The Influence of Landscape Setting and Duration of Inundation on Oyster Reef Growth

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Objectives

Considering aerial exposure and landscape, we wanted to identify:

1) a minimum or critical exposure depth, below which productivity is low or non-existent and reefs will not accrete fast enough to keep up with SLR

2) an optimal exposure depth where productivity is highest

3) a maximum exposure depth or ceiling, above which desiccation and temperature stress is too high for oysters to live

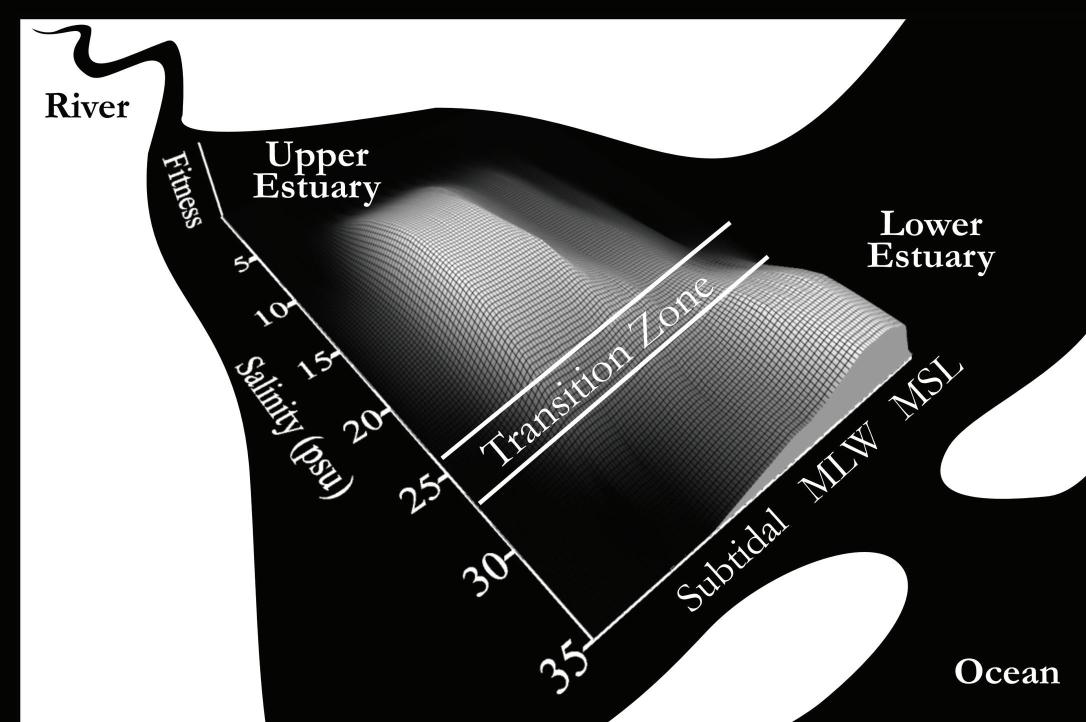
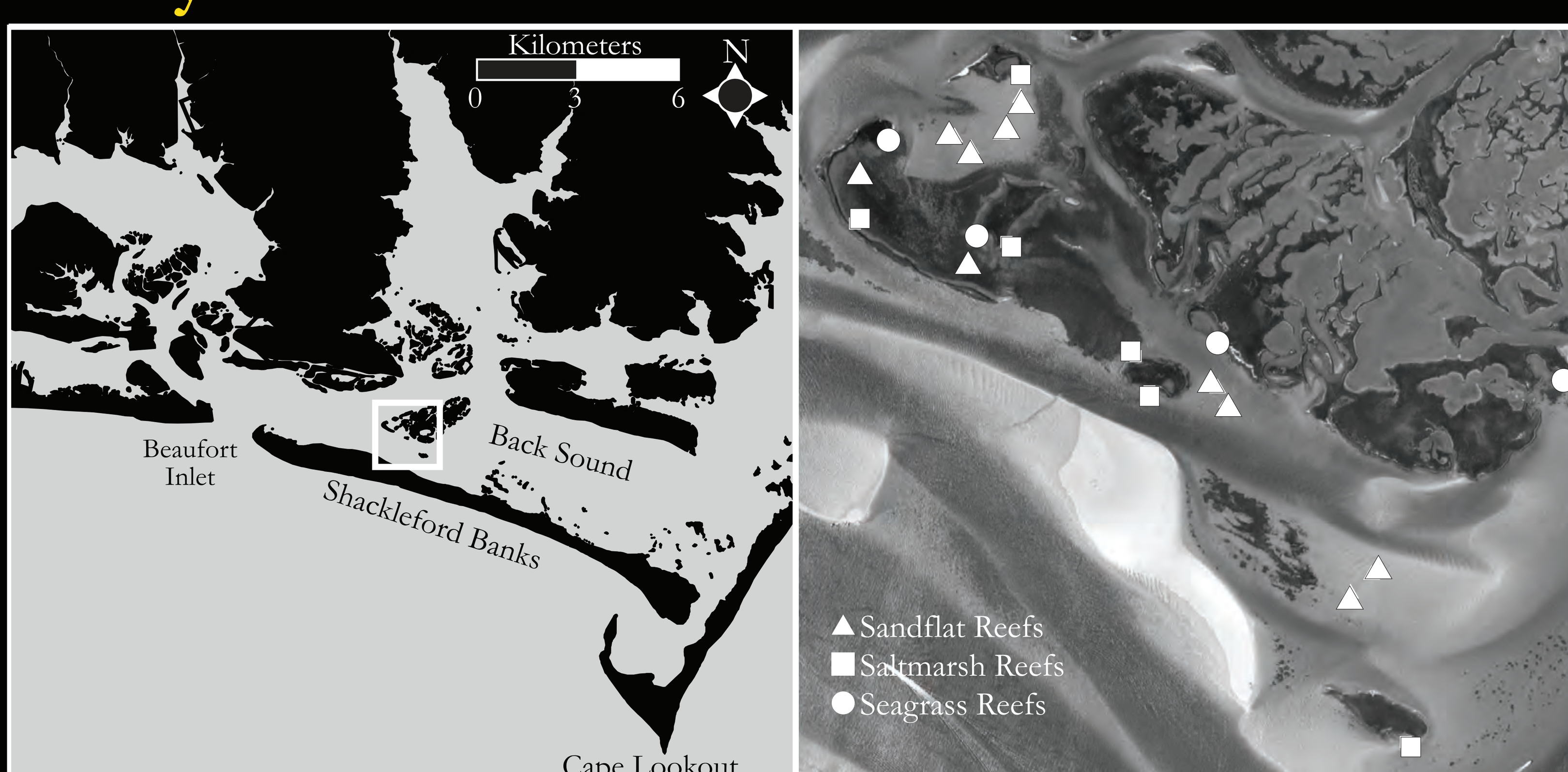


