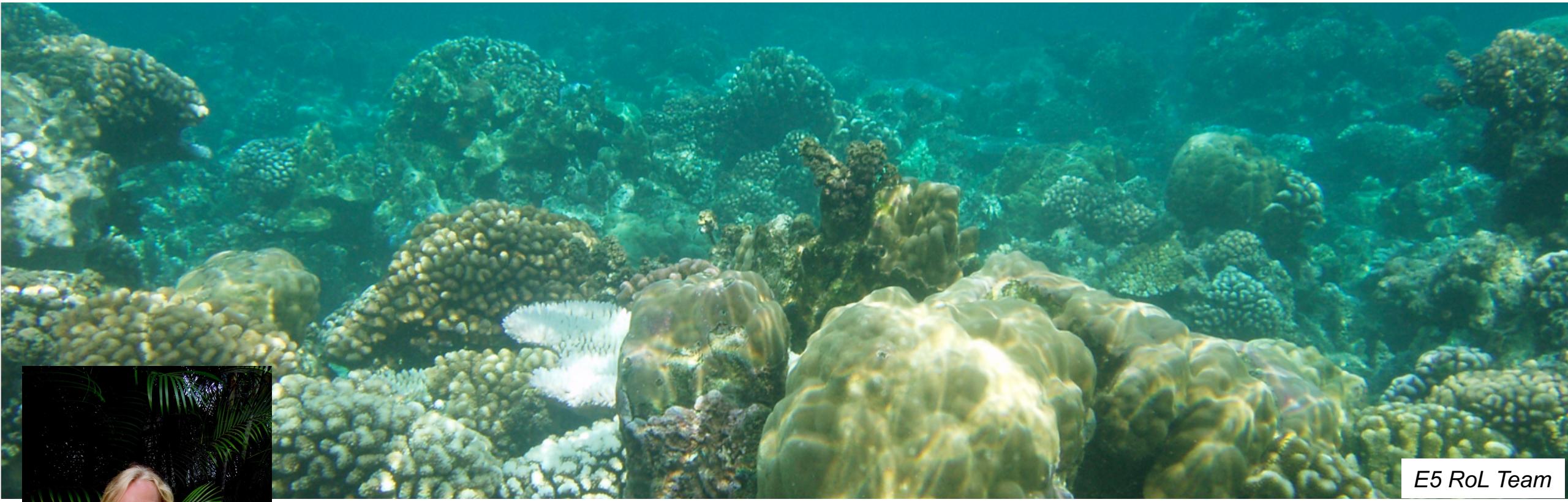


# *How do dynamic environmental conditions shape coral symbiosis and metabolism and drive energetic-epigenetic linkages?*



