

Hurricane Hole, St. John, USVI: corals with a resilient microbiome

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Introduction

The health of coral reefs worldwide is in decline, but certain reefs exhibit resistance to many global and local stressors. We aim to study these locations to identify factors within corals that make them resilient. After several bleaching and disease events occurring throughout the USVI over the last several years, scientists identified Hurricane Hole, St. John as a potential non-reef coral refuge. Corals within this site exhibit resilience to stressors including ocean acidification and temperature increases. **By characterizing and comparing the bacterial microbiomes of three dominant coral species (*Diploria labyrinthiformis*, *Colpophyllia natans*, *Orbicella annularis*) among four sites (Coral Bay, Haulover Bay, Otter Creek, Water Creek) we identified particular features that may contribute to Hurricane Hole's resilience.**

Methods

- 30 coral mucus and tissue samples and 3 water samples were collected at each site
 - Within each site, 10 samples were collected from each coral species: *D. labyrinthiformis*, *C. natans*, and *O. annularis*
 - Resilient sites: Otter Creek, Water Creek
 - Susceptible sites: Haulover Bay, Coral Bay
- Samples were sequenced using Next-Generation sequencing on an Illumina platform
- Resulting data analyzed in R/RStudio and Microsoft Excel

Results

- Bacterial community compositions significantly different among sites and coral species
- Beta diversity was significantly higher for *D. labyrinthiformis* compared with the other two coral species
- Alpha diversity was significantly lower in *O. annularis* and significantly higher in Water Creek
- Dominant bacterial classes: Alphaproteobacteria, Gammaproteobacteria, Cyanobacteria, and Flavobacteriia (and percent abundance of these varied between resilient and susceptible sites)
- Significant bacterial genera: *Alteromonas*, *Pseudoalteromonas*, *Xanthobacillum*, *Prochlorococcus*

Recommendations

- Sample microbiomes of other geographically-distinct resilient sites and determine commonalities among the bacterial communities
- Use current characterization of Hurricane Hole as a bioindicator for identifying other resilient sites
- Help prioritize sites, such as Hurricane Hole, when it comes to management and marine spatial planning