Using dermal denticle assemblages to reconstruct shark communities on coral reefs over millennia

Erin Dillon
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depleted on many modern coral reefs worldwide

MacNeil et al. 2020
Many shark populations have declined over the last several decades.
Long-term trends of change in shark abundance are largely unknown.
How abundant were sharks on coral reefs before humans? Why do some reefs support more sharks?

How much have reef shark communities changed over the last several millennia in different regions?

What are the ecological consequences of these changes?
How abundant were sharks on coral reefs before humans? Why do some reefs support more sharks?

How much have reef shark populations changed in just several millennia in different regions?

What are the ecological consequences of those changes?
The fossil record of shark “skin teeth”
The fossil record of shark “skin teeth”

- Sub-Recent
- 7 ka

- 10-85 Ma

- >200 Ma

Methods development

Application: quantify a pre-exploitation shark baseline in Caribbean Panama

Bocas del Toro, Panama

- Punto Donato reef (4 samples)
- Casa Blanca reef (6 samples)
- Cayo Adriana reef (6 samples)
- Fossil (5 sites, 3 samples each)

- Mid-Holocene reef
- Modern reef
Application: quantify a pre-exploitation shark baseline in Caribbean Panama

~71% decline in abundance

shift in functional composition

Dental accumulation rate (denticles kg sediment^-1 year^-1)

Mid-Holocene (7.2-5.7 ka)  Modern (last 50-360 y)

Reef age

NMDS 1  NMDS 2

Demersal  Pelagic

Reef Age

Mid-Holocene  Modern

Stress=0.12  p=0.02

Dillon et al. 2021
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erinmdillon@ucsb.edu

@erinmdillon