E5 RoL Team

**Ariana S. Huffmyer, PhD**  
Postdoctoral Researcher

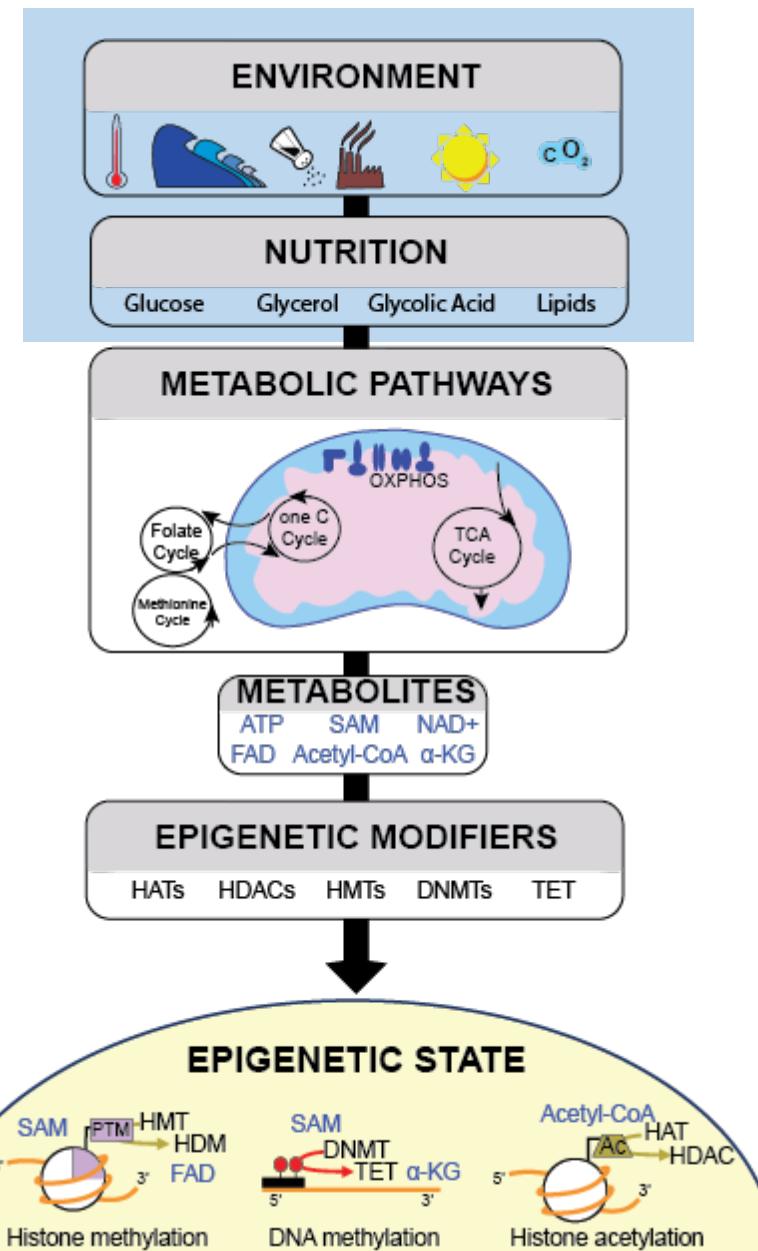
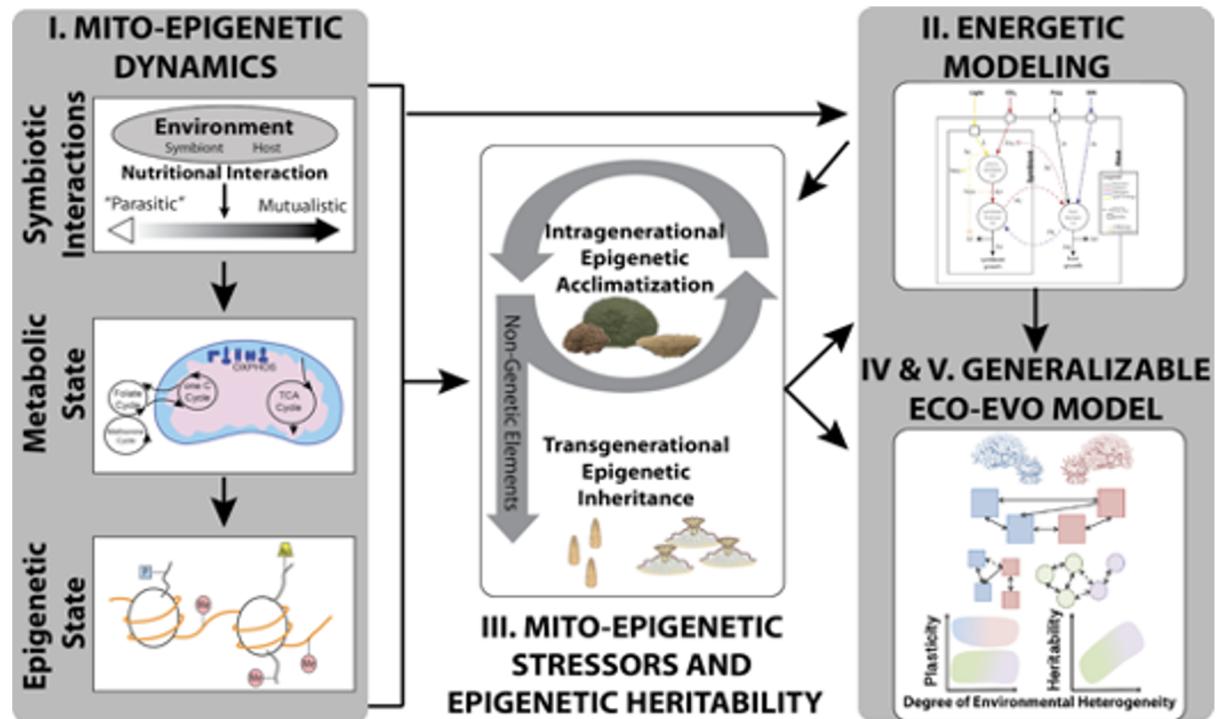
University of Rhode Island | Department of Biological Sciences  
University of Washington | School of Aquatic and Fisheries Sciences

@Dr\_Cnidariana  
[ashuffmyer@uri.edu](mailto:ashuffmyer@uri.edu)



# How do dynamic environmental conditions shape coral symbiosis and metabolism and drive energetic-epigenetic linkages?

## NSF E5 Rules of Life: Epigenetics



## Mahana

- High temperature and daily temperature range
- Low nutrients

## Hilton

- High pH variability, high/low daily pH
- Medium nutrients

## Manava

- High light
- High nutrients



Massive *Porites*



*Acropora pulchra*



*Pocillopora* spp.



