

# LATE HOLOCENE RAISED SHORE PLATFORMS IN SOUTHWESTERN JAMAICA

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The background image is a photograph of a coastal landscape. It shows a series of raised, flat, brownish-grey rock platforms extending from the shore into the sea. Waves are breaking against the edges of these platforms. To the right, there are lush green trees and some stone ruins on a hillside. The sky is overcast and grey.

## KEY POINTS

- Hundreds of raised shore platforms along SW Jamaica
- Typical tidal range around 20-30 cm
- Shore platforms encrusted with sub-fossil serpulid worms
- Living serpulids at sea level and below
- $^{14}\text{C}$  age date 1184 – 940 cal BP [ $956 \pm 122$  CE] (95.4% CI)
- Wave-cut notches below shore platforms
- Abrupt(?) uplift of about 1 m
- If single event, potentially a M6 – M7 event
- Coastal features are a disappearing resource...at risk from erosion and climate change



# TECTONIC SETTING





# TECTONIC SETTING

WFZ

DFZ

Jamaica

SFS

RMCRFZ

ps

scr

st

po

SCFZ

SOUTHERN SHELF

EPGFZ

PEDRO BANK

59 mi

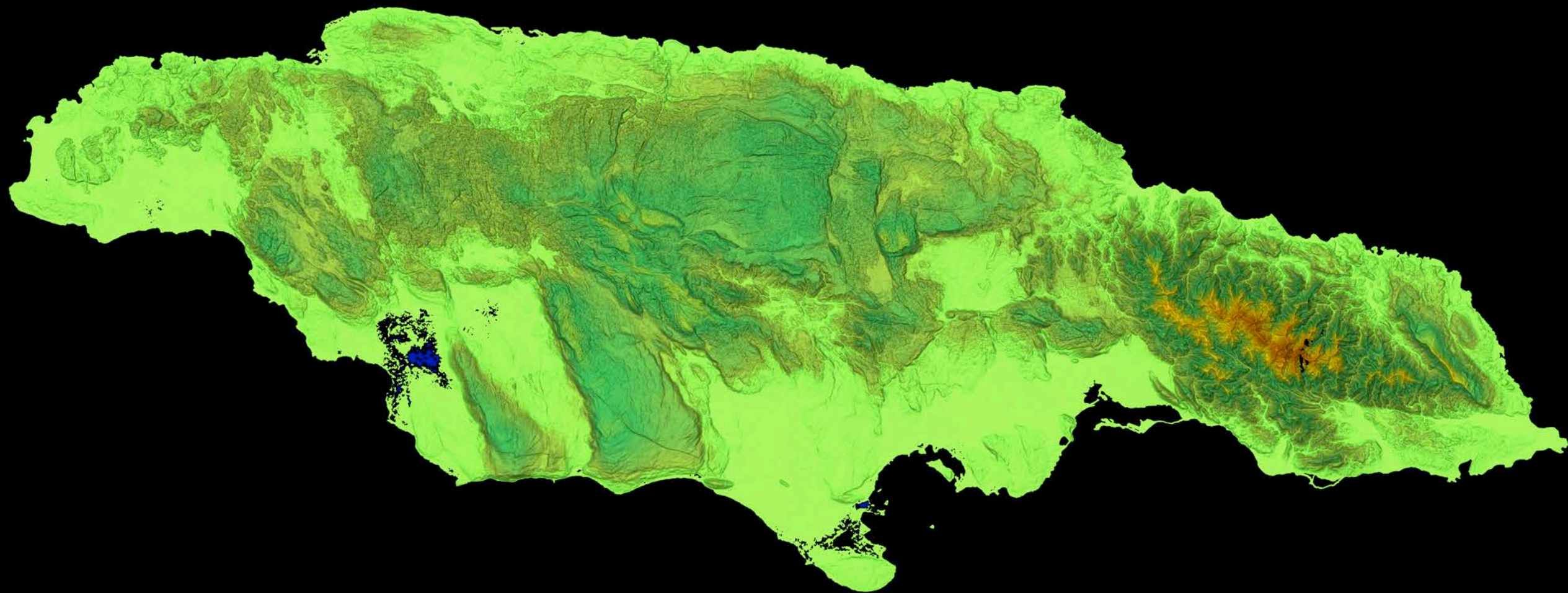
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus

Google earth





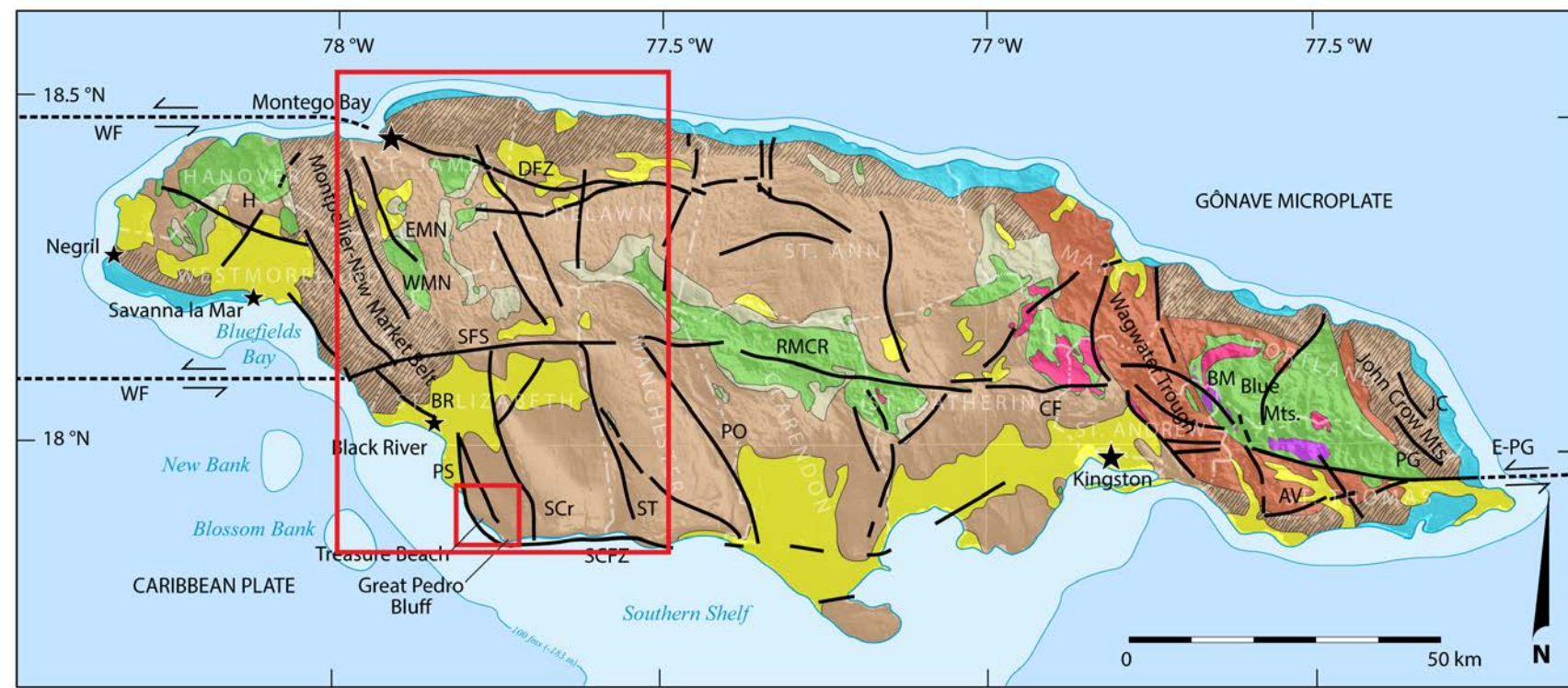
# NASA SRTM DEM





## GEOLOGIC SETTING

- 140 million years in age
- Cretaceous volcanics
- K-Pg Rift zones
- Yellow Ls Group (mid-Eo.)
- White Ls Group (mid-Eo. to mid-Mio.)
- Heavily faulted and uplifted
- Coastal Group (mid-Mio. to Pleist.)
- Seismically active



### EXPLANATION

	Alluvium (Quaternary sediments and morass)
	Coastal Group (mid-Miocene to Pleistocene)
	White Limestone, shallow/deep water facies (mid-Eocene to mid-Miocene)
	Yellow Limestone (Paleocene)
	Wagwater and John Crow rift deposits
	Cretaceous sedimentary rocks (with granitoids and volcanics)
	Faults, arrows indicate relative movement

