckenkel@usc.edu

Key research topics: evolutionary ecology, genomics, ecophysiology, coral reefs

The CEE Lab investigates the ways that an organism's physical traits – also known as its phenotype – are produced and modified by genetic and environmental effects. We study how these ecological interactions mold and are molded by the evolutionary tracks of populations and species. Our Lab also values translational ecology: turning scientific findings into tools for conservation management.

Do you have specific projects or positions to offer at the moment? Yes - we are recruiting a PhD student for a Fall 2027 start - see https://dornsife.usc.edu/carlslab/prospective-lab-members/



Meet the labs

The Martindale Lab

https://www.jsg.utexas.edu/martindale/
www.linkedin.com/in/rowan-martindale-833b222a/



Rowan Martindale | Professor
The University of Texas at Austin, United States

Martindale@jsg.utexas.edu

Key research topics: Mesozoic Reefs, Jamaican Reefs, Extinction, Triassic, Jurassic, Ocean Acidification

Our research group focuses on determining how environmental conditions influence the evolution and extinction of marine invertebrate communities through the geological past (and even today). Many projects are devoted to understanding the kill mechanisms that cause reef collapse and extinctions at carbon cycle perturbation events, and the critical factors that distinguish those major events from non-extinction C-cycle perturbations. The team is also interested in the (paleo)ecology of reef ecosystems, reef builders (e.g. corals, sponges, bivalves) and their symbionts, as well as the environmental ramifications of flood basalt eruptions (e.g., extinctions, ocean acidification and anoxia). We also have projects studying modern reef ecosystems in Jamaica, with an eye to the future of coral reefs. Other interests of the research group include assessing the conditions that created marine Lagerstätten (exceptional fossil deposits), Geoscience Education (e.g., Virtual Field Trips), and Gamification of Earth Science concepts.

Do you have specific projects or positions to offer at the moment? I am applying for funds to study Middle Jurassic reefs from Morocco and modern reef chemistry in Jamaica; however, I do not currrently have funded postdoctoral positions or Graduate Research Assistantships. There are graduate fellowships and postdocs at UT though, so if you're interested in working with me, please reach out!



Meet the labs

The wigglers

https://stri.si.edu/scientist/aaron-odea

Aaron O'Dea

Staff Scientist

Smithsonian Tropical Research Institute, Panama City, Panama

ODeaA@si.edu

Research in my lab focuses on change in marine ecosystems over time, from millions of years ago to the recent past and the present day. Environmental and ecological transformation of the Caribbean caused by formation of the Isthmus of Panama and global climate changes over the last 10 million years provides a framework to unravel ecological and evolutionary processes in deep time. Human activity has also had a major impact on Caribbean life and this is revealed in young fossil records. By piecing together clues left by fossil coral, sponges, sharks, mollusks and fish, we reconstruct baseline conditions to help guide Caribbean reef conservation and improve our understanding of fundamental biological processes.









Meet the labs



Palaeozoic Reefs and Corals Research Group

Mikołaj K. Zapalski | Professor
University of Warsaw, Poland

m.zapalski@uw.edu.pl

Key research topics: Palaeozoic, corals, reefs, paleoecology, mesophotic

While it is not a lab in common meaning, we are a group of researchers from several Polish universities. Our members cover all major groups of Palaeozoic fixosessile macrobenthos, sedimentology and geochemistry. We carry out a field research in Morocco, Australia, Poland and other places. We also carry out comparative studies on modern reefs (Jamaica, GBR, Singapore).