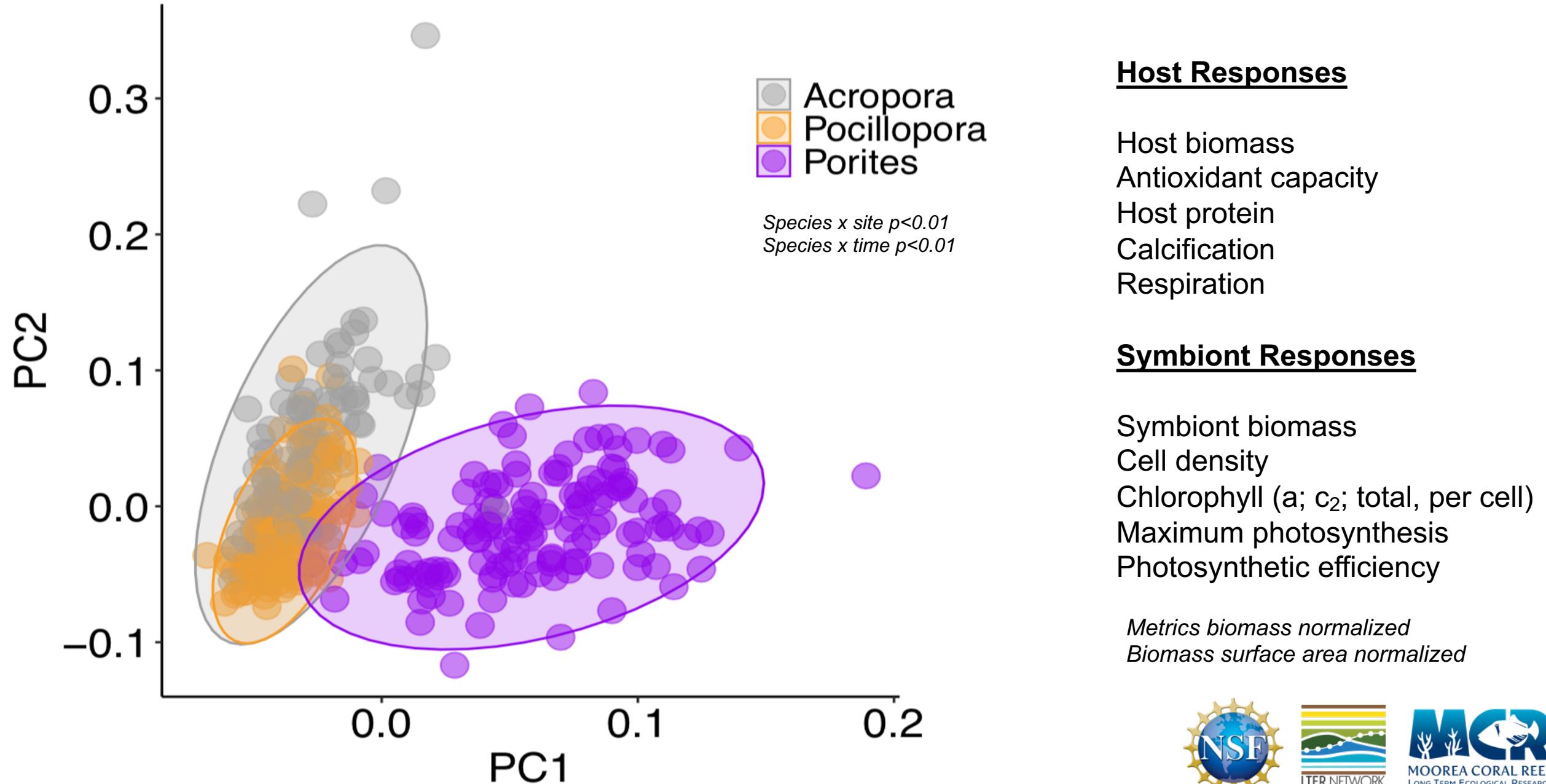
Logging Sensors



n=34-40 colonies per species

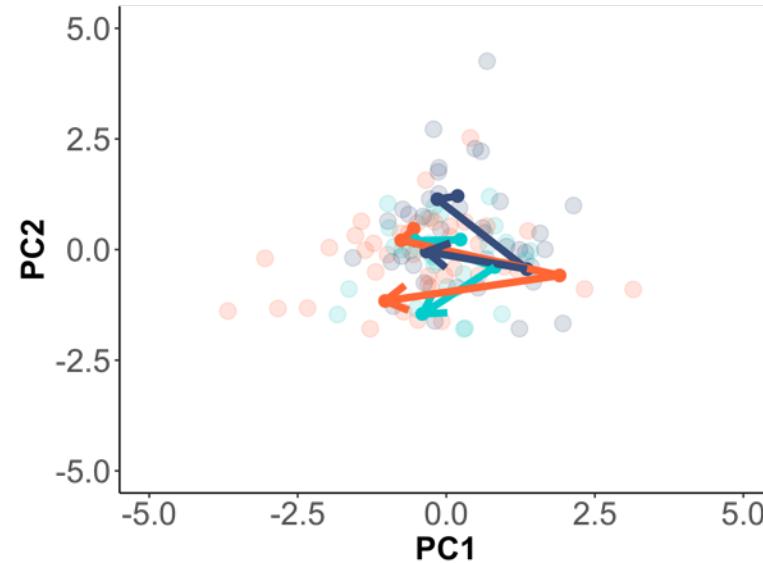
January – March – September – November 2020

