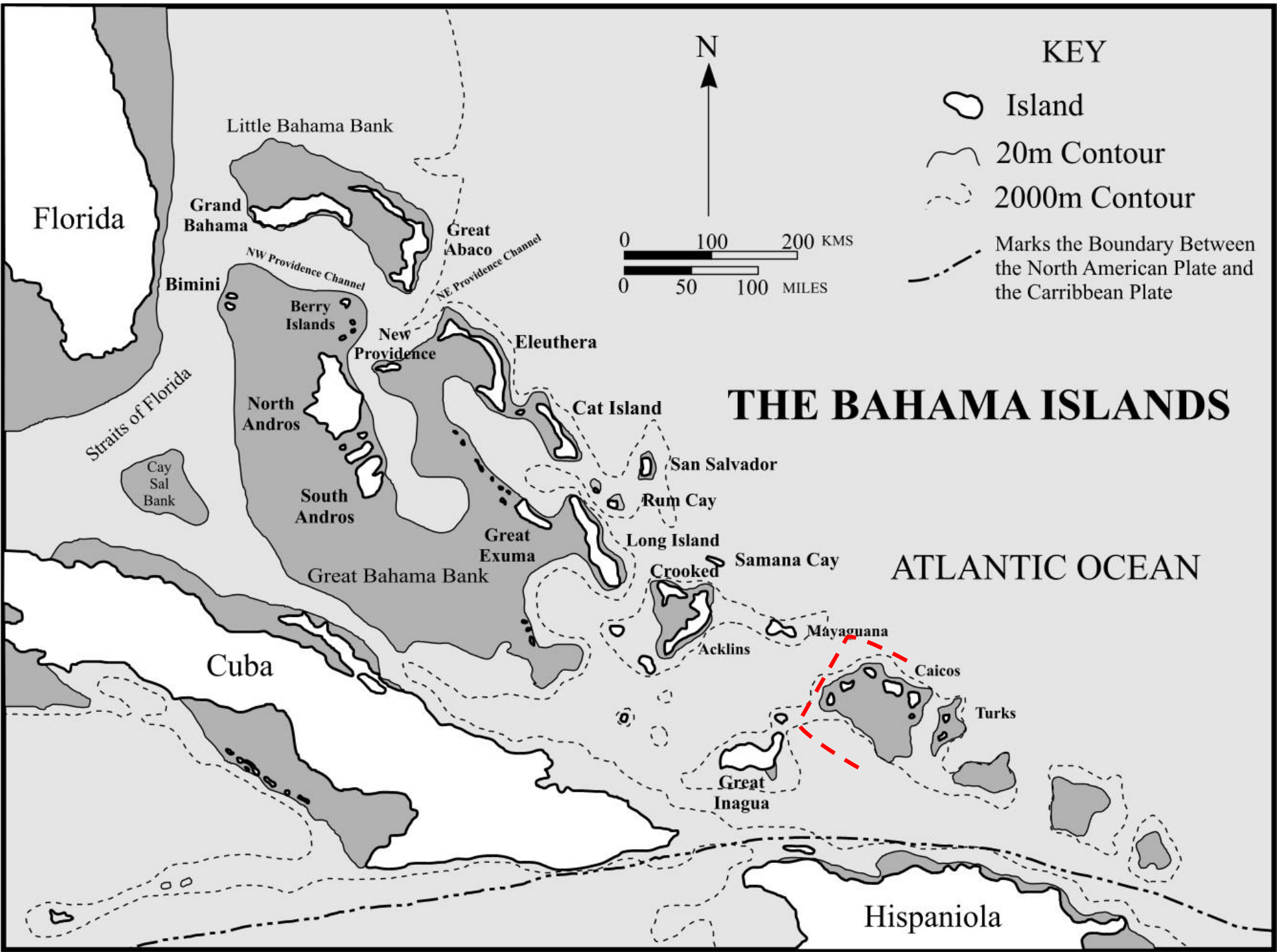


John Mylroie, Michael Lace, Nancy
Albury, and Joan Mylroie

Mid-Quaternary sea-level highstands in the Bahamian Archipelago: Evidence from karst denudation and flank margin cave position

Airport Cave no. 4, Eleuthera





**Bahamian Geology is 100% Carbonate Rocks, With Eolian
Calcareenites Dominating Elevations Above 8 m.**



White Point, Cat Island

Subtidal Facies, Including Fossil Reefs, Are Restricted To Below 6 m Elevation.