Figure 1. Conceptual oyster fitness model

Study Area



Middle Marsh, Back Sound, North Carolina

Methods

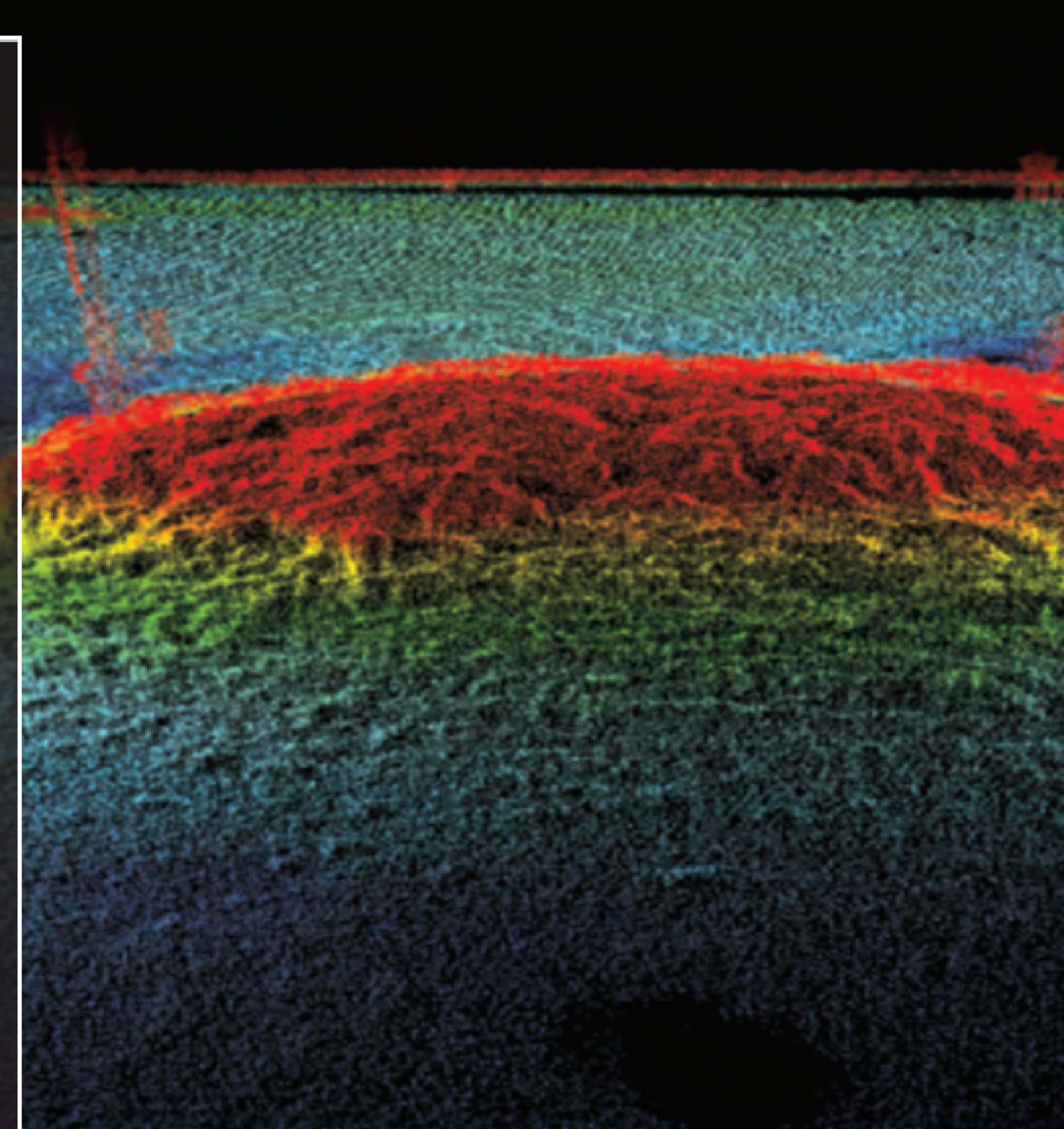
Oyster Density | Jackhammer Coring | Laser Scanning

Results

Oyster Density (Fig. 2A)
- Sandflat reefs exhibited a strong, positive linear dependence on aerial exposure time
- No relationship with saltmarsh reefs

Reef Cores (Fig. 2B) - Growth
- Strong, parabolic relationship between reef height and aerial exposure on sandflat reefs
- Negative linear relationship on saltmarsh reefs

Laser Scan Data
- Reefs exhibit different morphologies based on landscape (Fig. 3A)
- Parabolic growth curve with aerial exposure on sandflat reefs (Fig. 3B)