# Species exhibit differential responses across site and time

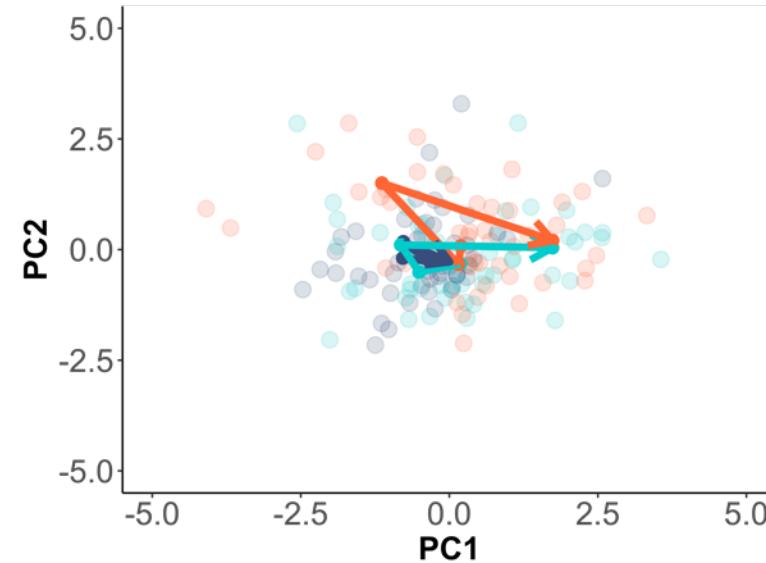


# Multivariate physiology: Host

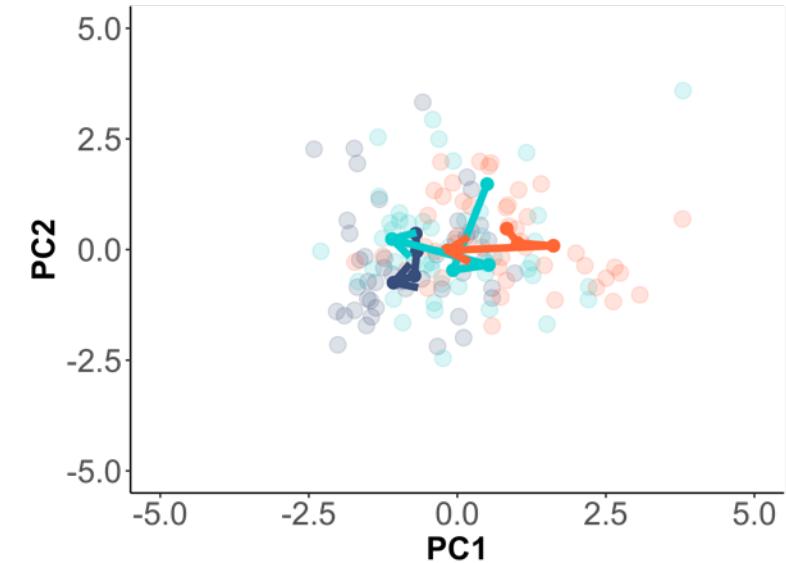
*Acropora*



*Pocillopora*



*Porites*

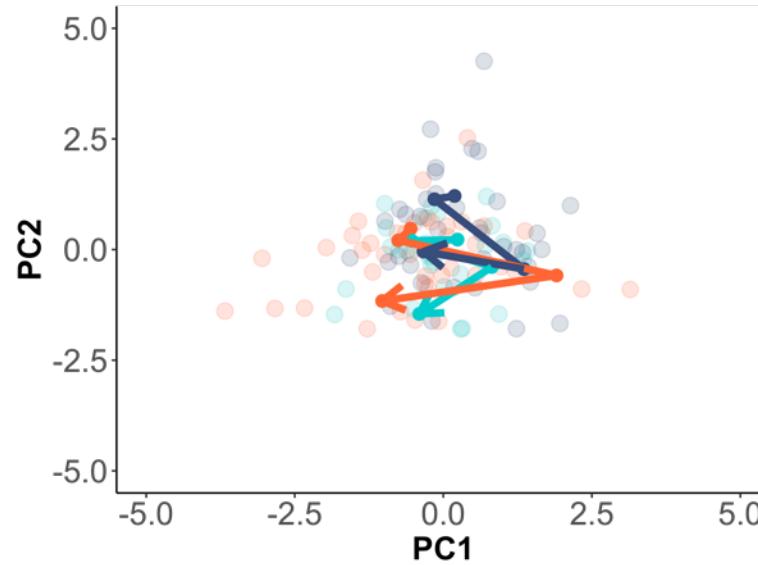


• Mahana Low • Hilton Medium • Manava High

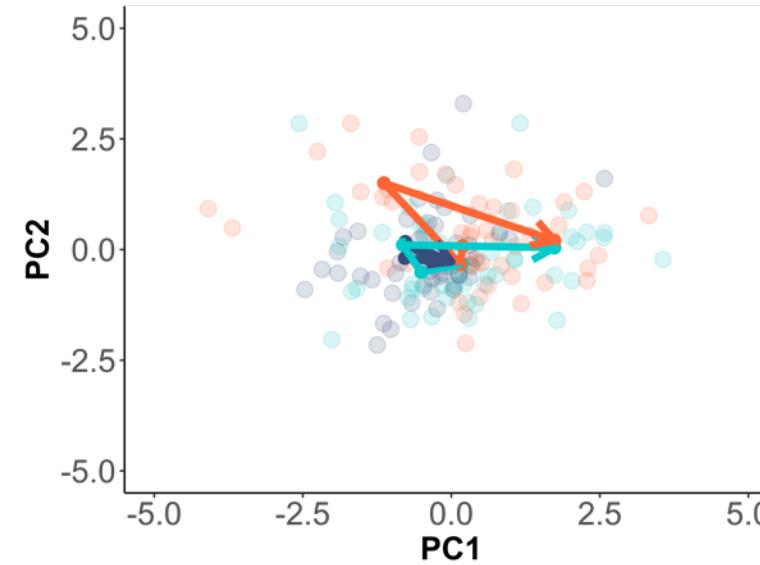
- Physiological trajectories are shaped by time and site interactions for each species
- Stronger influence of site on host physiology in *Porites* than other species