INTERNATIONAL FOSSIL CORAL AND REEF SOCIETY

PLENARY TALK

ABSTRACT BOOKLET | NOVEMBER 19TH 2026

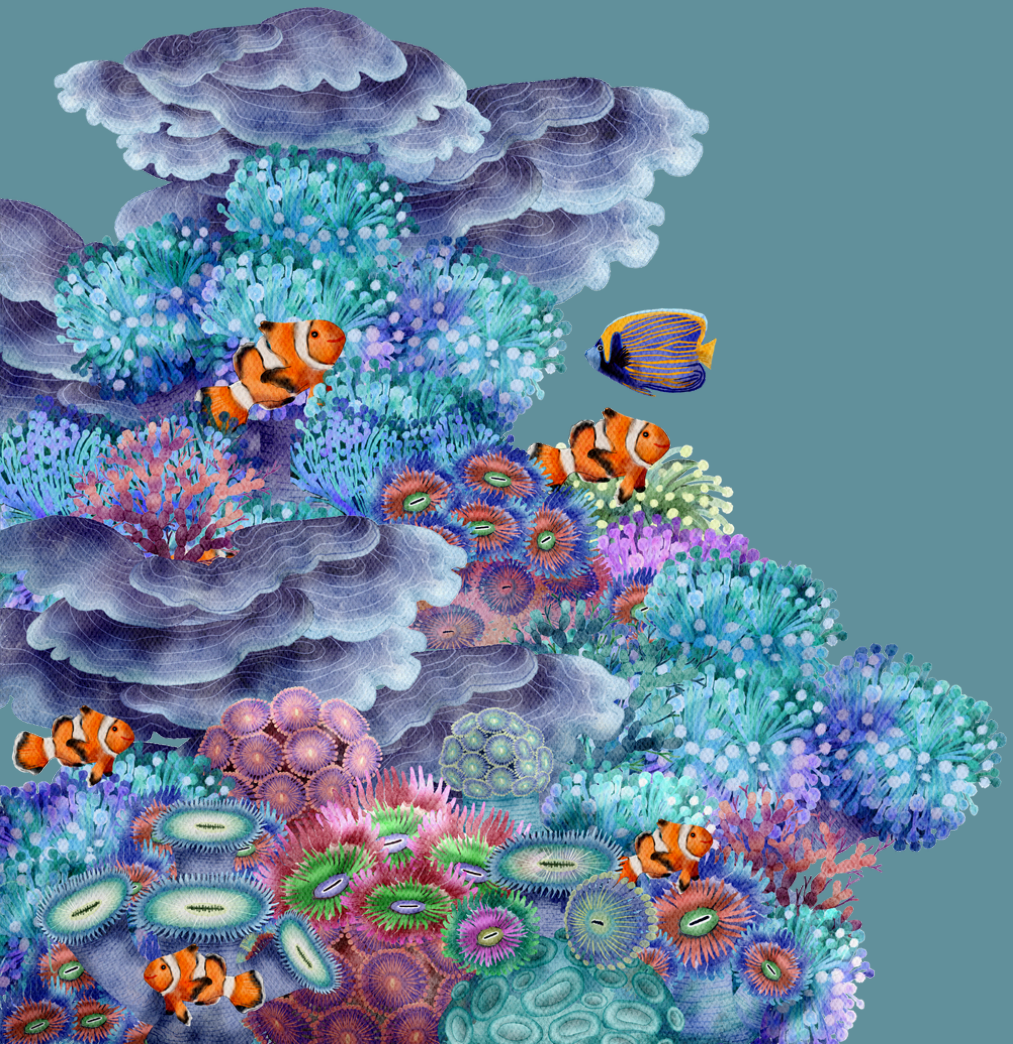


Reefs in the changing tropics: Perspectives from the fossil record

Aaron O'Dea

Staff Scientist

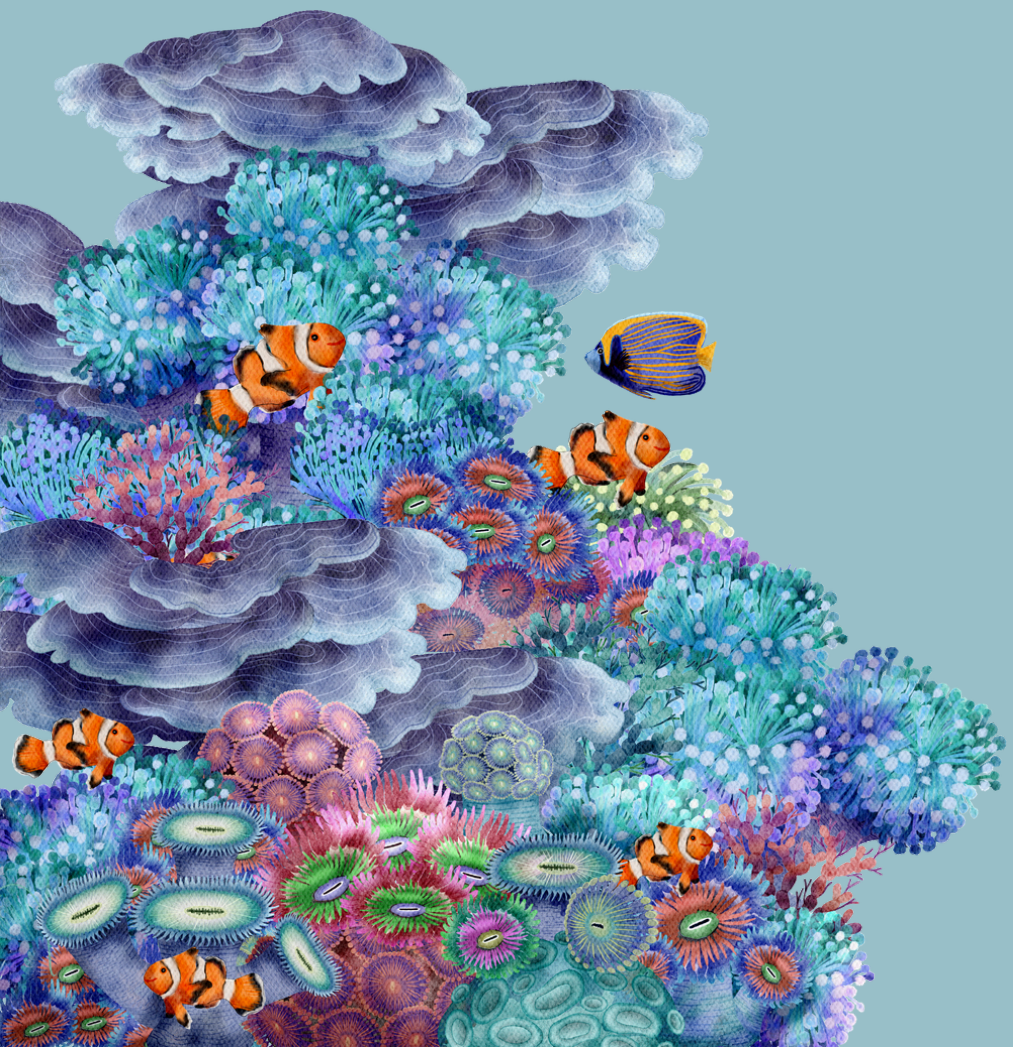
Smithsonian Tropical Research Institute, Panama



INTERNATIONAL FOSSIL CORAL AND REEF SOCIETY

INVITED TALKS

ABSTRACT BOOKLET | NOVEMBER 19TH 2026



A Refined Facies Distribution model for the microbialites of the late Ediacaran Schwarzrand Platform



Ajani Bissick

McGill University, Canada

Although the composition of reef-building communities has changed substantially throughout geological time, the extent to which reef architecture and distribution reflect persistent environmental controls remains an important consideration in reconstructing ancient reef systems. The late Ediacaran Schwarzrand Subgroup of the Nama Group in southern Namibia preserves a diverse assemblage of thrombolite–stromatolite reef systems developed across a shallow-marine carbonate platform. These buildups provide an excellent opportunity to investigate how microbial architecture and distribution varied with depositional conditions within an evolving sequence stratigraphic framework. Microbialites in the Schwarzrand succession can be broadly classified into three morphological groups: domical, columnar, and stratiform. Their occurrence is closely associated with the platform's depositional and sequence stratigraphic architecture, with microbialite development occurring predominantly during the regressive systems tracts of third-order depositional sequences. Within this framework, domical and columnar forms can be found across a broad range of depositional settings, whereas their stratiform counterparts are restricted to shallow, low-energy settings of the lower Huns Member and to the upper surfaces of larger reef buildups. These differences in environmental distribution are also complemented by substantial architectural variability within individual morphological groups. Progressive increases in dome size with response to interpreted water depth and spatiotemporal changes in the width and overall morphology of columnar microbialites suggest that depositional conditions—such as water depth and hydrodynamic energy—had a major influence on microbialite development. By situating these growth patterns within a larger sequence stratigraphic framework, this study helps us to better understand how microbial reef development was partitioned across the Schwarzrand platform and evaluate the extent to which environmental conditions account for observed architectural patterns.