### MAJOR FAULTS AND FAULT ZONES

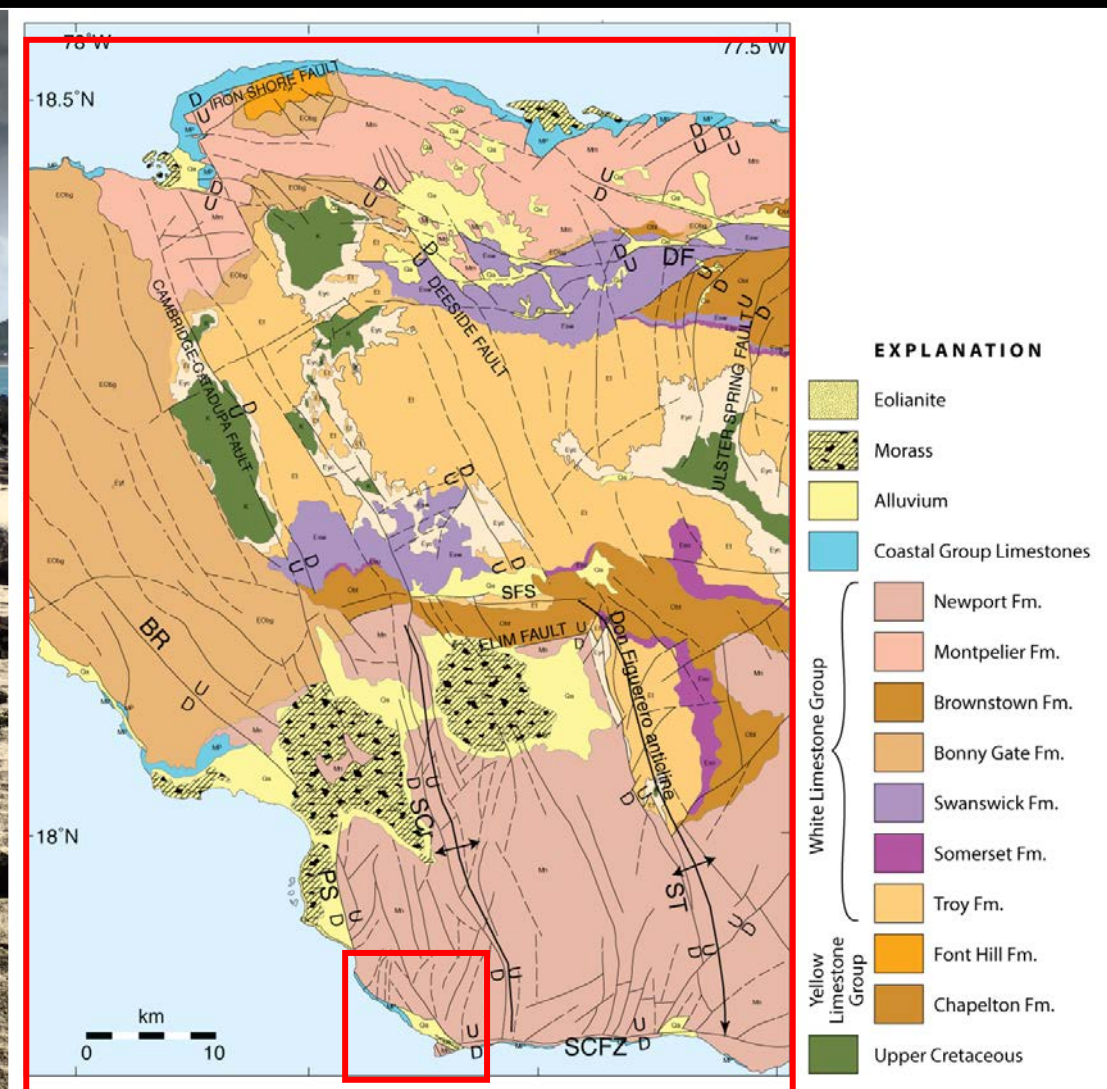
AV	Aeolus Valley	PO	Porus
BM	Blue Mountain	PS	Pondside
BR	Black River	RMCR	Rio Minho-Crawle River
CF	Cavaliers Fault	SCFZ	South Coast Fault Zone
DFZ	Duanvale Fault Zone	SCr	Santa Cruz
EMN	Eastern Montpelier-New Market	SFS	Siloah Fault System
E-PG	Enriquillo-Plantain Garden	ST	Spur Tree
H	Hanover	WF	Walton Fault
JC	John Crow	WMN	Western Montpelier-New Market
PG	Plantain Garden		
★	Key urban areas		