# Multivariate physiology: Host

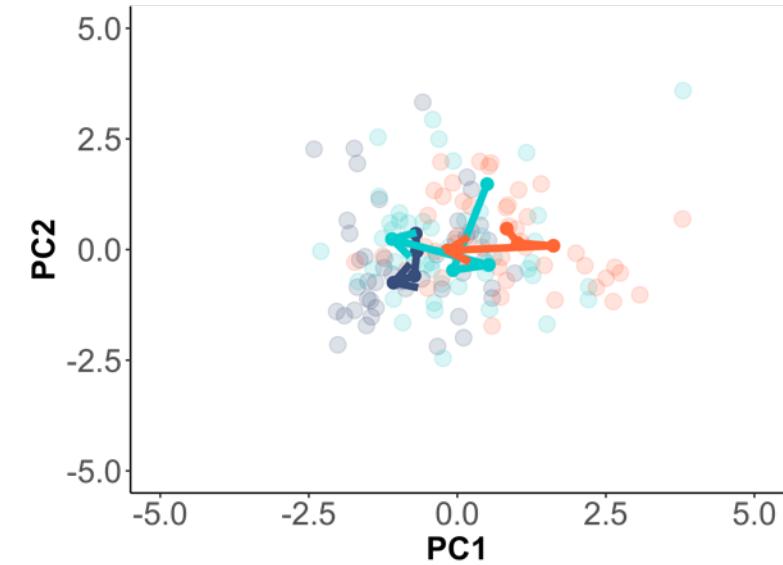
*Acropora*



*Pocillopora*



*Porites*



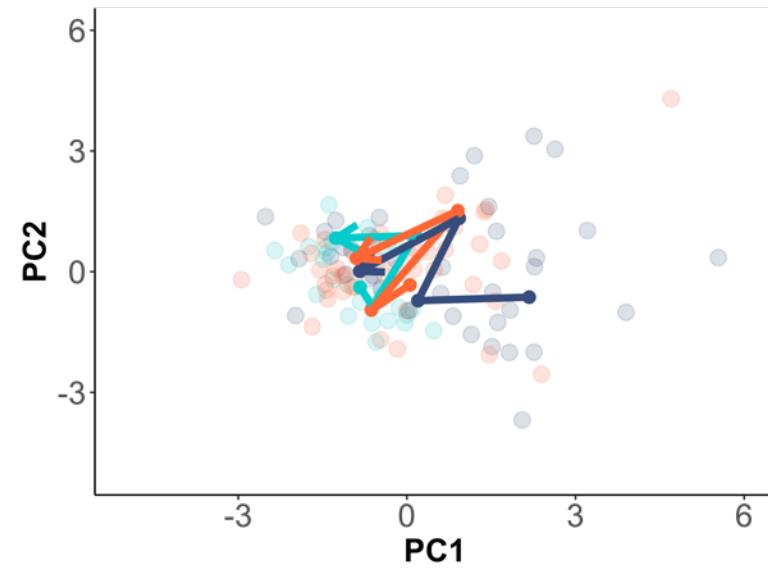
• Mahana Low • Hilton Medium • Manava High

- Strong seasonal influences across species:
  - Elevated tissue biomass, antioxidant capacity, and protein in cooler seasonal period
  - Higher respiratory demand during warmer seasonal periods, especially at sites with high light and nutrients (Manava) and high temperature (Mahana)
- More "movement" in trajectories in *Acropora* and *Pocillopora*