Where do corals go when the oceans heat up? Coral reef refugia over the Phanerozoic



Danijela Dimitrijević

Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Coral reefs are among Earth's most vulnerable ecosystems. Rising temperatures are driving mass bleaching and mortality, and the pace of change is unprecedented. One hope is reef refugia: places where marine heatwaves hit less hard, such as deeper waters, turbid habitats, and higher latitudes. They could shelter corals, reduce extinction risk, and later help repopulate shallow reefs. But can we really tell whether these places will work as refugia without a long-term view?

The fossil record provides empirical evidence of how ecosystems have historically responded to climate crises. In this study, we investigated the potential of reef environments, such as deeper (blue mesophotic), turbid (brown mesophotic), and subtropical regions, to serve as refugia for corals across warming-induced reef crises. We also explore the evidence needed to identify mesophotic reef ecosystems in the fossil record and develop a common data framework that facilitates meaningful quantitative comparisons between fossil and modern reefs. By analysing a comprehensive database of fossil reefs covering the last 485 million years (Ordovician - Pleistocene), we demonstrate that following rapid warming events, reef distributions shifted toward higher latitudes and deeper (blue mesophotic) environments, indicating their role as refugia. While our findings offer hope for coral reef resilience in the face of current climate change, the fossil record shows that full ecosystem recovery, in most cases, took millions of years. Therefore, understanding the long-term dynamics of these potential refugia is essential amid the current climate crisis.

The Coral Triangle in the Past and Present



Katherine Faulkner

University of Oxford, United Kingdom

The Coral Triangle in the Indo-West Pacific (IWP) is the largest marine biodiversity hotspot in the world, and it currently houses the highest abundance of coral species. Despite an increase in ocean warming over the last thirty years, IWP coral cover has remained remarkably stable. This resilience may, in part, be due to these coral communities originating in turbid waters. Previous work suggests low-light conditions in the region have been present since at least the Miocene. To better understand the original environment of the IWP, we described and characterized over 1,200 Oligocene scleractinian corals from eastern Sabah, Malaysia. These corals originally resided in fine silt and clay carbonate deposits, and the high diversity of these fossils provides support for some coral communities in the IWP having adapted to and evolved in turbid, low-light environments over the last 27 million years. Previous research found these water conditions to reduce the effects of ocean warming on coral communities, which may explain current coral cover resilience in the Coral Triangle. To test this, we examined coral cover change in the IWP before, during, and after a coral bleaching event. Coral reef transects at 6 and 12 m depth were recorded from March to June 2023 in Kimbe Bay, Papua New Guinea. We find a significant depth dependence mediated by coral morphology. Interestingly, there was only a 0.2 °C difference in temperature between depths, while light intensity was 2.4 times higher at 6m compared to 12m depth. This suggests temperature alone does not explain this depth contrast. However, despite 12 m depth displaying less bleaching, coral rubble increased significantly, suggesting bleaching severity is not indicative of short-term coral bleaching recovery. These projects are significant for marine conservation, as they provide crucial information about the vulnerability and resilience of the Coral Triangle reef ecosystem through time.

Persistent Ancestral Morphologies: Can solitary corals with 200 million year old skeletal structures survive the modern biodiversity crisis?



