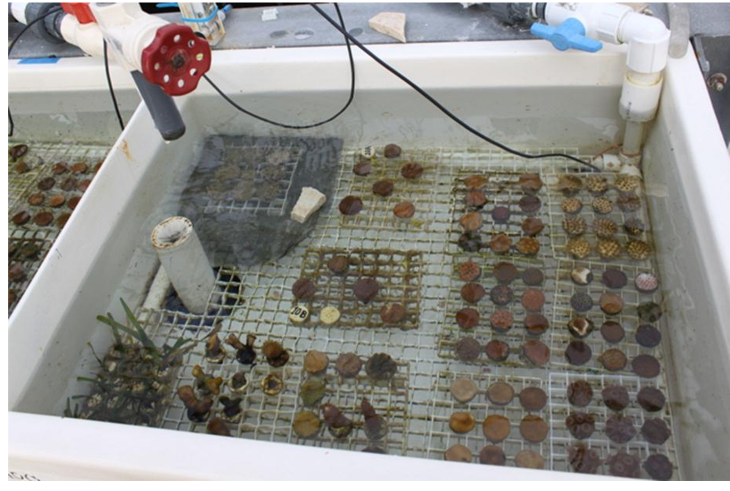
Species-specific heterotrophic response to increased acidification and temperature in corals of the Florida Reef Tract



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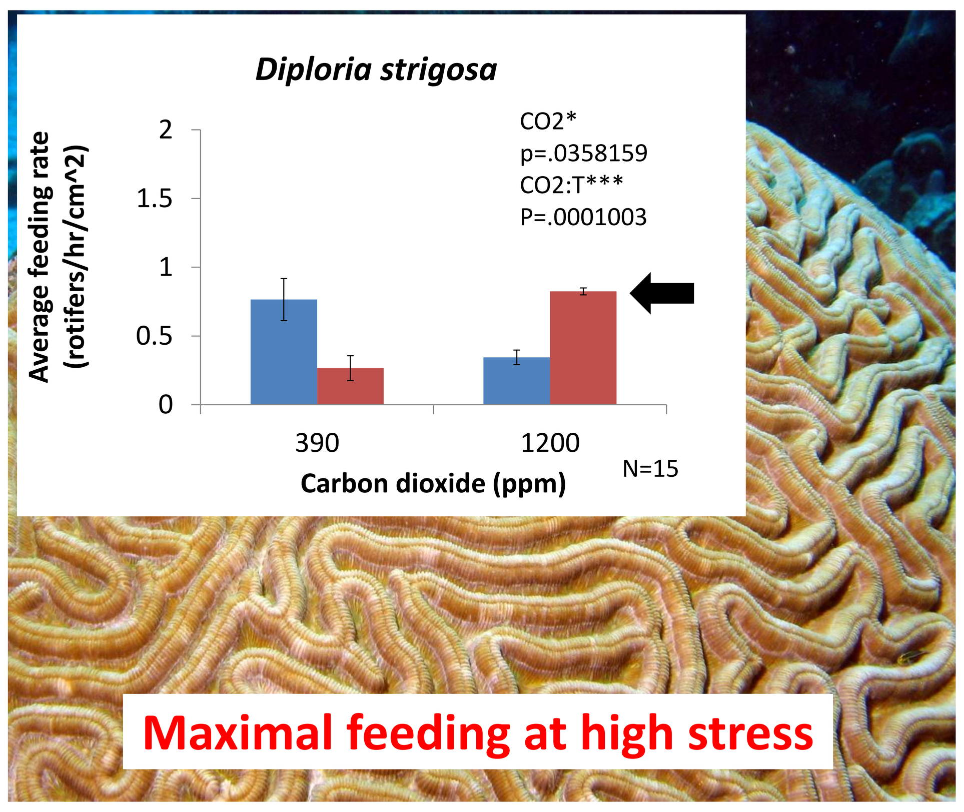
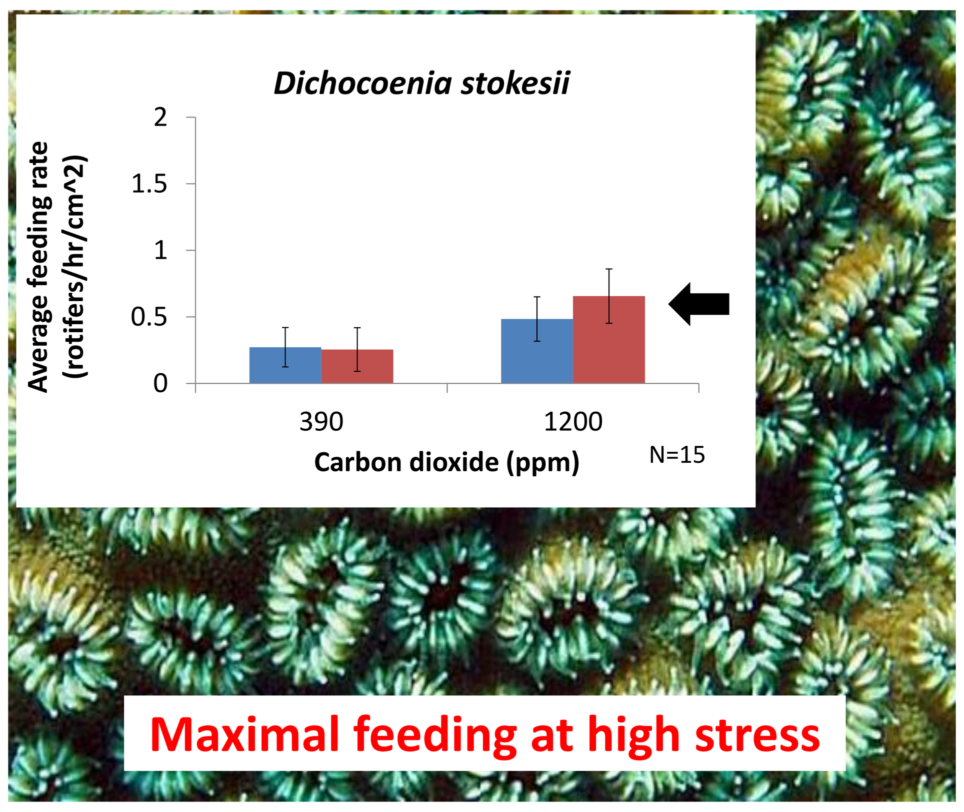
1. Objective:

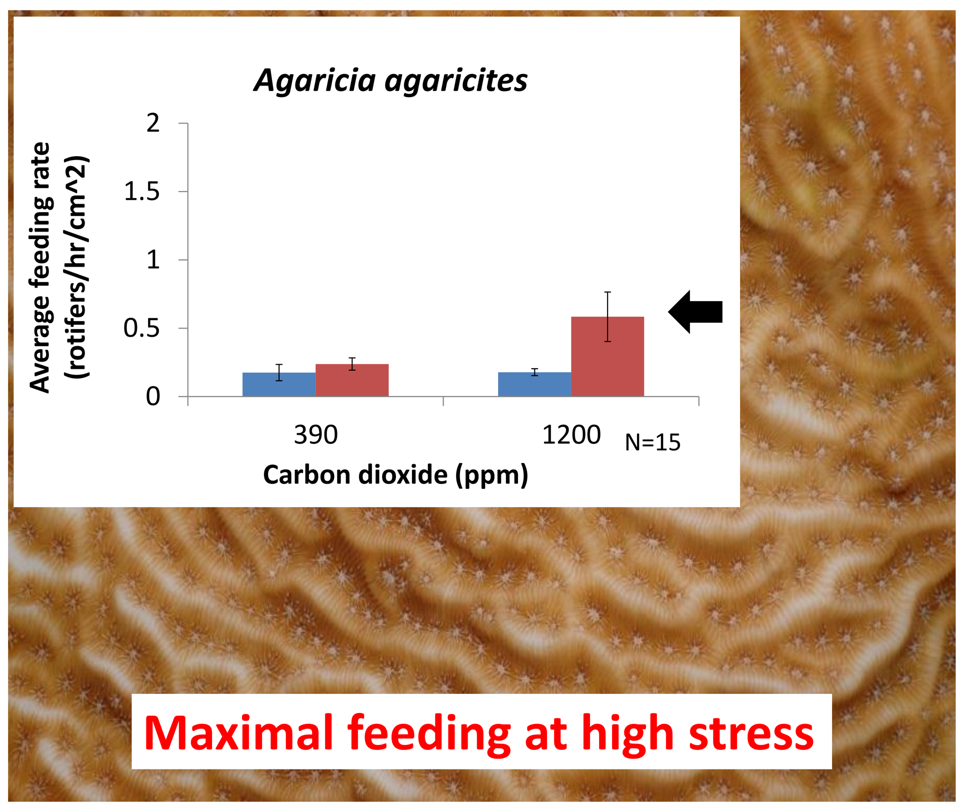
Heterotrophy may confer resilience to climate change stress such as bleaching[1] and ocean acidification[2]. This research examines the relative contributions of heterotrophic nutrition for 9 coral species in the Florida Reef Tract under the combined stresses of increased acidification and temperature.

