Introduction Outline

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Purpose: We looked to find what aspects of the soundscape were creating changes seen in SPL (possibly on ACI) on Kiritimati.

Aspects of the Soundscape: Broadband (All frequencies), Snapping shrimp (high frequencies) and Fish (low frequencies).

Storyline:

Biggest: Acoustics in the ocean are associated with many processes associated with the health and reproduction of coral reefs and their inhabitants. (**REF**).

Bioacoustics created by coral reef inhabitants are partially responsible for the settlement patterns of fish and invertebrates in the surrounding water column (**Radford REF**).

Several species of reef fish have evolved the ability to create sounds for use in reproductive behavior and territorial disputes (**Lobel REF**).

Big: Patterns in bioacoustics have been associated with changes in season, moon phase and reef health (**Radford REF,**

Small: These patterns are the result of the ecosystem responding to environmental stimuli, however these specific responses have often been aggregated and rarely separated into their parts to determine the effects of stimuli on different sections of the biogenic soundscape.

Hypothesis: We investigated the mechanisms of these patterns, quantifying snaps and fish calls to determine their effect on metrics commonly used to describe biogenic sound underwater.

* The notion of the “silent world” has been changed with the introduction of acoustics applied to marine environments. Marine soundscapes are in fact one of the least understood subjects in marine biology.
  + Fish have evolved a method of “hearing” (Popper and Fay 2011).
* Underwater acoustics is one of the fastest growing fields in marine biology with a large part of that movement centered on the interpretation of large acoustic data files collected by passive acoustic monitoring (PAM) systems (Lammers et al. 2008; Luczkovich et al. 2008; Wall et al. 2013; Merchant et al. 2015).
  + Several studies are working toward learning programs that can pull information from this big data without user input (Sattar et al. 2016; Lin et al. 2017, 2018).
* The big goal of acoustic studies is to draw connections between the “health” of an ecosystem and the sounds that it creates (Nedelec et al. 2015; Bertucci et al. 2016; Freeman and Freeman 2016)
  + Several acoustic indices have been adopted from terrestrial systems to apply to the marine environment.
  + A variety of metrics have been studied to determine correlations with ecosystem health indicators to provide information about the reefs (Parks et al. 2014; Bertucci et al. 2016; Mcpherson et al. 2016; Bolgan et al. 2018)
    - ACI was adapted from use in avian soundscapes to give information about acoustic complexity underwater (Pieretti et al. 2011)
    - It has been used in a variety of ecosystems as a metric to describe complexity in the marine soundscape (Kaplan et al.; McWilliam and Hawkins 2013; Butler et al. 2016)
* Coral reef soundscapes have been connected to larval settlement patterns for both invertebrate and invertebrate larvae (Radford et al. 2011b, 2011a; Stanley et al. 2012)