

## MarineGEO Newsletter December 2017

Dear Friends and Colleagues,

2017 has been a big year! We completed a MarineGEO Core Research Plan, added five new sites for a total of 13 active network members, obtained resources for a new PhD Science Coordinator and two new Postdoctoral Fellows, published 13 papers, and won an NSF grant for a new Research Coordination Network on wetland blue carbon. And that's just the highlights! Details below. Best wishes for a happy holiday season—and please come visit us in 2018.

Emmett Duffy

Director, Tennenbaum Marine Observatories Network and MarineGEO Program

### People: Staff news

*Data Manager.* We're delighted to welcome Andy Bell to the position of MarineGEO Data Manager and IT Coordinator starting in January 2018! Andy comes to us from the Center for Watershed Sciences at the University of California, Davis, where he has worked on a variety of projects related to environmental and biodiversity data. Andy will be a key figure in moving us toward MarineGEO's goal of an integrated, collaborative data system for the network.

*CPOP (Chemical-Physical Observations Program) Coordinator.* Roy Rich came on board as CPOP Coordinator on October 1<sup>st</sup>, 2017 to streamline network-wide instrument data service and management. Roy is based at SERC. We owe a debt of gratitude to Tom Opishinski, who has intrepidly managed environmental sensors for the Smithsonian in Florida and Belize for many years, and got TMON's sensor network off the ground and running. We look forward to Tom's continued leadership of the sensor work in Florida and Belize.

*MarineGEO Panama.* We are sorry to say goodbye to our STRI colleague Andrew Altieri, who is leaving for an exciting new position at the University of Florida. Andrew has been an active member of our Executive Committee and led a vigorous field program at Bocas del Toro in Panama. TMON technician Janina Seemann is returning to Germany after three years of valiantly collecting MarineGEO data for the Bocas del Toro site and managing her own postdoctoral research. We'll miss you both—*Buen viaje!*

### People: MarineGEO Postdoctoral Fellows

MarineGEO welcomed two new Postdoctoral fellows in 2017:

#### Smithsonian Institution

MarineGEO Program and Tennenbaum Marine Observatories Network  
647 Contees Wharf Road, Edgewater, MD 21037  
202.633.4037; duffye@si.edu

*Holly Sweat* joined us in September as the newest MarineGEO Postdoctoral Fellow. Holly recently earned her Ph.D. from Florida Institute of Technology. While at the Smithsonian Marine Station for her fellowship, she is comparing how fouling microbiomes impact larval recruitment across latitudes. Holly is advised by Valerie Paul, Mark Torchin, and Whitman Miller.

*Matt Whalen* joined us in July 2017 as the MarineGEO-Hakai Fellow, based at the University of British Columbia and supported by our partner in BC, the Hakai Institute. Matt is a marine ecologist with a Ph.D. from the University of California, Davis, and is interested in how environmental heterogeneity influences the causes and consequences of biodiversity. Matt leapt directly into the fray after defending his dissertation in summer 2017 and co-led the 2017 MarineGEO/Hakai bio-blitz at Calvert island, BC.

... and of course our current and former Postdocs are also hard at work:

*Simon Brandl*, MarineGEO Postdoc Fellow (2015-2017), recently completed his fellowship and has moved on to a competitive Banting Postdoctoral Fellowship at Simon Fraser University in Canada, where he will continue coral reef research in French Polynesia, among other places.

*Brian Cheng*, MarineGEO Postdoc Fellow (2014-2016), has completed his tenure with the Smithsonian and moved on to a faculty position at the University of Massachusetts, Amherst, where we trust he will be a partner in MarineGEO's expansion into New England.

*Maggie Johnson*, current MarineGEO Postdoc Fellow (2016 - 2019), joined us from Scripps Institution of Oceanography in 2016. Under the advisement of Andrew Altieri and Valerie Paul, Maggie is using the TMON sites to understand how ocean acidification affects biodiversity and function in calcifying ecosystems.

*Erica Staaterman*, MarineGEO Postdoc Fellow (2015-2017) concluded her fellowship early to take a Bioacoustician position at the US Bureau of Ocean Energy Management (BOEM) in February 2017. While with us, she studied the relationships between bioacoustics, biodiversity, and anthropogenic noise.