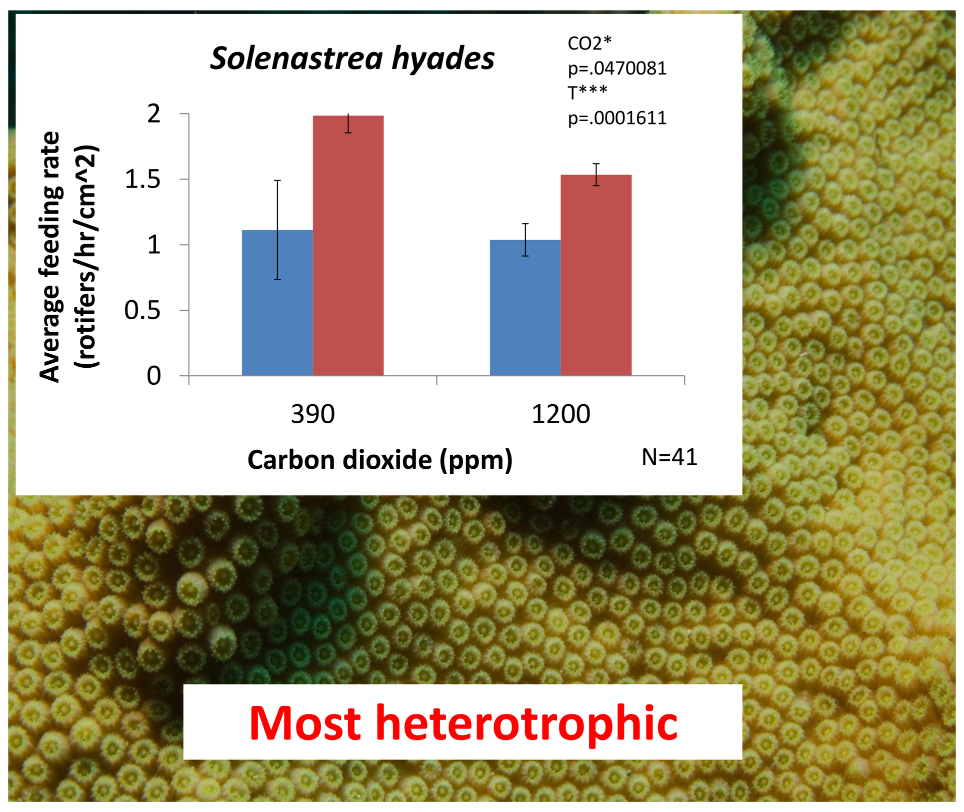
2. Approach:

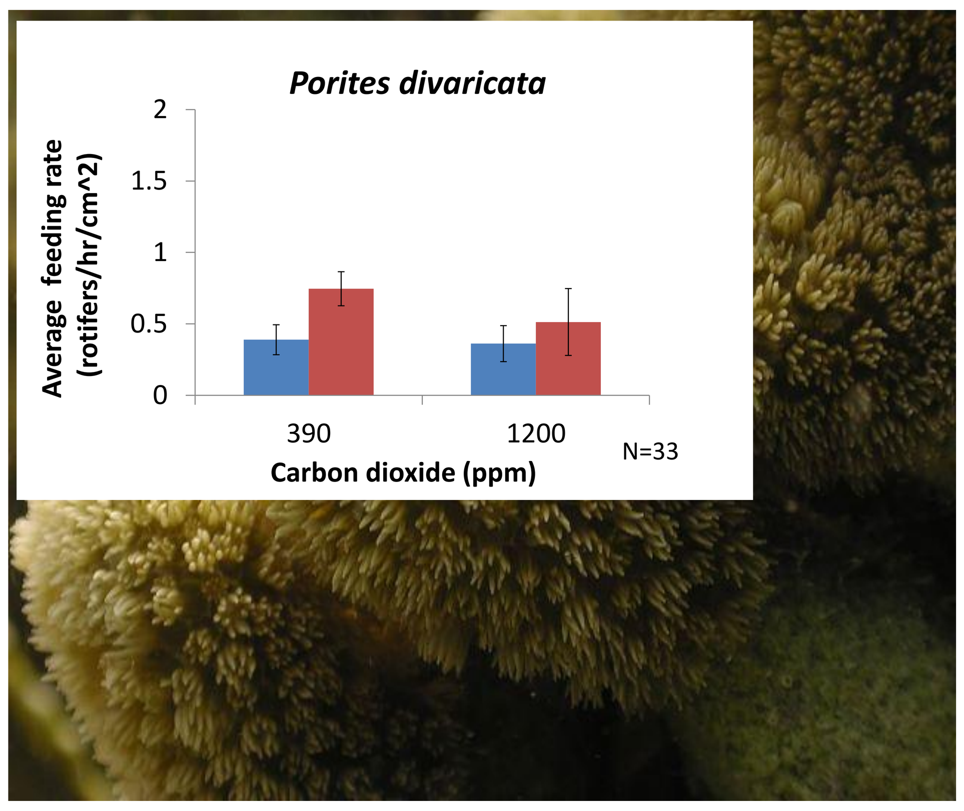
- Treatment levels were 27°C/390ppm, 27°C/1200 ppm, 30°C/390 ppm and 30°C/1200 ppm
- Each feeding trial had 12 1-L beakers – 10 containing a coral and 2 controls
- Each beaker had same flow rate, light, and initial concentration of rotifers (10/mL) and all corals fed for 1 hour
- Final water samples from each beaker were fixed in Lugols and quantified via microscope
- Final rotifer concentration - initial concentration = clearance rate for each coral in rotifers/hour, normalized to coral surface area

