Contribution ID: **49** Type: **Oral Presentation**

Monitoring of coral reef ecosystem: an integrated approach of marine soundscape and machine learning

Wednesday, 21 March 2018 12:00 (30 minutes)

Coral reefs represent the most biologically diverse marine ecosystem, however, they are vulnerable to environmental changes and impacts. Therefore, information on the variability of environment and biodiversity is essential for the conservation management of coral reefs. In this study, a soundscape monitoring network of shallow and mesophotic coral reefs was established in Okinawa, Japan. Three autonomous sound recorders were deployed in water depths of 1.5 m, 20 m, and 40 m since May 2017. To investigate the soundscape variability, we applied the periodicity-coded nonnegative matrix factorization to separate biological sounds and the other noise sources displayed on long-term spectrograms. The separation results indicate that the coral reef soundscape varied among different locations. At 1.5 m depth, biological sounds were dominated by snapping shrimp sounds and transient fish calls. Although not knowing the specific source, noises were clearly driven by tidal activities. At 20 m and 40 m depths, biological sounds were dominated by nighttime fish choruses and noises were primary related to shipping activities. Furthermore, the clustering result indicates the complexity of biological sounds was higher in mesophotic coral reefs compare to shallow-water coral reefs. Our study demonstrates that the integration of machine learning in the analysis of soundscape is efficient to interpret the variability of biological sounds, environmental and anthropogenic noises. Therefore, the conservation management of coral reefs, especially those rarely studied such as mesophotic coral reefs, can be facilitated by the long-term monitoring of coral reef soundscape.

Primary author: Dr LIN, Tzu-Hao (Research Center for Information Technology Innovation, Academia Sinica)

Co-authors: Dr SINNIGER, Frederic (Tropical Biosphere Research Center, University of the Ryukyus); Dr HARII, Saki (Tropical Biosphere Research Center, University of the Ryukyus); Dr AKAMATSU, Tomonari (National Research Institute of Fisheries Science, Japan Fisheries Research and Education Agency); Dr TSAO, Yu (Research Center for Information Technology Innovation, Academia Sinica)

Presenter: Dr LIN, Tzu-Hao (Research Center for Information Technology Innovation, Academia Sinica)

Session Classification: Earth, Environmental Science & Biodiversity Session

Track Classification: Earth & Environmental Sciences & Biodiversity Applications