## MarineGEO Partners and Sites

As of late 2017, the MarineGEO network has 13 active sites that conducted core research this year. Active sites in 2017 (\*new):

Chesapeake Bay region, USA (Smithsonian Environmental Research Center)  
Indian River Lagoon, Florida, USA (Smithsonian Marine Station)  
Carrie Bow Cay, Belize (Smithsonian Marine Station)  
Bocas del Toro, Panama (Smithsonian Tropical Research Institute)

San Juan islands, Washington, USA (Friday Harbor Labs, University of Washington)  
San Francisco Bay, USA (Romburg Tiburon Center, San Francisco State University)  
Calvert Island, British Columbia (Hakai Institute)

Kaneohe Bay, Hawaii, USA (Hawaii Institute of Marine Biology, University of Hawaii)

\*Corpus Christi, Texas, USA (Texas A&M University Corpus Christi and University of Texas at Austin Marine Science Institute)

\*Peru (Smithsonian Conservation Biology Institute)

\*Madeira, Portugal (Marine and Environmental Sciences Centre)

\*Hong Kong (Hong Kong University)

\*Tasmania (University of Tasmania)

## Science: Highlights from the field

### *See photos below!*

*Hawaii: MarineGEO goes live.* A group of nearly 100 participants from around the world converged on Coconut Island, Hawai‘i for an intensive biodiversity assessment. We collected more than 3,700 specimens, with matching genetic barcodes and high-resolution images, and discovered many new species, a new non-native invasion, and a species formerly thought extinct in Hawai‘i. One highlight was development and implementation of MarineGEO’s first field data template, based on Darwin Core standards, to coordinate with other biodiversity databases. Twitter: #MarineGEOHI. Flickr gallery: <http://bit.ly/2iyfO0q>

*British Columbia: MarineGEO-Hakai bio-blitz.* We completed a successful field campaign at partner site in British Columbia (August), including an intensive biodiversity inventory, (collections, DNA barcoding) involving numerous scientists and students from institutions in several countries. Several media stories were published on the *Hakai Magazine* site (<http://bit.ly/2BsVd1o>). Twitter: #MarineGEOBC. Flickr gallery: <http://bit.ly/2ApjkhY>

*Hong Kong: Welcome MarineGEO Hong Kong.* A team of senior scientists and students from Hong Kong University, Smithsonian, University of Florida, and others retrieved Autonomous Reef Monitoring Structures (ARMS), conducted surveys, and measured ecosystem processes at the new MarineGEO site in Hong Kong. Local scientists and students participated with invited taxonomic and ARMS experts. Twitter: #MarineGEOHK.

*San Francisco: After the flood.* MarineGEO team members worked with colleagues from SFSU’s Romberg Tiburon Center to document changes in natural and restored seagrass beds, as well as sediment bottoms, after the biggest spring rains in decades, which turned the whole Bay fresh.

*Tasmania.* Smithsonian technicians joined partners from University of Tasmania and the Reef Life Survey to initiate two new MarineGEO sites. The team surveyed 14 sites, including rocky reef, seagrass, and sand bottoms.

*Belize: 3<sup>rd</sup> annual MarineGEO field campaign.* The team completed this year’s annual observations at Smithsonian’s Carrie Bow Cay Field Station, including a new interactive live Facebook event in partnership with the National Museum of Natural History’s Ocean Portal. We

also held a popular public science café event in the neighboring village of Dangriga for the third year in a row.

*Panama: MarineGEO in Coiba.* The Smithsonian Tropical Research Institute is ramping up research around the Pacific island of Coiba in the Gulf of Chiriqui, Panama’s “third ocean”. TMON scientists and MarineGEO postdocs participated in the expedition to Coiba, Panama to begin a long-term research program in the National Park, with baseline ecological surveys of biological community composition and function in reefs and mangroves. Former MarineGEO postdoc Matt Leray led the team.

### Science: Coordinated research

*Ocean Bitemap.* We completed the first assembly of data from the 2016 Ocean Bitemap project, which engaged > 40 partners from five continents in a study of geographic variation in fish predation intensity in seagrass beds and unvegetated seabed. MarineGEO Postdoc Matt Whalen (funded by Hakai Institute) is leading analysis for publication in 2018.