Devils Point, Great Inagua



Clifton Point, New Providence



Devils Point, Great Inagua

No Fossil Reefs Are Known From Above 4 m



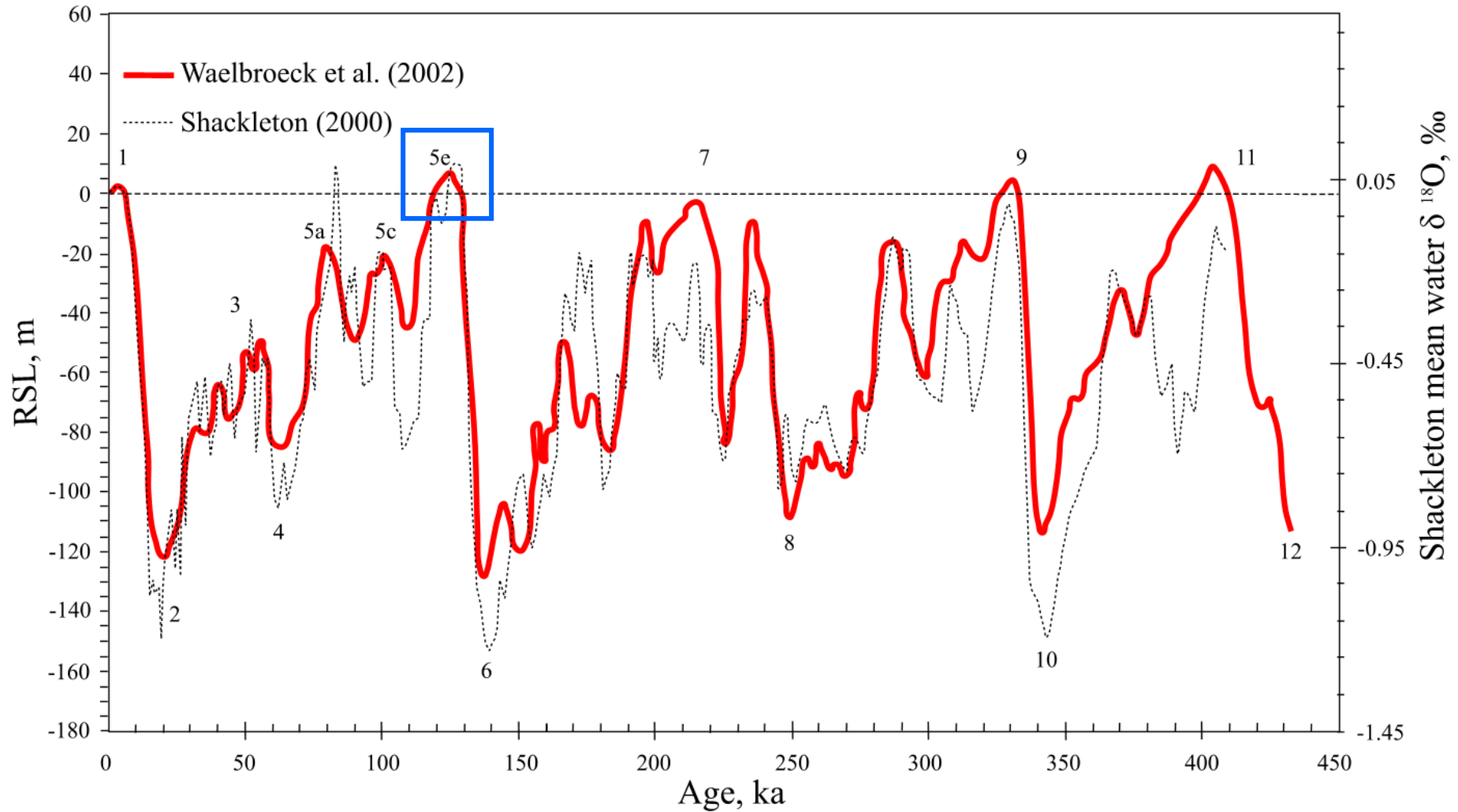
Sweetings Pond, Eleuthera

**No Fossil Reefs Are Known From Above 4 m
All published U/Th dates fall within MIS 5e**



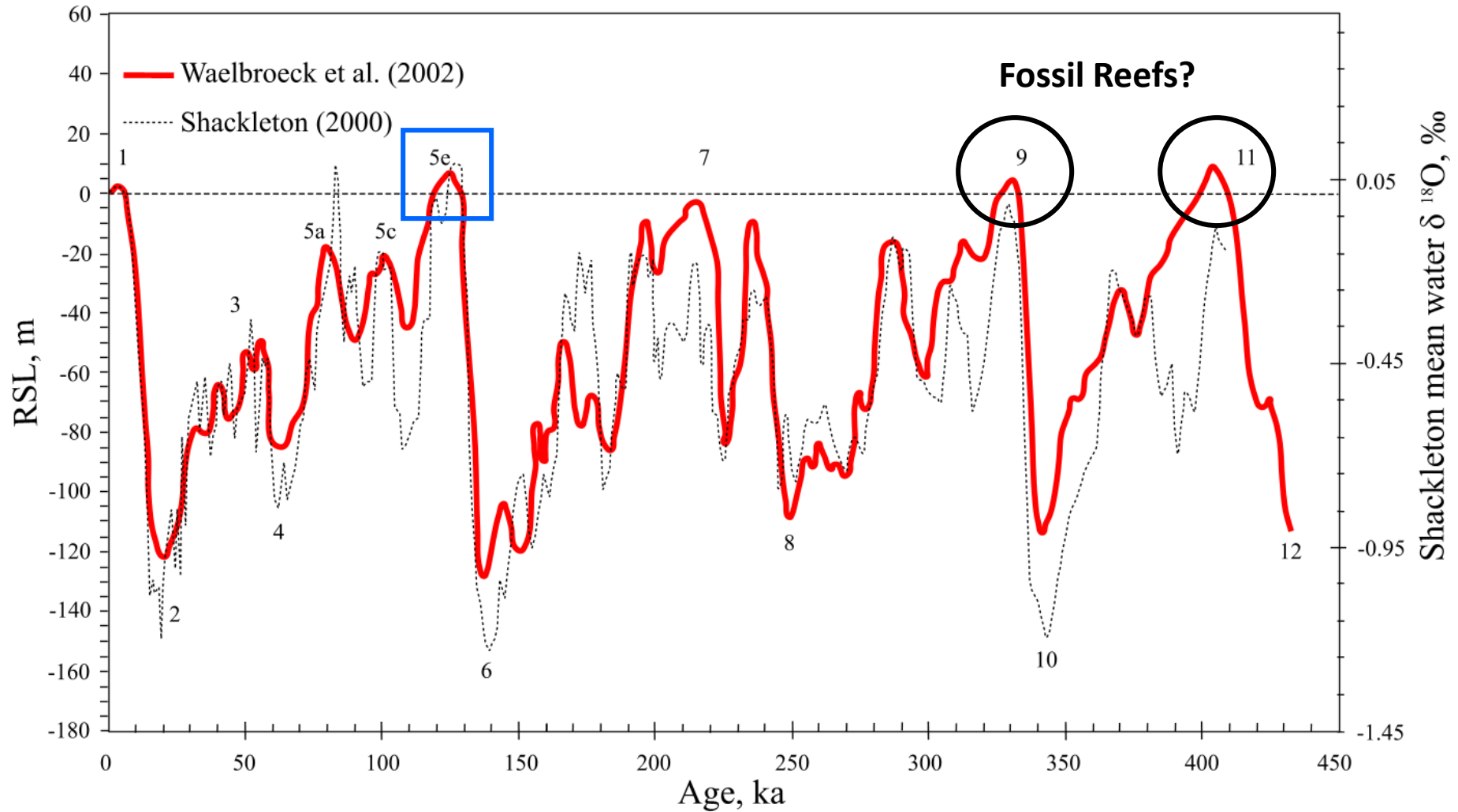
Sweetings Pond, Eleuthera

Global Glacioeustatic Sea-Level Curve for the Last Half-Million Years



From Lascu, 2005

Global Glacioeustatic Sea-Level Curve for the Last Half-Million Years



From Lascu, 2005

The Bahama Banks are believed to be isostatically subsiding at 1-2 m/100ka; and Stage 9 and 11 fossil reefs are no longer above modern sea level.

Meyerhoff and Hatten, 1974

McNeil et al., 1988

Carew and Mylroie, 1995

Codakia sp.