Samantha Hartzell

Indiana University, United States

What are the ancestral traits of order Scleractinia, and are these traits present in modern corals? Long-term stability of a basal morphology may indicate resilience within the scleractinian lineage. Taxonomists first attempted to trace the evolutionary relationships of fossil and modern corals utilizing skeletal morphology, though widespread agreement on these relationships was not reached until the advent of molecular methods. Molecular clock studies indicate that order Scleractinia originated in the Middle Ordovician. Scleractinia persisted in mostly soft-bodied forms which failed to fossilize throughout the Paleozoic, after which skeletonized forms appear in the Middle Triassic and persist to the present day. Skeletal morphologies could not determine evolutionary relationships among scleractinian taxa, but when combined with a molecular phylogeny as a framework, morphology can provide important insights.

Skeletal macromorphologies were compiled for 31 fossil and 19 extant solitary scleractinian families, and 236 fossil and 104 modern solitary scleractinian genera. Parsimony-based trait node analysis was performed using 69 skeletal traits present in scleractinian families mapped to a published molecular phylogeny. Results indicate the basal scleractinian morphology included a trochoid or discoid corallum, laminar septa, septal teeth, ornamented lateral flanks, axial structure and costae. This collection of traits, the Persistent Ancestral Morphology, is retained by modern solitary corals across clades Vacatina and Refertina, though more members of Vacatina retain all basal features. Corals with the Persistent Ancestral Morphology inhabit a wide range of water depths and latitudes, including shelf, slope, and bathyal environments. Direct analysis of occurrence data for corals with the Persistent Ancestral Morphology is complicated by historical undersampling of solitary and deep-water corals, though machine-learning models indicate they are at risk for regional rapid biodiversity decline. Increased attention to solitary, deep water corals will be crucial to determining the trajectory of coral biodiversity in modern oceans.

Coral Reef Time Machine: Holocene reef geomorphology and paleoecology of the Spermonde Archipelago



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Tropical coral reefs and their associated low-lying islands are important biodiversity ecosystems and provide numerous ecological and socioeconomic benefits. As many reefs have a direct impact on local populations, it is important to understand how reefs and islands may change in response to shifting sea levels and environmental conditions. Holocene reef formation in the Coral Triangle (CT), an understudied region given its high coral reef diversity, was assessed to determine past influences on reef/island accretion and growth, with the purpose of better understanding present and future reef growth scenarios. Previously published Holocene reef core data was used to examine regional and global geomorphological and paleoecological regimes over centennial to millennial scales, and a suite of reef cores were collected from two islands in the Spermonde Archipelago, Indonesia, and were analyzed to reconstruct the Holocene geomorphology and paleoecology of the local area. This study shows that low-lying islands in the Spermonde Archipelago were able to cope with sea level rise over the first few thousand years of their existence, and have adapted to turbid conditions and other stressors over time. Further, they were able to continue carbonate production and accretion at levels needed to stay above sea level and maintain area even as the island's margins and location shifted across the reef platform. This is encouraging as large human populations live on these islands and associated coastlines, and rely on these reef systems for support. However, it is equally important that other stressors such as climate change and overfishing are addressed to ensure that these important ecosystems persist into the future.

Who Remembers the Reef? Incentives for Institutional Memory After SCTLD



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The Caribbean has experienced numerous coral diseases and mortality events, including Acropora die-offs in the 1970s and 1980s and unprecedented, repeated mass bleaching in recent years. Stony Coral Tissue Loss Disease (SCTLD) is one of the latest threats, affecting many coral species, including the slow-growing massive corals that contribute to the reef framework. Do SCTLD's effects extend beyond community change to the reef and to what these reefs ultimately leave in the geological record? While this threat prompted new monitoring, coordination, funding, and political attention, that support is finite.

We approach this as a memory problem. Fewer and fewer scientists and divers remain who remember what the Caribbean Acropora fields looked like. Ecologically, shifting baselines may lead scientists, divers, and other stakeholders to accept more degraded reefs as normal. Institutionally, similar loss can occur when long-term datasets lapse, response networks disband, and lessons from one disaster or outbreak are not carried forward into the next. Across the Caribbean, relatively few people are trained and funded to maintain long-term monitoring records, so institutional memory can depend on a small number of individuals and short-term projects. Drawing on policy and practitioner insights from SCTLD response efforts, we ask which crisis-era practices may be the most vulnerable to loss, and which institutional, financial, and behavioral incentives may drive that loss. How, then, might incentives be redesigned to build adaptive management into routine governance, sustain the people, datasets, and coordination that hold long-term memory?