*Pan-American experiment.* We completed a pilot run at four sites of a coordinated experiment, to measure latitudinal and geographic variation in predation on fouling community development and invasion. Results were promising and the team is now planning strategy for and fund-raising to roll out the large-scale experiment beginning in 2018

### Science: New grant

We were awarded a new NSF Research Coordination Network grant “*RCN: Building a Collaborative Network for Coastal Wetland Carbon Cycle Synthesis*”, led by Pat Megonigal of the Smithsonian Environmental Research Center, with colleagues from US Geological Survey, Conservation International, and the Marine Biological Laboratory. The project is building a repository and portal for coastal (“blue”) carbon data, a website with data analysis and training resources, webinars, and a workshop series to address gaps in coastal carbon science.

### Friends and supporters

Our benefactor and Smithsonian National Board Member *Michael Tennenbaum* generously pledged \$500,000 over five years toward a Secretary’s Scholar to serve as MarineGEO Science Coordinator. Smithsonian Secretary *David Skorton* added \$125,000 for this purpose. We will advertise soon for a Marine Biodiversity Scientist—stay tuned! Thanks to both of these visionary individuals—we expect this to be a game changer for MarineGEO.

SI National Board member *Nancy Hogan* and husband Charlie generously pledged \$250,000 for a MarineGEO postdoctoral researcher in the Salish Sea (Pacific Northwest). Stay tuned for this advertisement in the new year also.

James Smithson Society member *Cary Frieze* made a third donation to the MarineGEO program, this time \$1,500.

*Ann Young* provided a gift of \$100.

The late *Peggy Ann Wall* generously pledged \$100,000 as an unrestricted endowment for MarineGEO. As a result of her recent passing, the endowment is now directly helping TMON and MarineGEO.

*Thank you to all—we couldn't do it without you!*

### MarineGEO publications

1. Campbell, J. E. et al. Herbivore community determines the magnitude and mechanism of nutrient effects on subtropical and tropical seagrasses. **Journal of Ecology** 106, 401–412 (2018).
2. Altieri, A. H. et al. Tropical dead zones and mass mortalities on coral reefs. **PNAS** 114, 3660–3665 (2017).
3. Brandl, S. J., Casey, J. M., Knowlton, N. & Duffy, J. E. Marine dock pilings foster diverse, native cryptobenthic fish assemblages across bioregions. **Ecology and Evolution** 7, 7069–7079 (2017).
4. Cheng, B. S., Komoroske, L. M. & Grosholz, E. D. Trophic sensitivity of invasive predator and native prey interactions: integrating environmental context and climate change. **Functional Ecology** 31, 642–652 (2017).
5. Cramer, K. L., O'Dea, A., Clark, T. R., Zhao, J. & Norris, R. D. Prehistorical and historical declines in Caribbean coral reef accretion rates driven by loss of parrotfish. **Nature Communications** 8, 14160 (2017).
6. Duffy, J. E., Godwin, C. M. & Cardinale, B. J. Biodiversity effects in the wild are common and as strong as key drivers of productivity. **Nature** 549, 261 (2017).
7. Freeman, C. J., Stoner, E. W., Easson, C. G., Matterson, K. O. & Baker, D. M. Variation in  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values suggests a coupling of host and symbiont metabolism in the Symbiodinium-Cassiopea mutualism. **Marine Ecology Progress Series** 571, 245–251 (2017).
8. Hamilton, J. F., Osman, R. W. & Feller, I. C. Modeling local effects on propagule movement and the potential expansion of mangroves and associated fauna: testing in a sub-tropical lagoon. **Hydrobiologia** 803, 173–187 (2017).
9. Janiak, D. S., Adams, J. N., Rubinoff, B. & Osman, R. W. Predator-Prey Interactions of the Polyclad, *Euplana gracilis*, and the Amphipod, *Apocorophium lacustre*, in the Chesapeake Bay. **Estuaries and Coasts** 40, 513–521 (2017).
10. Leray, M. & Knowlton, N. Random sampling causes the low reproducibility of rare eukaryotic OTUs in Illumina COI metabarcoding. **PeerJ** 5, (2017).
11. Nelson, N. G., Muñoz-Carpena, R., Neale, P. J., Tzortziou, M. & Megonigal, J. P. Temporal variability in the importance of hydrologic, biotic, and climatic descriptors of dissolved oxygen dynamics in a shallow tidal-marsh creek. **Water Resources Research** 53, 7103–7120 (2017).