# STRUCTURAL SETTING

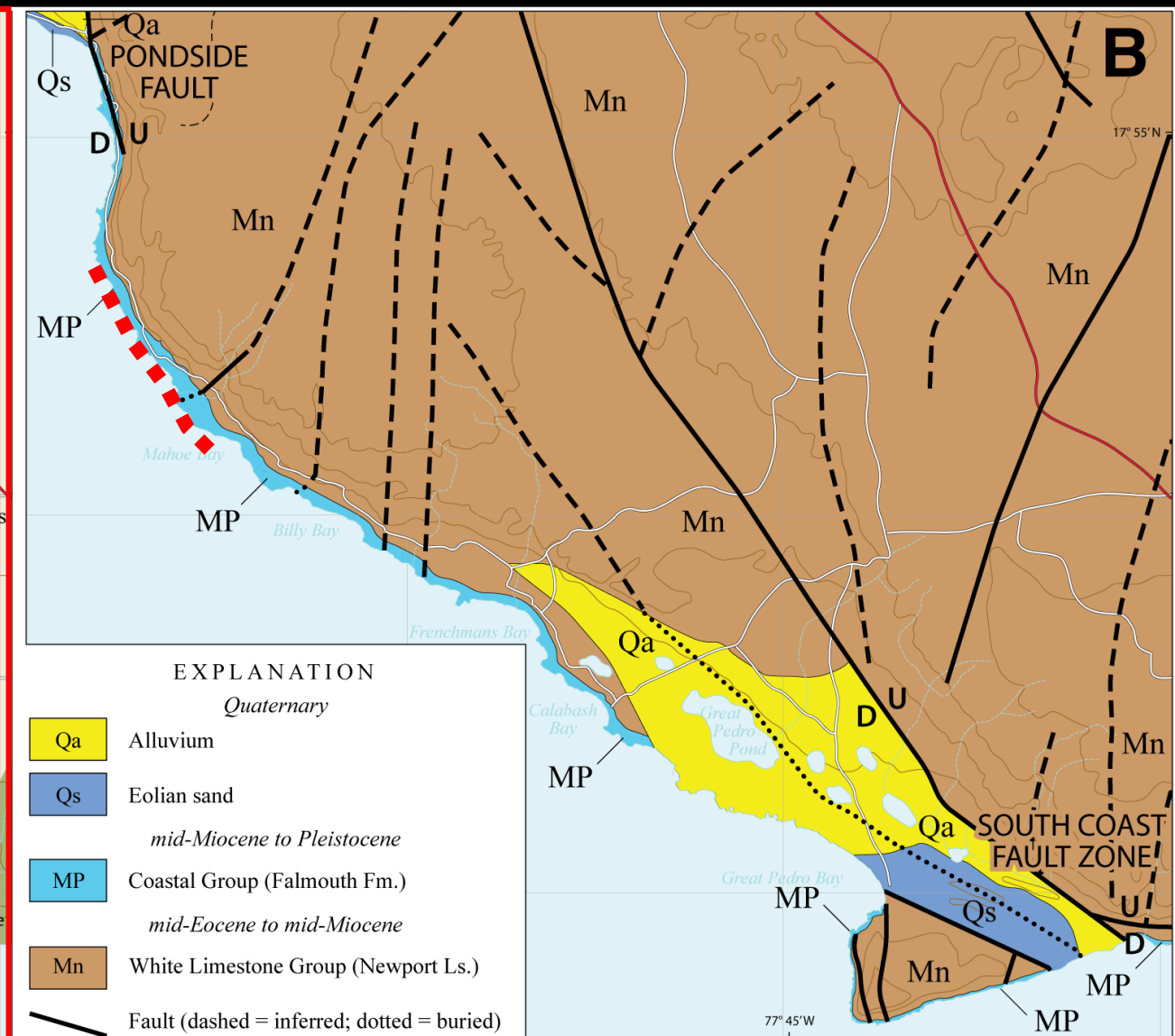


Photo Brett Kenning (2018)



Modified from Benford et al. (2014) and Walker (1975)





*Modified from Benford et al. (2014)*



# DIGITAL ELEVATION MODEL





# OBLIQUE SATELLITE VIEW

Hill Top hill



5176 ft


Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image © 2018 DigitalGlobe  
Image © 2018 CNES / Airbus

Google earth



## SHORE PLATFORMS

15 m




*Drone imagery Toby Dogwiler (2018)*



## SHORE PLATFORMS

15 m

An aerial drone photograph showing a rugged coastline. The left side of the image is dominated by dark, jagged rock formations extending into the turquoise ocean. White surf is visible where waves are breaking against the rocks. To the right of the rocks is a sandy beach area. Further inland, a property is visible, featuring a large house with a white roof and several solar panels. Adjacent to the house is a swimming pool with blue water. The property is surrounded by lush green vegetation and trees. A scale bar in the bottom left corner indicates 15 meters.