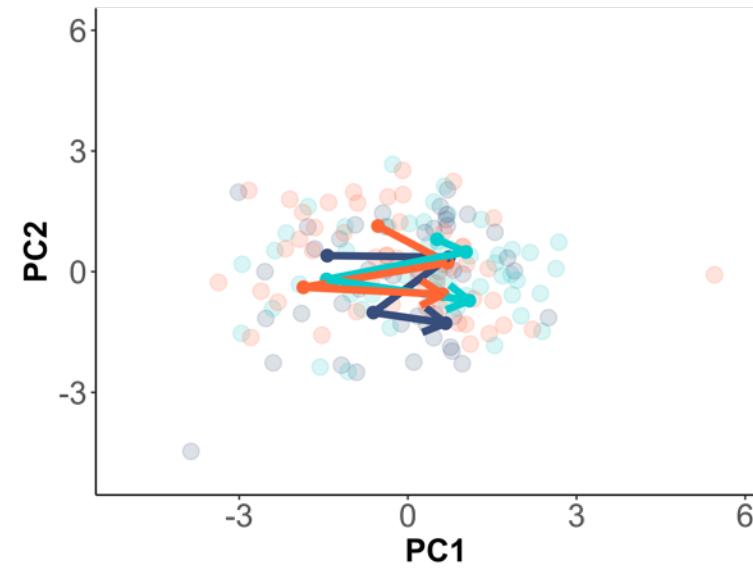


# Multivariate physiology: Symbiont

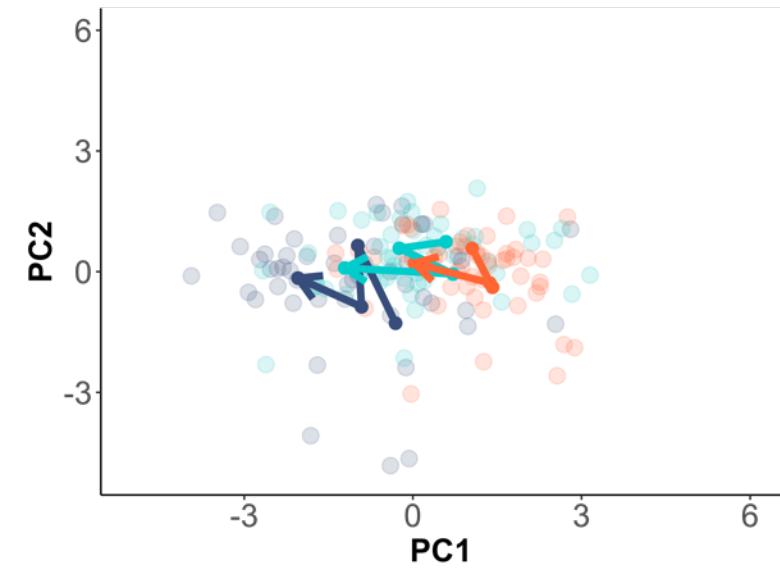
*Acropora*



*Pocillopora*



*Porites*



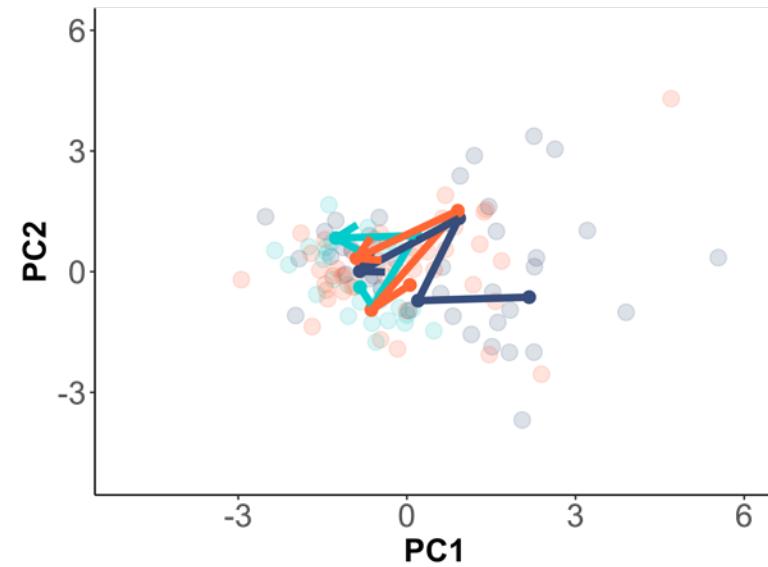
• Mahana Low • Hilton Medium • Manava High

- Symbiont physiological trajectories are shaped by time and site interactions for each species
- Metabolism and symbiosis characteristics were enhanced at the high light/nutrient site (Manava)