Sweetings Pond, Eleuthera

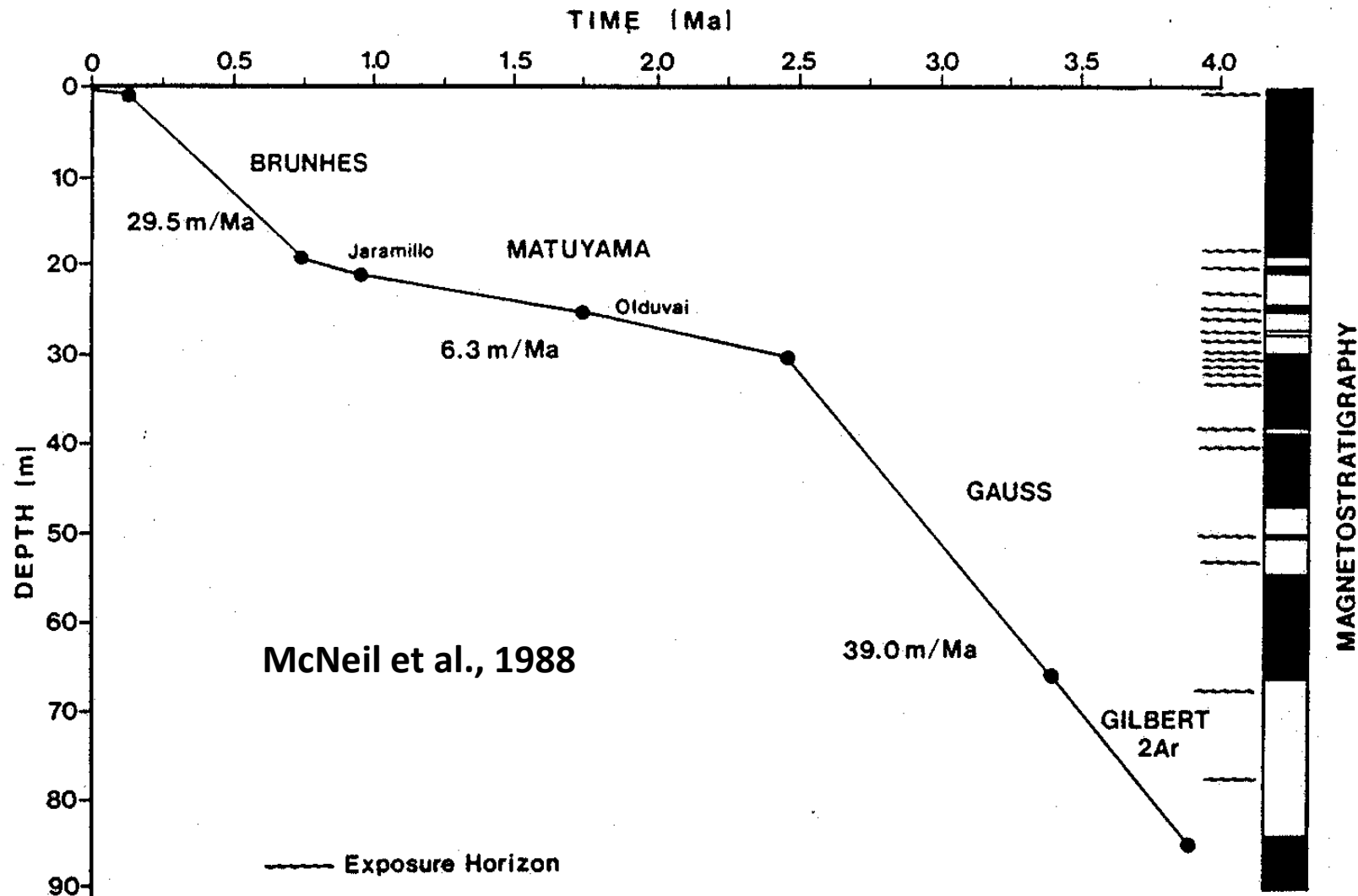


Figure 4. Age/depth curve for 91-m San Salvador core based on magnetostratigraphy (Harland et al., 1982). Matuyama reversed zone in core is relatively short, most likely result of prolonged subaerial exposure during late Pliocene and early Pleistocene. Increased frequency of subaerial exposure horizons during this period is consistent with estimated global eustatic lowering of sea level.