Laser Scan of a Sandflat Reef

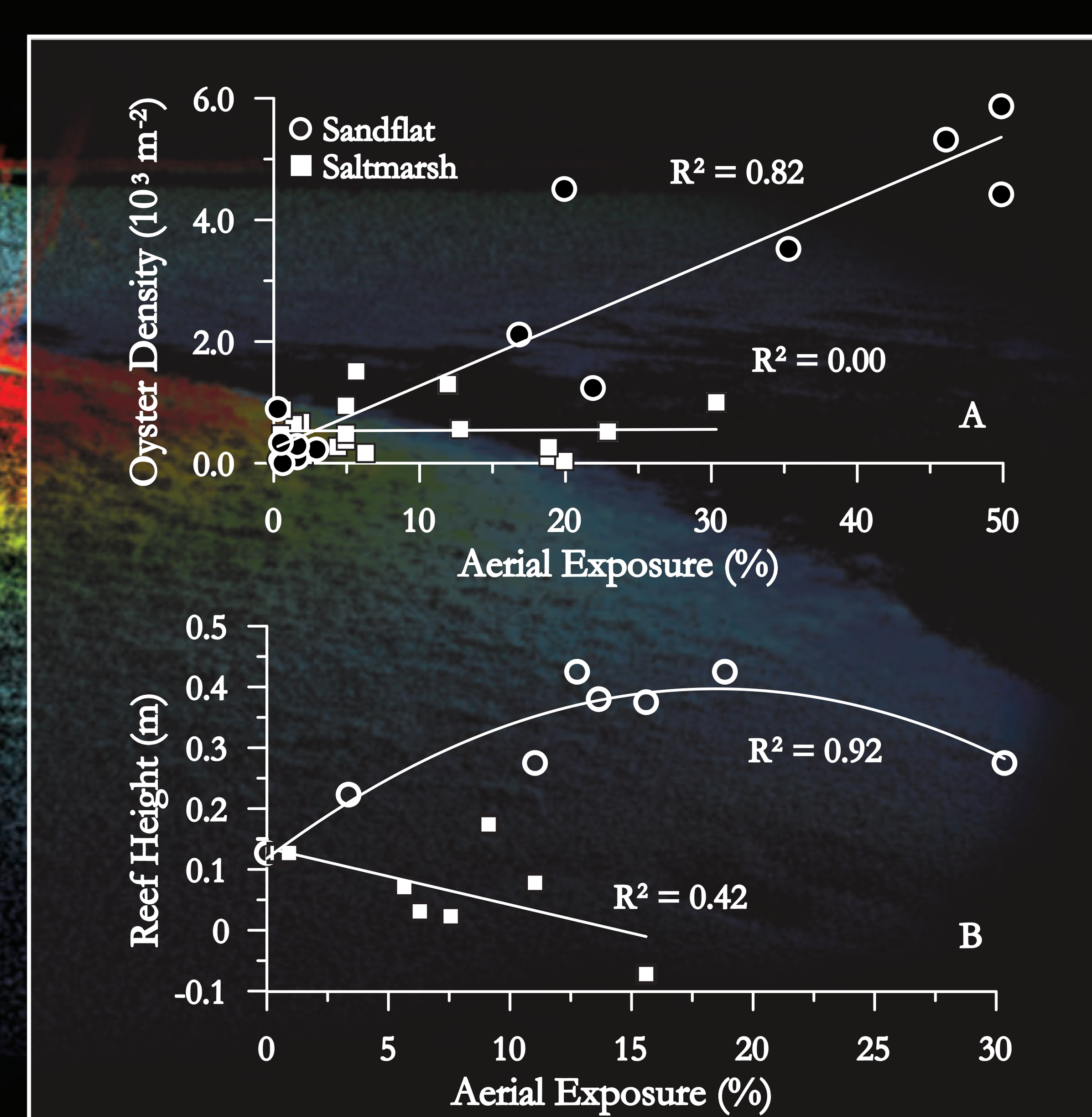


Figure 2. Oyster densities and reef heights by aerial exposure

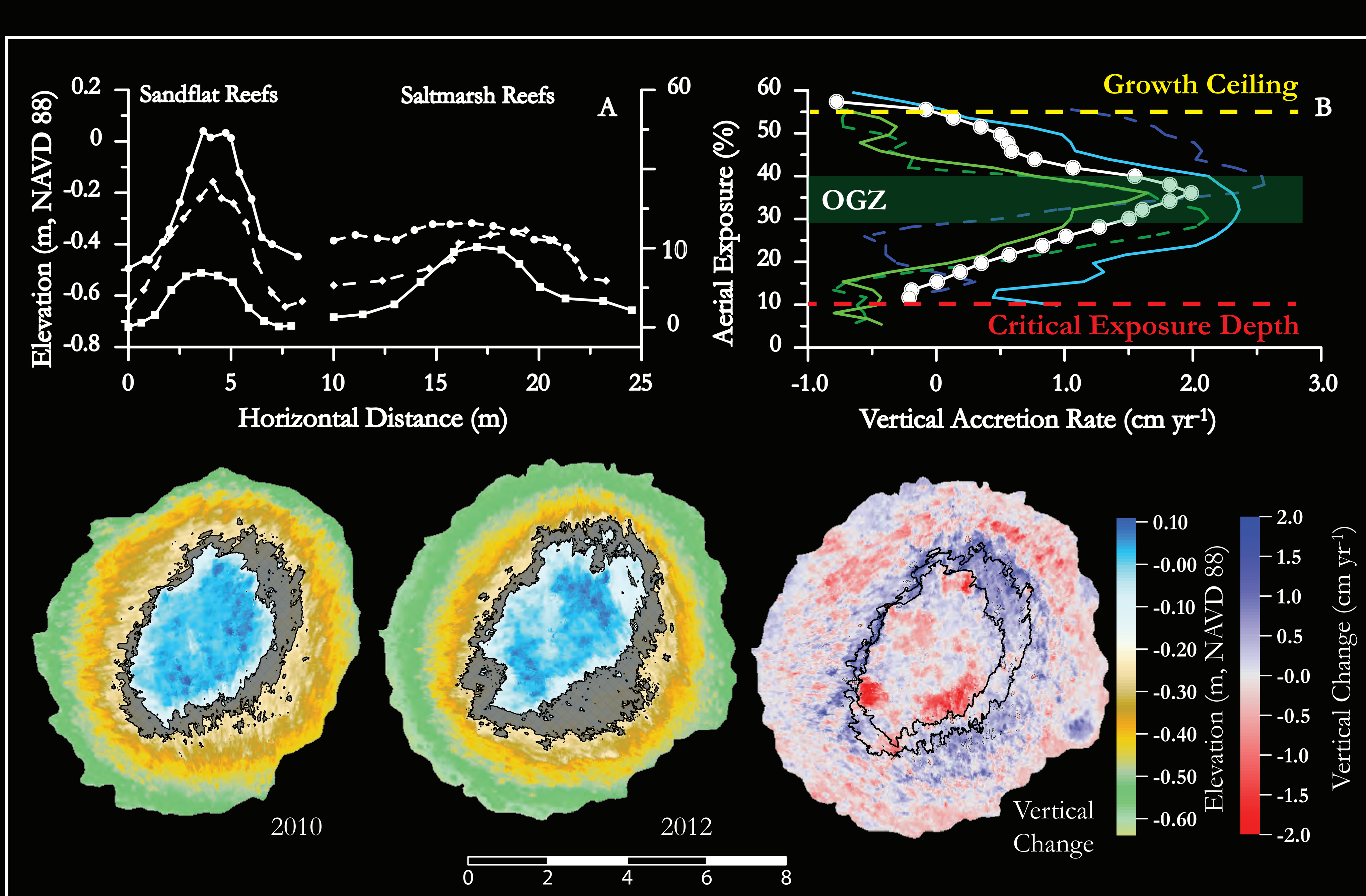


Figure 3. Oyster reef profiles by landscape and reef growth by % aerial exposure captured through laser scanning. Optimal Growth Zone (OGZ) is shaded on reef scans.

Conclusions

- Critical Exposure Depth exists at 10% aerial exposure
  - Minimum depth for the surface of reef material
- Optimal Growth Zone (OGZ) identified at the 30-40% aerial exposure on sandflat reefs
- Reef Growth Ceiling occurs at 55% aerial exposure

- Saltmarsh reefs need further study

Acknowledgments

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