

Bacterial and Coral Reef Communities ~ Multivariate Analysis ~

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Learn at Miki sensei's lab(3/1~3/4)

Multivariate analysis with ecoplate



Similar analysis methods can be used for research in microbial and coral reef community diversity.

Introduction

Importance of coral reefs

Diversity Human society *tourism, fish, coastal protection*

Degradation

Anthropogenic impact Natural disturbances *pollution, typhoon, overfishing*



Coral Reefs in Danger !!!



<u>Introduction</u>

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<u>Taiwan</u>



Distribution of coral reef



Vicky's work

<u>Objective</u>: Identify ecological communities in reefs around Taiwan

3 regions and 2 depths

But

This type of research without automatization is time-consuming and challenging !!!



Who does this work on behalf of her ???

Objective 1: Learning about coral reef associated organisms

Objective 2: Comparing results of Artificial intelligence (AI) and Visual Observation (VO)



human

machine

Material & Methods

1.Using 209 pictures in 2 regions, Green Island and Kenting

- VO: Analysis using CPCe (manual)
- Al: Analysis using CoralNet (automatic)
- 2. Data Analysis

Identify benthic categories at functional level (morphologies)

Compare both of them with Bray-Curtis Dissimilarity, Cluster (dendrogram), n-MDS, and test using ANOSIM

Compare VO and AI, Green Island and Kenting



<u>Results</u>

Ordered Bray-Curtis Dissimilarity Matrix

040 4 GGVO40 4 GVO40_1 GGVO40_1 **GGVO40** 3 GGVO40_3 **GGVO40** 5 GGVO40 5 GGVO40 GGVO40_2 A140_2 GGAI40_2 5 GGAI40 1 GGAI40_1 GGAI40 3 GGAI40 3 GGAI40 5 GGAI40 5 GGAI40_4 A 17 15 KXAI40_5 XA140 3 KXAI40_3 KXA140 4 KXA140_4 KXAI40 1 KXAI40_1 KXA140_2 KXA140 2 KXV040_5 KXVO40 5 KXVO40_4 KXVO40_4 KXVO40 1 KXVO40 1 KXVO40 KXVO40_3 KXVO40 2 KXV04

UPGMA (average) dendrogram of BC similarity



hclust (*, "average")

Al: computer VO: Human

GG: Green Island KX: Kenting

<u>Results</u>



non-Metric Dimentional Scaling (n-MDS) of BC dissimilarities

Analysis of Similarities test (ANOSIM)



- ✓ Difference among regions for AI and VO
- Regions better distinguished with VO



Discussion & conclusions

Reefs at Green Island and Kenting are very different

Green island

Distance between AI and VO is high

Kenting

Distance between AI and VO is lower than Green Island.

 Increase accuracy of Al: training (especially for regions with higher diversity, *Green Island*)



VS.

 Higher AI accuracy: less difference with VO





ΑΙ

Discussion & conclusions



 Increase accuracy of AI: training (especially for regions with higher diversity, *Green Island*)

 Higher AI accuracy: less difference with VO

If ability of AI gets better...

It may become useful in the future, and Vianney sensei can replace Vicky by a machine !

<u>Acknowledgments</u>

Miki's Lab / Vianney's Lab

Thank you for listening Field work & sampling