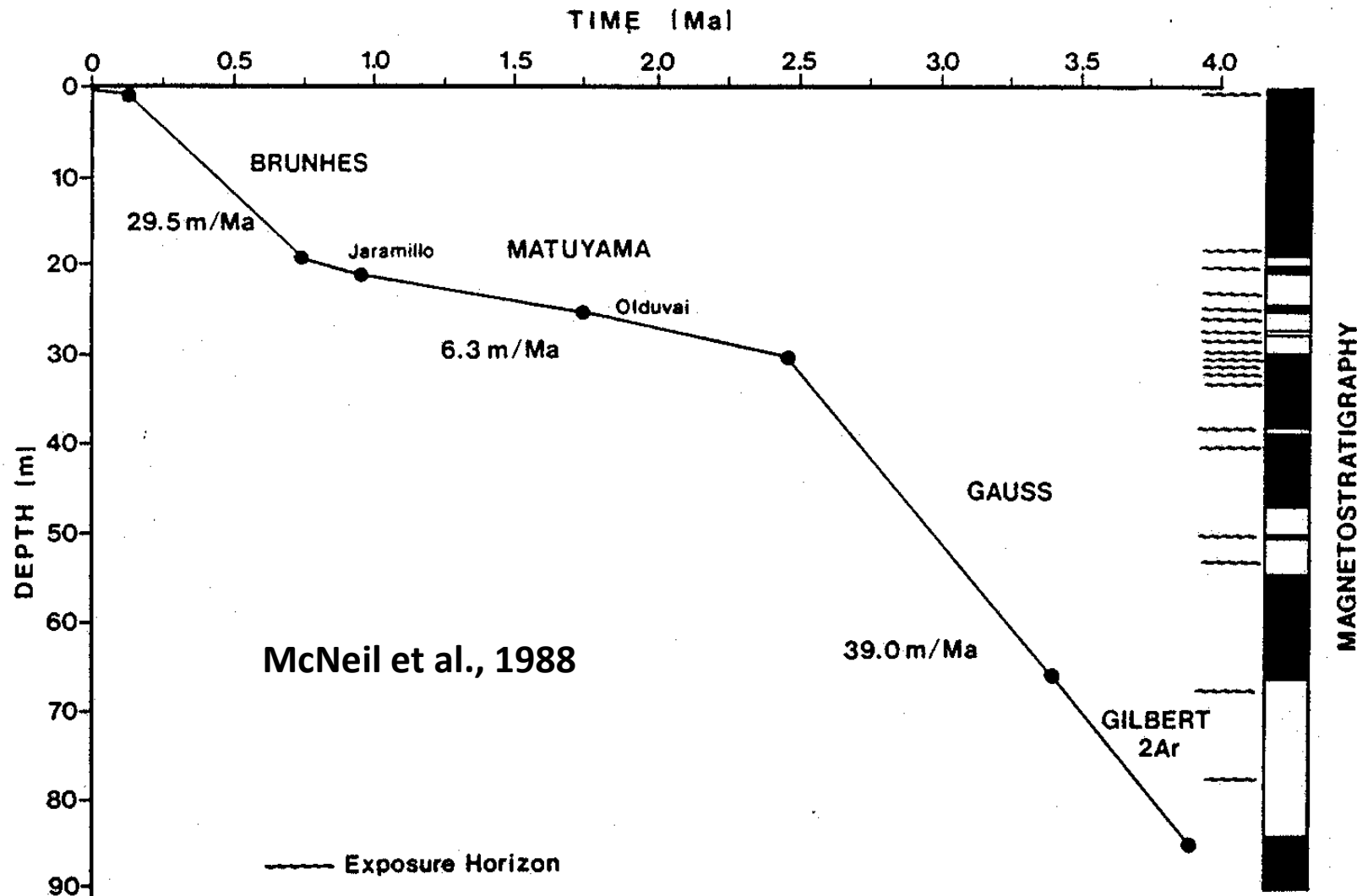


Figure 4. Age/depth curve for 91-m San Salvador core based on magnetostratigraphy (Harland et al., 1982). Matuyama reversed zone in core is relatively short, most likely result of prolonged subaerial exposure during late Pliocene and early Pleistocene. Increased frequency of subaerial exposure horizons during this period is consistent with estimated global eustatic lowering of sea level.