Using comparative policy analysis informed by conservation finance, we propose an incentive-based framework that rewards data continuity, learning, and prevention. Coral scientists, including those working on historical and geological records, have a stake in whether institutional memory persists. SCTLD will not be the last outbreak, so the question is what we carry into the next one.

Scleractinia distribution helps constrain the huge range of Mesozoic-Cenozoic paleotemperature estimates



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Despite the wide use of paleo-temperature curves in geological and biological research, their limitations are perhaps not always fully appreciated. This is particularly apparent at particular times in the past where estimates of Global Mean Surface Temperature (GMST) can differ by as much as 12°C. To help constrain which paleotemperature estimates are most realistic, we model ensembles of Mesozoic-Cenozoic climates across 7 CO2 levels and then create a compilation of climate states that most fit scleractinia distribution based on their modern water temperature preferences. We find fossil coral distribution does broadly reflect past climate trends, with warm Mesozoic global temperatures peaking in the Cretaceous at ~22°C and then progressively cooling through the Cenozoic. However, isotope-based temperature reconstructions are either too cool or too warm to match coral distributions. The post-Triassic low-latitude SSTs of Grossman and Joachimski (2022) are, on average, 14% cooler than our best-fit curve. Song et al. (2019) estimates are even cooler, averaging 24% below our reconstruction. On the other hand, the data assimilation curve of Judd et al. (2024) is consistently 2-3°C warmer than our best-fit curve. The hybrid curve of Scotese et al. (2021) and the carbon-cycle based model of Merdith et al. (2025) overlap the range of temperatures in our best-fit curve for 72% and 75% of stages, respectively. The Scotese et al. (2021) curve also matches the timing of the Cretaceous hothouse and Jurassic coolhouse, making it our preferred model. We suggest that while geochemical data is useful at quantifying temperature changes, deriving absolute paleo-temperatures may be problematic.

Reassessing the Function of Thorny Corolla Ornamentation in the Archaeocyath *Yukonensis yukonensis*



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Reef ecosystems have a long history of fostering vast amounts of biodiversity due to numerous complex ecological interactions occurring at these sites. In contrast to modern reefs that have coral-built frameworks, Cambrian-aged reefs were built by Archaeocyatha – extinct filter-feeding sponges. These enigmatic organisms first appeared during the Cambrian Stage 2 (~529 Ma) creating the world's first animal reefs, eventually experiencing extinction by the upper Cambrian Stage 4 (~509 Ma). Archaeocyaths typically constructed elaborate cylindroconical or mound-shaped calcium carbonate skeletons with a cone-in-cone morphology that is hypothesized to have allowed for effective filter feeding adapted for specific environmental conditions. One unusual morphologically unique taxon is *Yukonensis yukonensis*, which was composed of stacked porous subspherical units surrounded by a protruding thorny corolla structure that resembles an upside-down umbrella at the intersection between each unit. Adding to its complexity, the thorny corolla are ornamented by T-shaped ridges, which were previously proposed to resemble I-beams and thus improve structural rigidity. In this study, we employ computational fluid dynamics (CFD) and fluid-structure interaction (FSI) modelling to investigate the functional morphology of *Y. yukonensis* using 3D-modelled reconstructions and the program COMSOL Multiphysics. CFD tested the movement of water around the archaeocyath cup and within the thorny corolla, whereas our FSI approach tested the structural strength of a single unit of the thorny corolla with and without the T-shaped ridges. Our results demonstrate that the presence of the thorny corolla drastically reduces the velocity of water. Furthermore, the T-shaped ridges experienced heightened stress when compared to the hypothetical non-ridged spines, implying that the architecture of the spines did not improve structural rigidity. Based on our CFD and FSI results, the thorny corolla and T-shaped ridges likely served another purpose, such as stabilizing the organism in soft substrate as it grew upwards.