12. Pagenkopp Lohan, K. M., Fleischer, R. C., Torchin, M. E. & Ruiz, G. M. Protistan Biogeography: A Snapshot Across a Major Shipping Corridor Spanning Two Oceans. **Protist** 168, 183–196 (2017).
13. Rodemann, J. R. & Brandl, S. J. Consumption pressure in coastal marine environments decreases with latitude and in artificial vs. natural habitats. **Marine Ecology Progress Series** 574, 167–179 (2017).
14. Staaterman, E. et al. Bioacoustic measurements complement visual biodiversity surveys: preliminary evidence from four shallow marine habitats. **Marine Ecology Progress Series** 575, 207–215 (2017).
15. Bourlat, S. J., Haenel, Q., Finnman, J. & Leray, M. Preparation of Amplicon Libraries for Metabarcoding of Marine Eukaryotes Using Illumina MiSeq: The Dual-PCR Method. in **Marine Genomics** 197–207 (Humana Press, New York, NY, 2016). doi:10.1007/978-1-4939-3774-5\_13
16. Brandl, S. J. & Bellwood, D. R. Microtopographic refuges shape consumer-producer dynamics by mediating consumer functional diversity. **Oecologia** 182, 203–217 (2016).
17. Brooker, R. M., Brandl, S. J. & Dixon, D. L. Cryptic effects of habitat declines: coral-associated fishes avoid coral-seaweed interactions due to visual and chemical cues. **Scientific Reports** 6, (2016).
18. Duffy, J. E., Lefcheck, J. S., Stuart-Smith, R. D., Navarrete, S. A. & Edgar, G. J. Biodiversity enhances reef fish biomass and resistance to climate change. **PNAS** 113, 6230–6235 (2016).
19. Freeman, C. J., Easson, C. G. & Baker, D. M. Niche structure of marine sponges from temperate hard-bottom habitats within Gray’s Reef National Marine Sanctuary. **Journal of the Marine Biological Association of the United Kingdom** 96, 559–565 (2016).
20. Freeman, C. J., Stoner, E. W., Easson, C. G., Matterson, K. O. & Baker, D. M. Symbiont carbon and nitrogen assimilation in the *Cassiopea-Symbiodinium* mutualism. **Marine Ecology Progress Series** 544, 281–286 (2016).
21. Lefcheck, J. S., Brandl, S. J., Reynolds, P. L., Smyth, A. R. & Meyer, S. T. Extending Rapid Ecosystem Function Assessments to Marine Ecosystems: A Reply to Meyer. **Trends in Ecology & Evolution** 31, 251–253 (2016).
22. Leray, M. & Knowlton, N. Visualizing Patterns of Marine Eukaryotic Diversity from Metabarcoding Data Using QIIME. in **Marine Genomics** 219–235 (Humana Press, New York, NY, 2016). doi:10.1007/978-1-4939-3774-5\_15
23. Leray, M., Haenel, Q. & Bourlat, S. J. Preparation of Amplicon Libraries for Metabarcoding of Marine Eukaryotes Using Illumina MiSeq: The Adapter Ligation Method. in **Marine Genomics** 209–218 (Humana Press, New York, NY, 2016). doi:10.1007/978-1-4939-3774-5\_14
24. Lohan, K. M. P. et al. Richness and distribution of tropical oyster parasites in two oceans. **Parasitology** 143, 1119–1132 (2016).
25. Lohan, K. M. P., Fleischer, R. C., Carney, K. J., Holzer, K. K. & Ruiz, G. M. Amplicon-Based Pyrosequencing Reveals High Diversity of Protistan Parasites in Ships’ Ballast Water: Implications for Biogeography and Infectious Diseases. **Microbial Ecology** 71, 530–542 (2016).
26. Duffy, J. E., Ziegler, S. L., Campbell, J. E., Bippus, P. M. & Lefcheck, J. S. Squidpops: A Simple Tool to Crowdfund a Global Map of Marine Predation Intensity. **PLoS One** 10, e0142994 (2015).

27. Leray, M. & Knowlton, N. DNA barcoding and metabarcoding of standardized samples reveal patterns of marine benthic diversity. **PNAS** 112, 2076–2081 (2015).
28. Lohan, K. M. P. et al. Molecular phylogenetics reveals first record and invasion of *Saccostrea* species in the Caribbean. **Marine Biology** 162, 957–968 (2015).