*Drone imagery Toby Dogwiler (2018)*



## SHORE PLATFORMS





## SHORE PLATFORMS



**TAFONI = SALT/SOLUTIONAL  
WEATHERING**



# SERPULID ENCRUSTATION ON MIS 5e CORAL

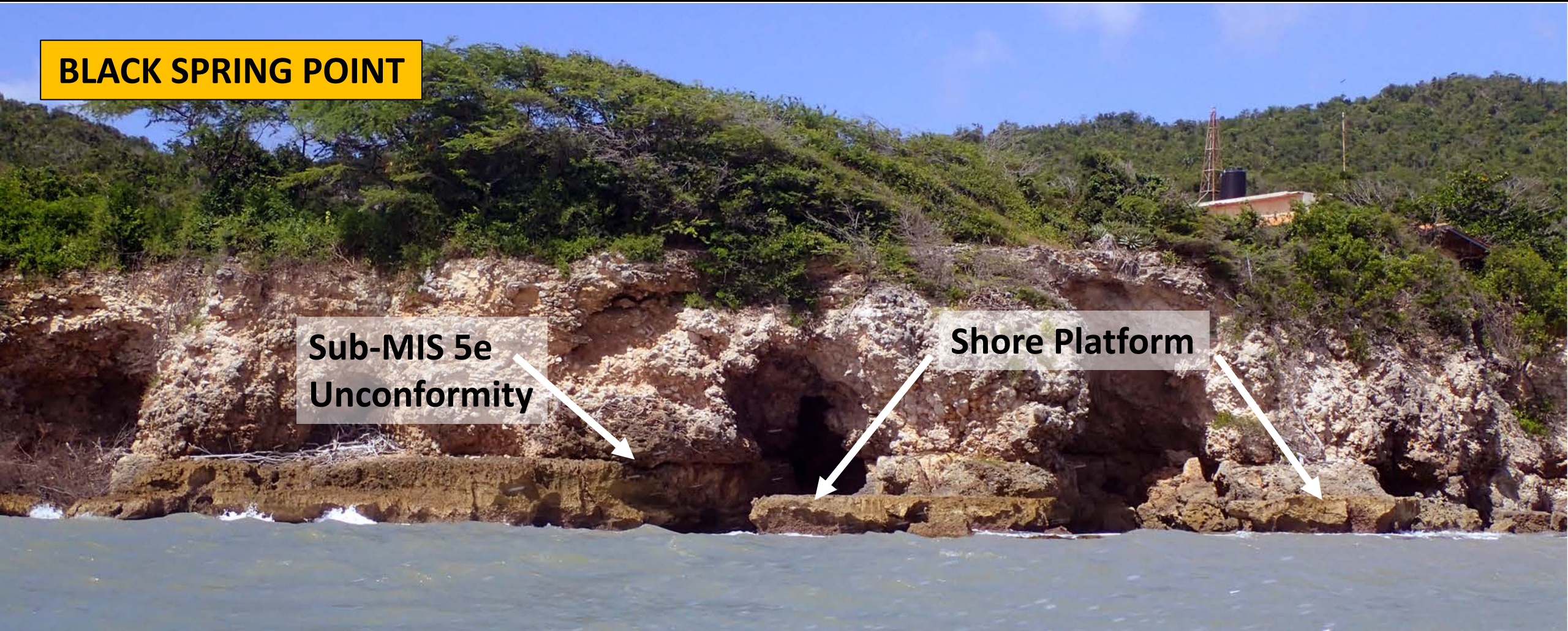




## BLACK SPRING POINT

Sub-MIS 5e  
Unconformity

Shore Platform

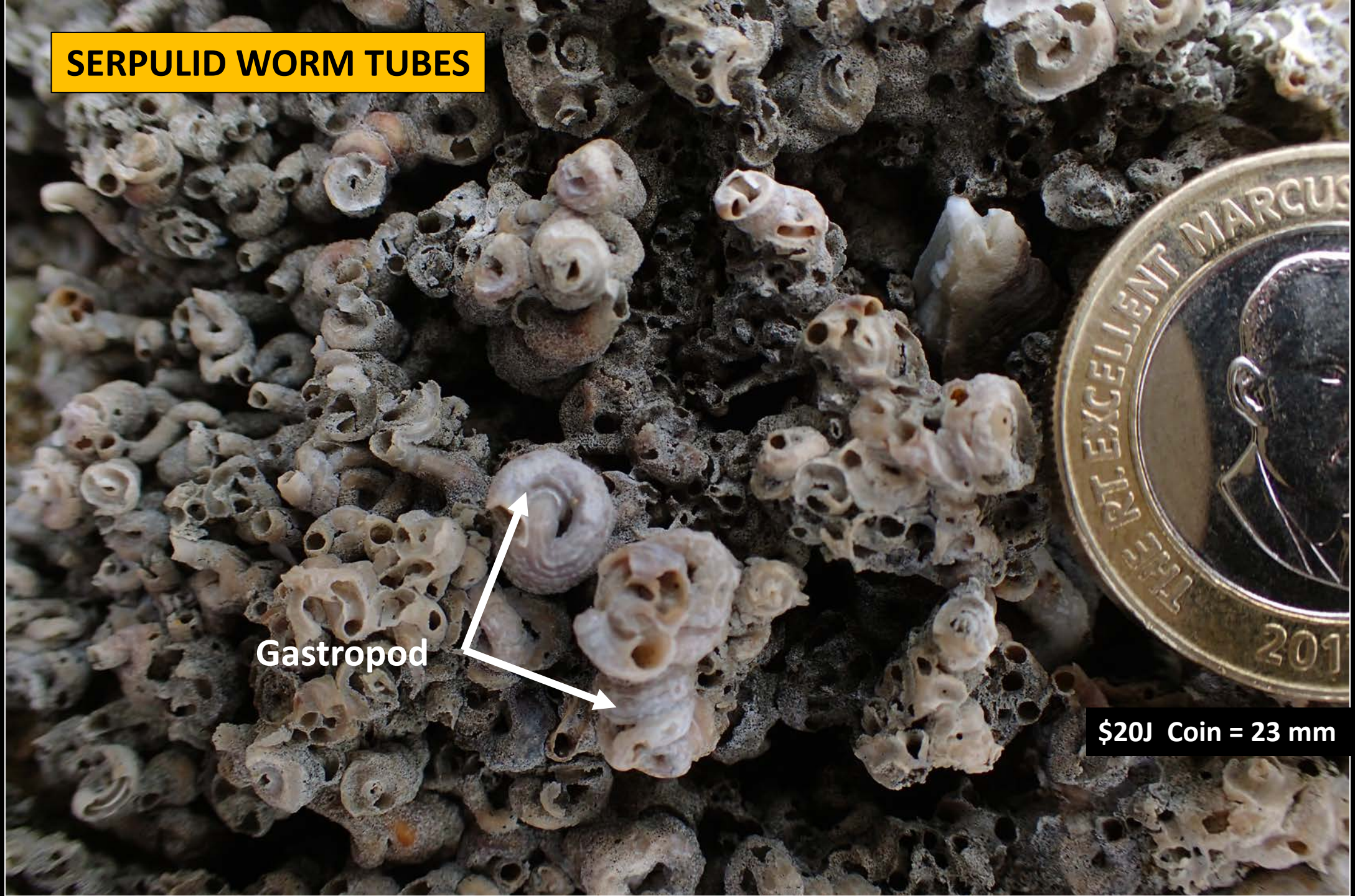




# SERPULID WORM TUBES

Gastropod

\$20J Coin = 23 mm





**VERMETID GASTROPOD SHELL**





## CHAMIDAE "JEWEL BOX" BIVALVE SHELLS





## SERPULID WORM TUBES



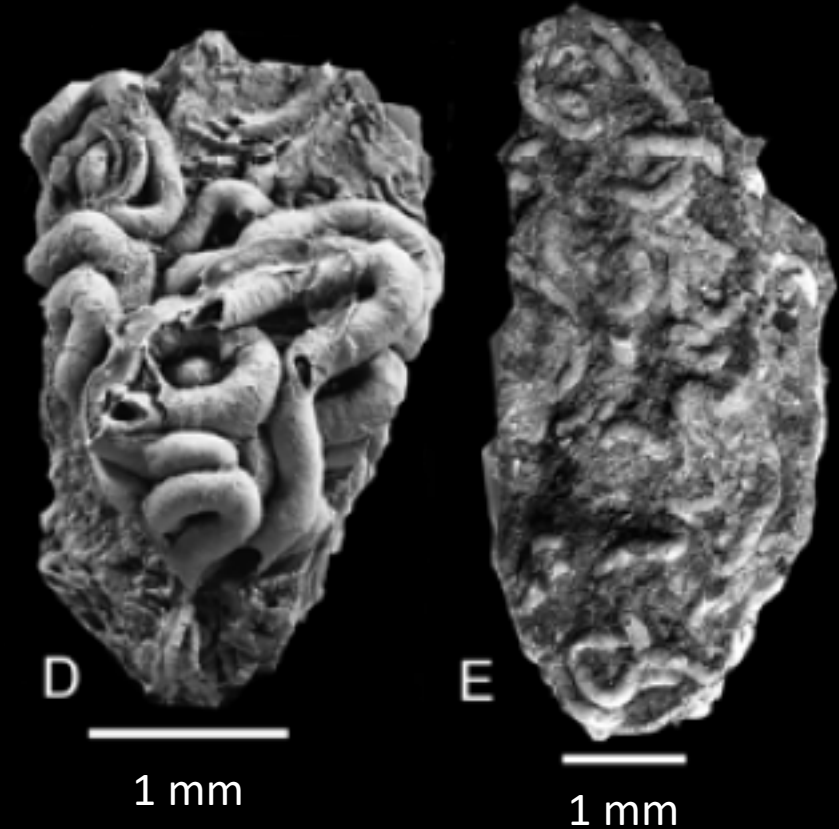