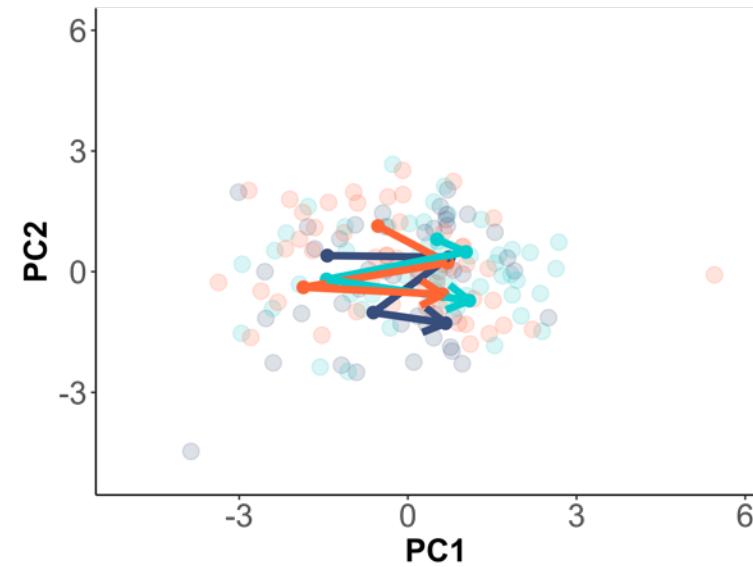


# Multivariate physiology: Symbiont

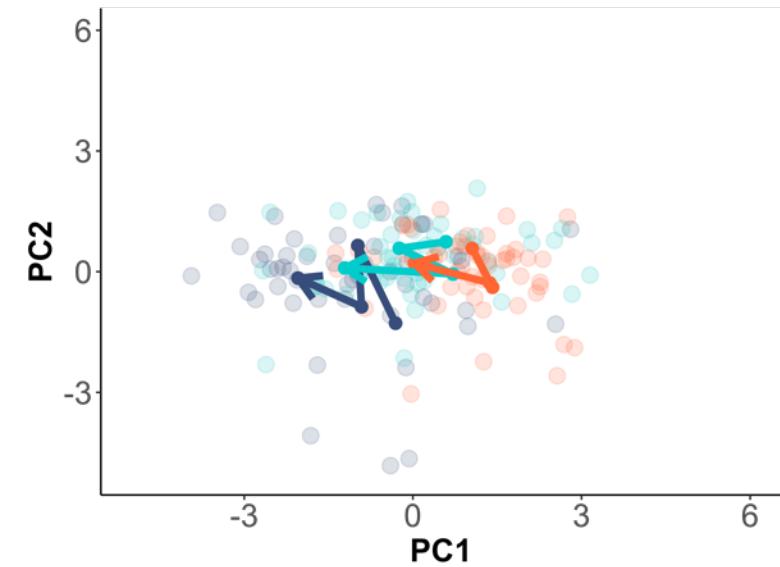
*Acropora*



*Pocillopora*



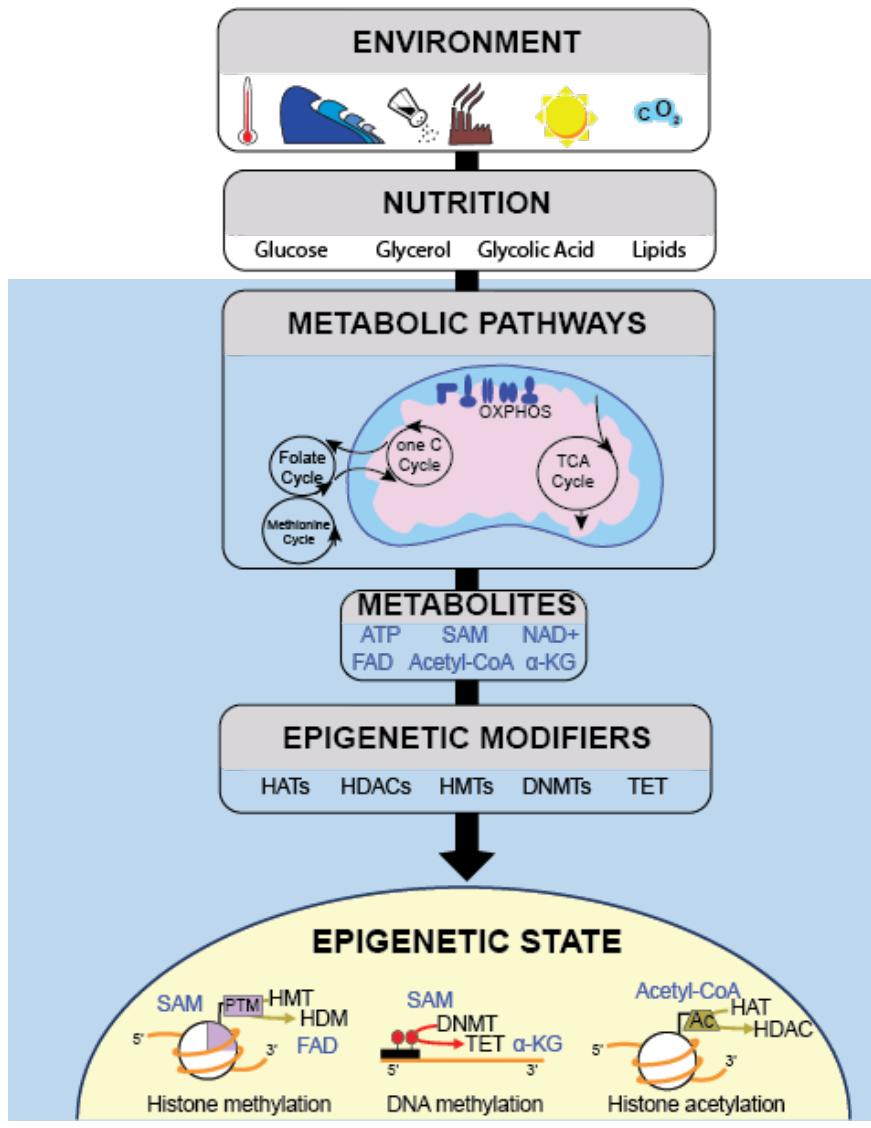
*Porites*



● Mahana Low ● Hilton Medium ● Manava High

- Trade-off between maximum photosynthesis and efficiency:
  - Higher max. photosynthesis in warm season and higher efficiency in cool season
  - Higher densities during warm period and higher chlorophyll concentration in cool season

# Environment shifts symbiosis and metabolism across a natural gradient with species-specific strategies



*Metabolomics  
Microbiome  
Symbiont community  
DNA methylation  
Histone acetylation  
Gene expression*



# NSF E5 Rules of Life: Epigenetics

Hollie Putnam  
Jose Eirin-Lopez  
Steven Roberts  
Holly Moeller  
Roger Nisbet  
Ross Cunning  
Juliet Wong  
Serena Hackerott  
Javier Rodriguez-Casariego  
Kelsey Yetsko  
Alexandra Brown  
Ferdinand Pfab  
Laetitia Hedouin

Yaamini Venkataraman  
Jill Ashey  
Dennis Conetta  
Alexandre Fellous  
Emma Strand  
Danielle Becker  
Kevin Wong  
Zach Bengtsson  
Shelly Trigg  
Sam White  
Raine Detmer  
Yann Lacube

## Questions?

[ashuffmyer@uri.edu](mailto:ashuffmyer@uri.edu)  
@Dr\_Cnidariana