See also the 2017 feature story in *Nature*, “Biodiversity moves beyond counting species”:  
<http://go.nature.com/2rbIfCJ>

# Greatest Hits 2017

SMS Scientist Justin Campbell censusing seagrass, Carrie Bow Cay, Belize



New goby species, Panama



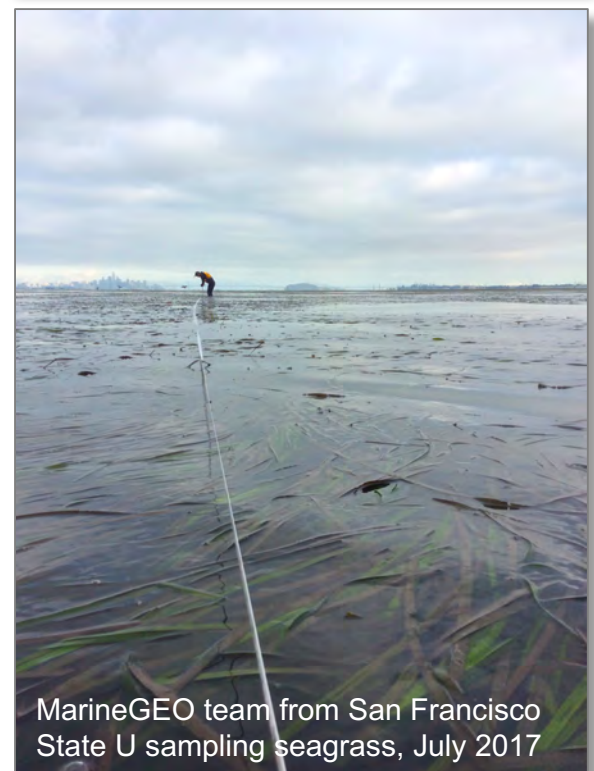
SERC's Drew Pinsonneault measuring marsh decomposition, Rhode River, 2017



MarineGEO Postdoc Maggie Johnson measuring reef carbonate dynamics, Pacific Panama, October 2017



Smithsonian Marine Station team samples oyster reef Indian River, Florida, June 2017



MarineGEO team from San Francisco State U sampling seagrass, July 2017





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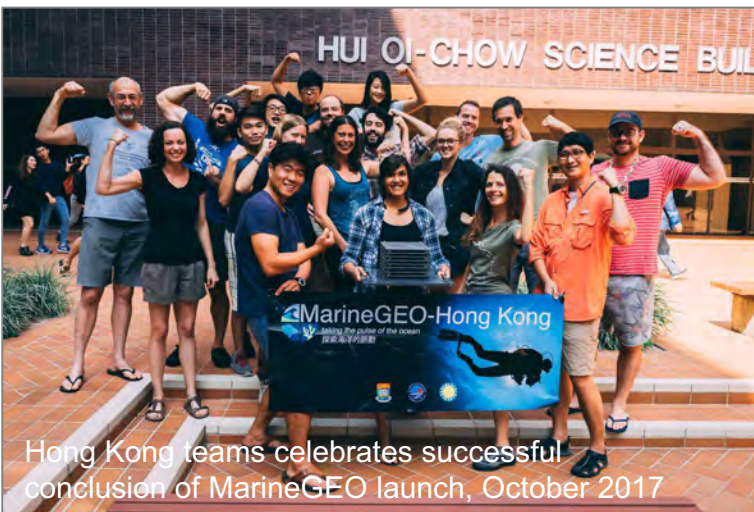
THE TENNENBAUM  
MARINE OBSERVATORIES NETWORK



Smithsonian-Hawaii Institute of Marine Biology  
Bio-blitz team (in part!), Hawaii, May 2017



MarineGEO team censusing mangroves  
Caribbean Panama 2017



Hong Kong teams celebrates successful  
conclusion of MarineGEO launch, October 2017



Pilot Panamex experiment  
Bocas del Toro, Panama, July 2017



Smithsonian-Hakai Institute bio-blitz team (in part!),  
Calvert Island, British Columbia, July 2017



Dr. Chris Patrick & students  
MarineGEO Texas, June 2017