## SERPULID WORMS

- Class Polychaeta
- Suborder Sabellida (fan worms)
- Family Serpulidae
- 490 living species and 70 genera
- Mid-Triassic to Recent
- Calcareous tubes
- Modern reef-former and encrusting habitats
- Shallow to deep marine
- Tropical to cool temperate climates

## AGE DATES AND STABLE ISOTOPE VALUES

- $^{14}\text{C}$  1184-940 cal BP (95.4% CI)
- $952 \pm 122$  CE
- $\delta^{13}\text{C}$  +2.7 ‰ vSMOW
- $\delta^{18}\text{O}$  -1.0 ‰ vPDB



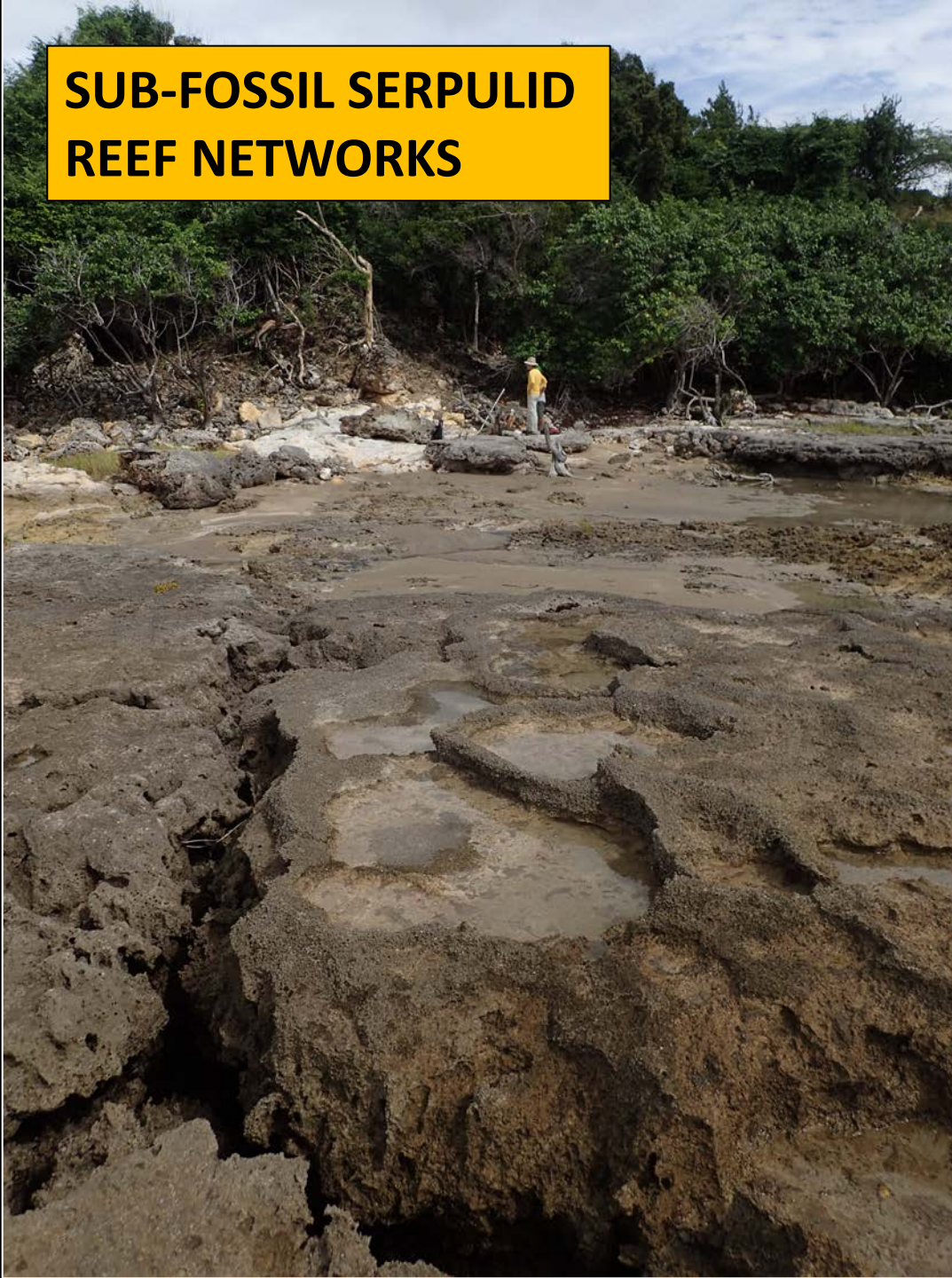
D, "*Filogranula*" *cincta* (Goldfuss, 1831)