Coral community composition and diversity of late Pleistocene reefs under contrasting sediment regimes (Jamaica)



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The late Pleistocene coral reefs of Jamaica serve as a natural laboratory for studying long-term ecological patterns in growth and biodiversity. They may also serve as an ecological baseline and standard for comparing anthropogenic effects on modern reef ecosystems. This study compares the coral biodiversity of two approximately coeval reefs deposited during the Last Interglacial Warm Period- the Falmouth Formation and the Port Morant Formation. The formations preserve both crest and backreef-to-lagoonal facies under contrasting sediment regimes. The Falmouth Fm. is a predominantly carbonate system that grew near a rocky limestone shoreline, whereas the Port Morant Fm. reefs grew with siliciclastic sediment at the edge of a delta front.

Coral assemblages at each location were quantified using point intercept transects, and photo-quadrats were point-counted in CPCe Software. Community structure was evaluated using taxonomic abundance, species richness and diversity metrics, and multivariate analyses. Preliminary analyses indicate differences in community structure between the two formations and reef zones. The backreef showed greater diversity than the crest assemblage in both ecosystems, with the crest characterised by the dominance of framework-building taxa. Importantly, the siliciclastic-influenced Port Morant Fm. reefs retain diverse coral assemblages despite their differences in taxonomic composition.

The results suggest that siliciclastic input did not preclude reef development during the Last Interglacial, but instead shaped the taxonomic organisation of coral communities. The comparison highlights the capacity of late Pleistocene Caribbean reefs to maintain diverse assemblages across markedly different sedimentary regimes.

Preservational variation of a middle Tonian microbialite reef and implications for the under-recognition of ancient thrombolites



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The Precambrian reef record is dominated by laminated microbially-induced precipitates called stromatolites. Thrombolites, which are unlaminated microbialites defined by a clotted mesoscale texture, are comparatively sparsely recognized and poorly understood. To investigate the significance of this discrepancy, we studied a middle Tonian reef in northwestern Canada that contains both stromatolites and thrombolites at variable stages of preservation. Our petrographic and geochemical data show that while stromatolitic lamination is retained at the mesoscale and microscale, thrombolite texture is overprinted by replacement phases in samples with similar paragenetic histories and geochemical profiles. As a result, thrombolitic rocks are typically unrecognizable as biogenic in outcrop without stratigraphic context and a complete preservational sequence as a reference. A comprehensive compilation of thrombolite occurrences from the Archean to the Holocene shows sparse documented thrombolites until the late Ediacaran Period, when the number and proportion of calcite thrombolites significantly increases. We suggest extensive dolomitization and silicification of ancient thrombolites due to their higher primary porosity caused their widespread textural obliteration. In contrast, stromatolites tend to retain lamination due to their lower initial porosity and stronger primary textural grain. This process occurred throughout the sedimentary record, but the widespread preservation of calcite from the late Ediacaran Period onwards enhanced the preservation of thrombolite textures. Together, our data from the Reefal assemblage and the microbialite compilation imply that the documented sedimentological record of ancient microbial life is strongly biased towards stromatolites, with implications for the completeness of the microbial evolutionary record and the deep-time carbon cycle.

Coffee chat sessions

Morning coffee session:

Navigating academic careers: From postdocs to permanent positions
A friendly Q&A session with members of our IFCRS community, Dr. Lewis Jones (Natural History Museum, London) and Professor Rowan Martindale (University of Texas - Austin)

Afternoon coffee breakout sessions:

Networking and branding yourself as an early career researcher in academia
Led by Dr. Jood Al Aswad, Postdoctoral Researcher, Virginia Tech

How can new methods in artificial intelligence help us better understand how reefs respond to ancient, current, and future climate change?
Led by Dr. Alison Cribb, Schmidt AI in Science Fellow, University of Oxford

Conservation across timescales: Bridging fossil and modern reef research
Led by Dr. Claire Williams, Postdoctoral Researcher at Georgia Tech

Making research happen: Project management in academia
Led by Dr. Amanda Godbold, Postdoctoral Fellow at the Smithsonian Tropical Research Institute



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THANK YOU

ABSTRACT BOOKLET | NOVEMBER 19TH 2026