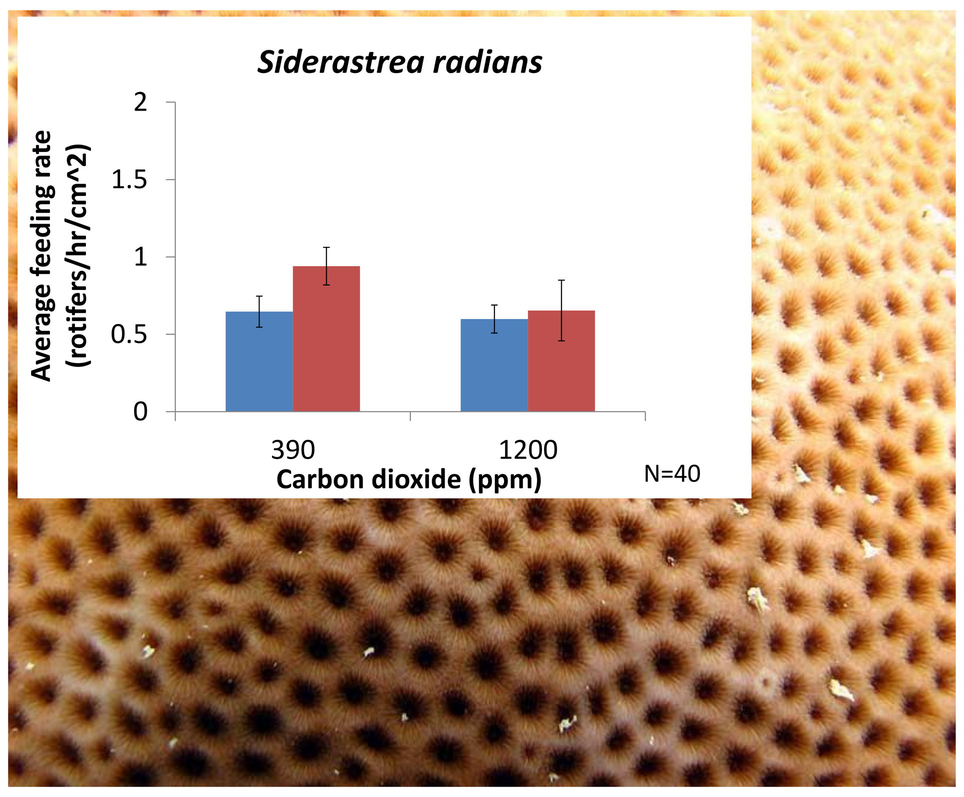


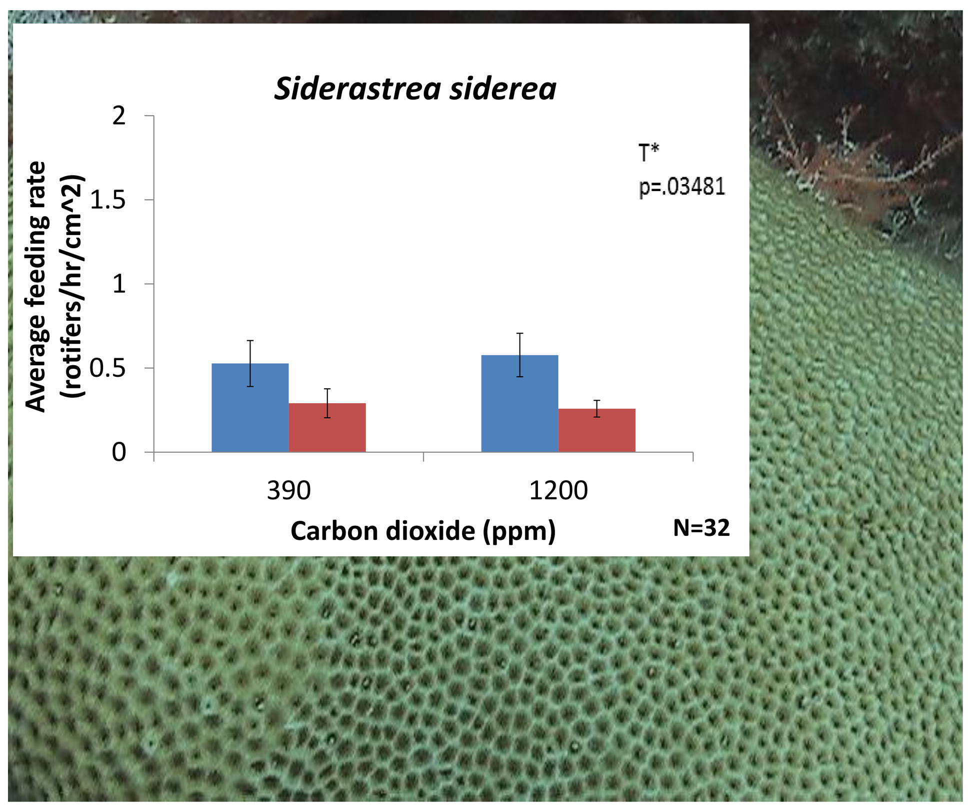


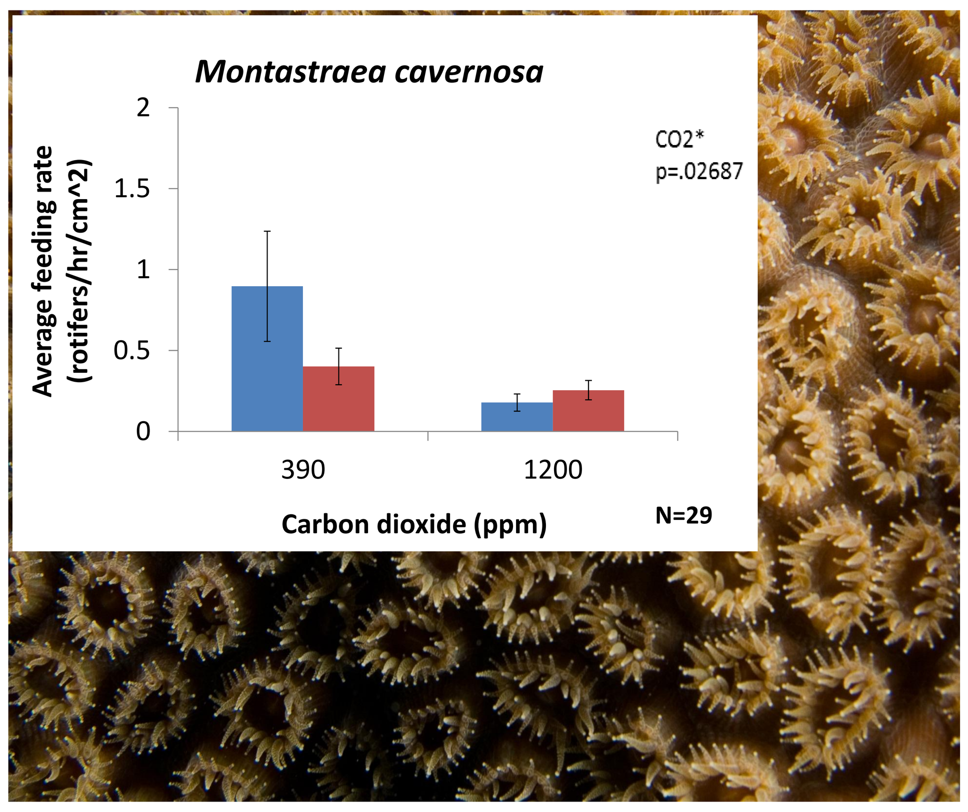


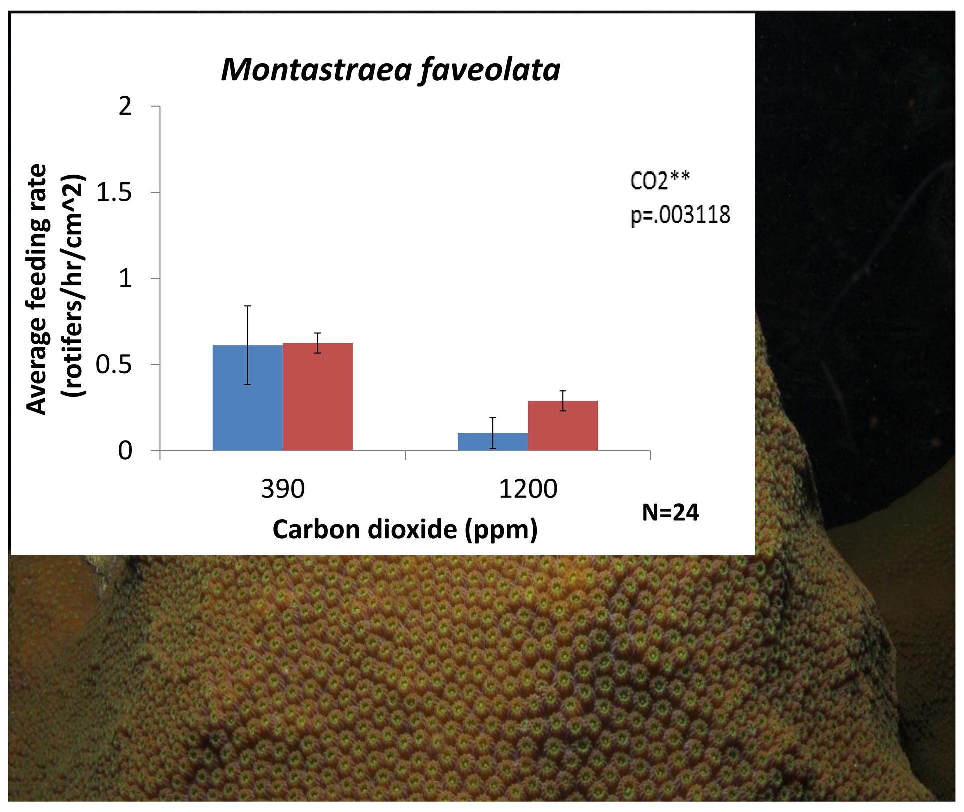












27ºC 30ºC All figures represent Two-way Unbalanced ANOVA. All error bars indicate mean ± 1 SE.

3. Results:

- *D. strigosa, D. stokesii*, and *A. agaricites* fed maximally at high temperature and high CO2
- *S. hyades* was the most heterotrophic and increased feeding at high temperature and high CO2
- *M. cavernosa, M. faveolata, S. radians,* and *P. divaricata* had depressed feeding at high CO2
- *S. siderea* feeding rates may be more sensitive to temperature as compared to other species

4. Conclusions

- **If heterotrophy is a marker for resilience *D. strigosa, D. stokesii, A. agaricites* , and *S. hyades* may be "winners" on reefs, while *M. cavernosa, M. faveolata, S. radians, P. divaricata,* and *S. siderea* may be "losers" in need of stronger conservation efforts**

5. Ongoing work

- Correlating heterotrophy rates to total lipid content to see if heterotrophy confers resilience with respect to energy stores
- Correlating heterotrophy rates to calcification data to see if heterotrophy confers resilience with respect to growth

5. Acknowledgements

University of Miami Storer Fellowship, RSMAS Alumni Award

6. References

1. Grottoli, A.G, Rodrigues, L.J, and Palardy, J.E. (2006) *Nature*, 440:1186-1189.
2. Cohen, A. and Holcomb, M. (2009) *Oceanography*, 22:118-127.