E, *Metaveremia* (*Vepreculina*) *minor* Jäger, 1983

Both from Cretaceous, Lower Saxony, Germany  
Ippolitov et al. (2014)

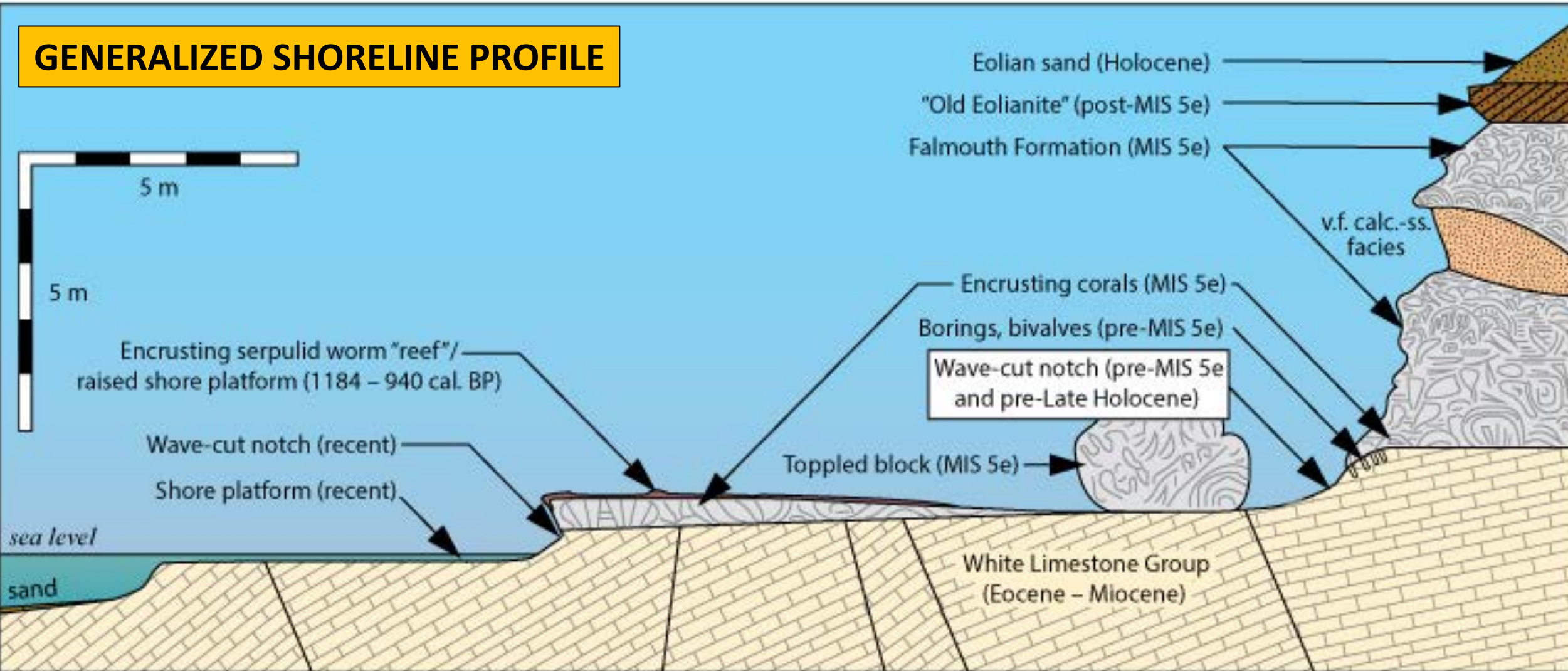


**SUB-FOSSIL SERPULID  
REEF NETWORKS**





## GENERALIZED SHORELINE PROFILE

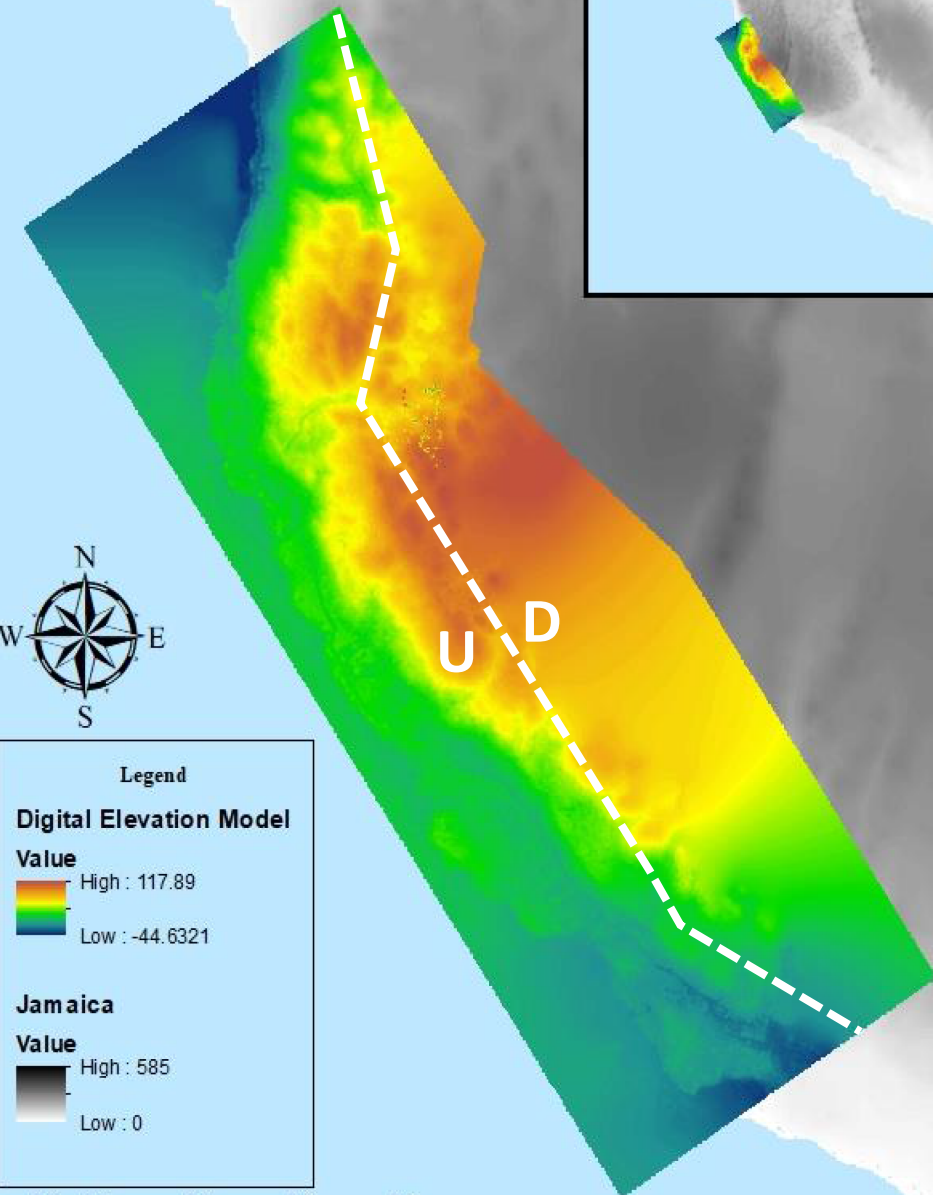
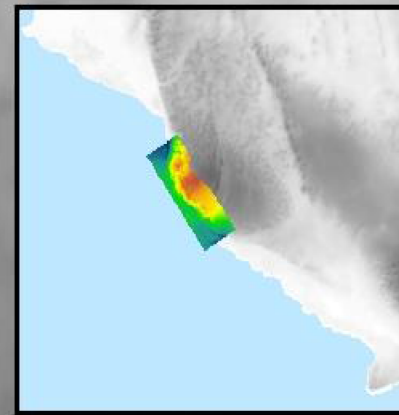
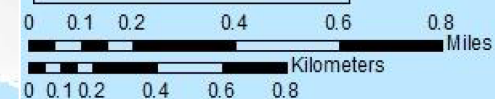
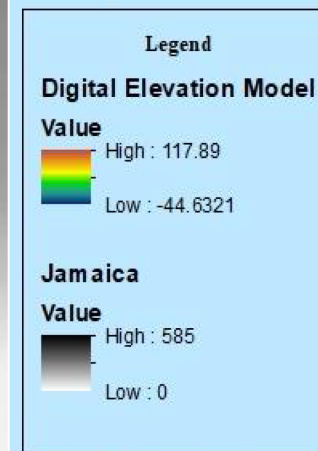
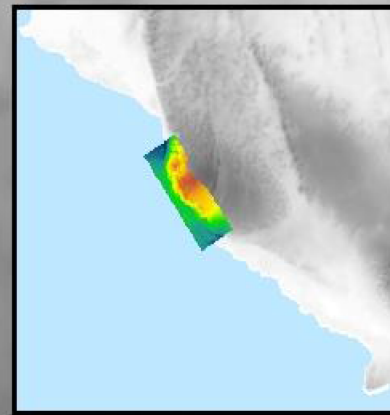




# STRUCTURAL INTERPRETATION

- Displacement typically 1/20,000 rupture length
- 1.0 m uplift indicates 20 km rupture
- Estimated Mw 6.0 to Mw 7.0.
- Uplift to southwest pattern

*Drone DEM Toby Dogwiler (2018)*





## SUMMARY

- Jamaica seismically active
- ~1.0 m raised shore platforms
- 1184 – 940 cal BP  $^{14}\text{C}$  age date
- Erosion actively undercutting platforms

## QUESTIONS?