0277-3791(94)00108-1

QUATERNARY TECTONIC STABILITY OF THE BAHAMIAN ARCHIPELAGO: EVIDENCE FROM FOSSIL CORAL REEFS AND FLANK MARGIN CAVES

JAMES L. CAREW* and JOHN E. MYLROIE†

**Department of Geology, University of Charleston, Charleston, SC 29424, U.S.A.*

†*Department of Geosciences, Mississippi State University, MS 39762, U.S.A.*



Ten Bay Cave, Eleuthera



Cockburn Town Fossil Reef, San Salvador

**Flank margin caves were presented as co-equal sea-level indicators;
no flank margin caves are above 7 m elevation.**

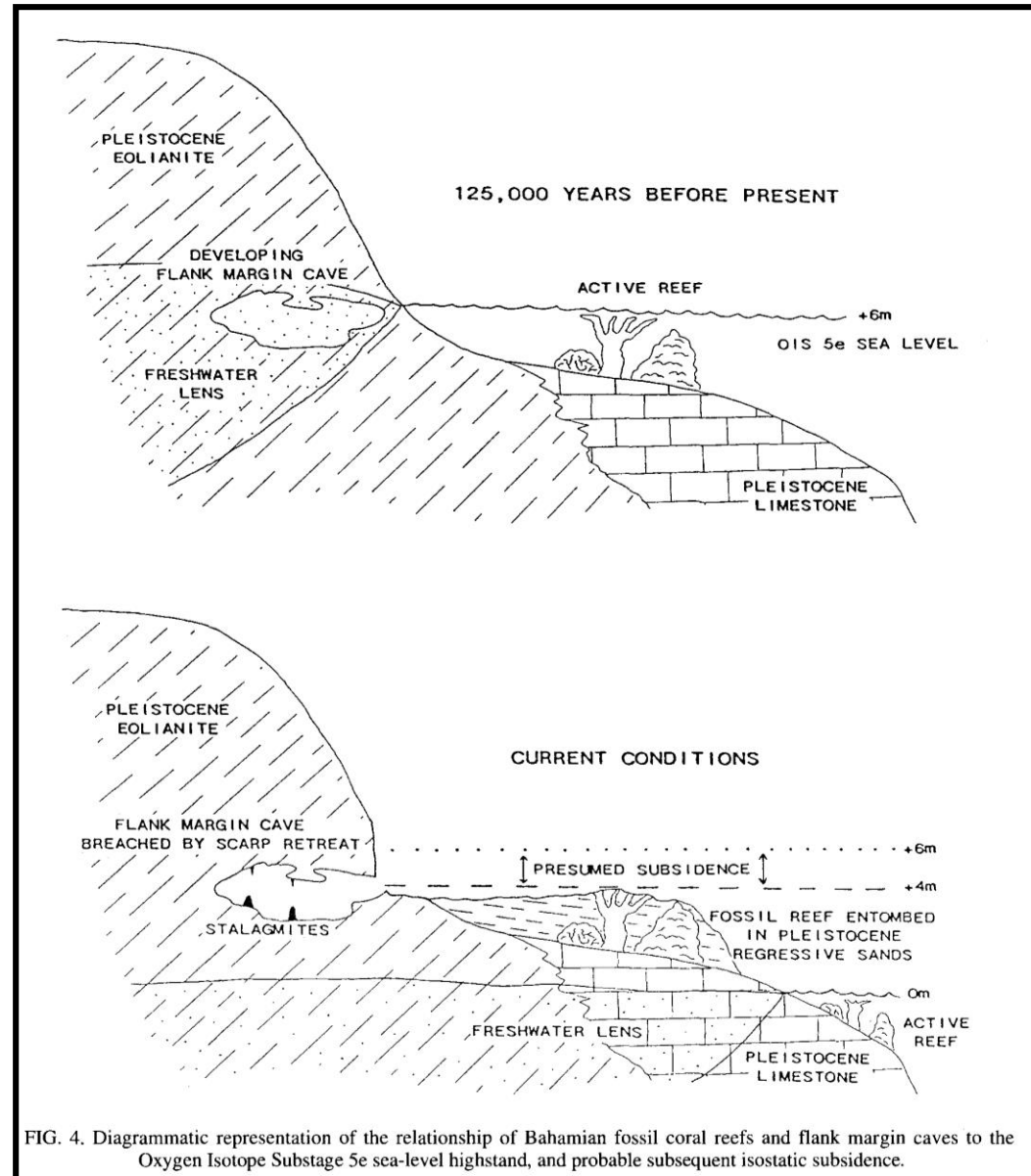
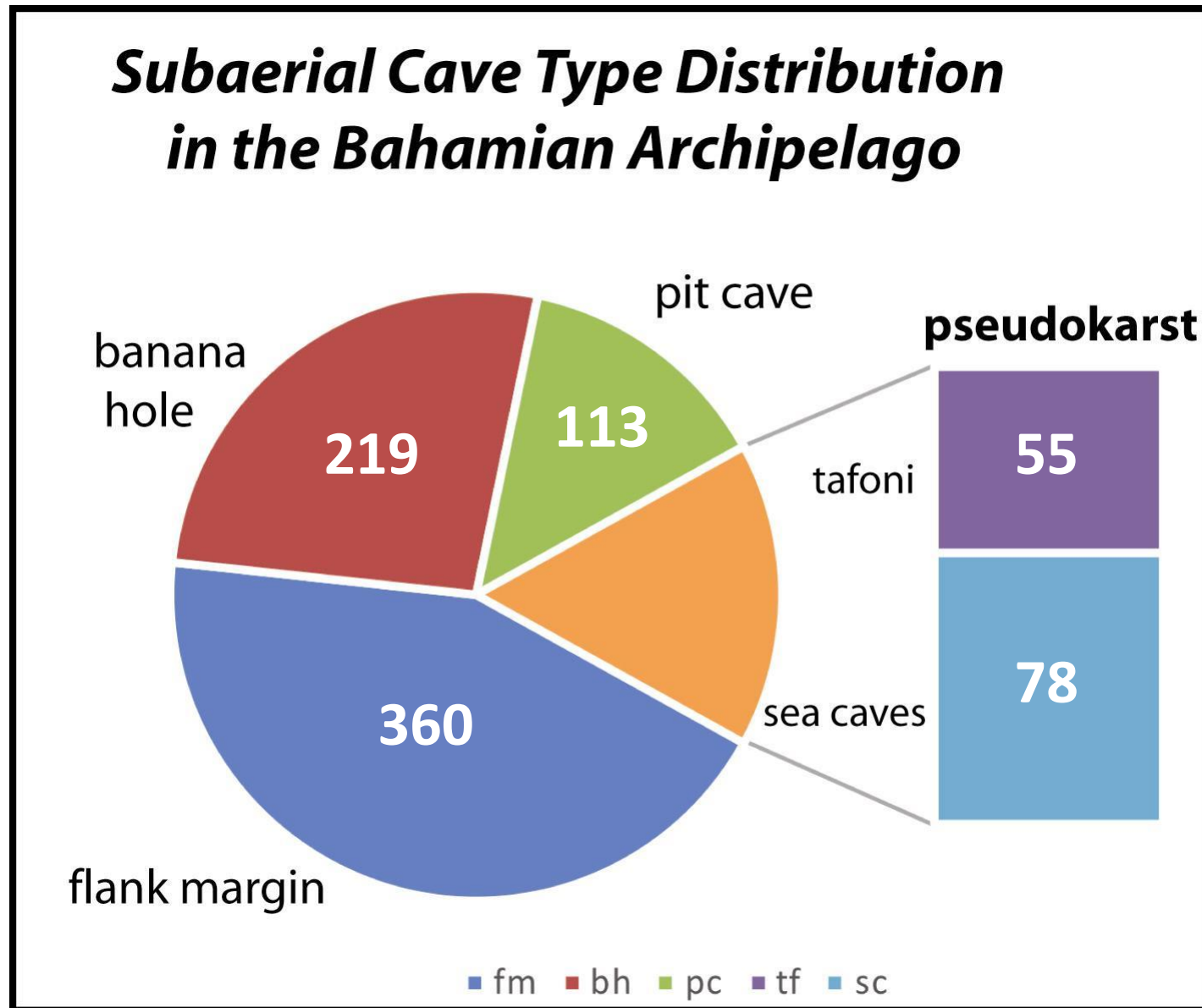


FIG. 4. Diagrammatic representation of the relationship of Bahamian fossil coral reefs and flank margin caves to the Oxygen Isotope Substage 5e sea-level highstand, and probable subsequent isostatic subsidence.

Carew and Mylroie, 1995

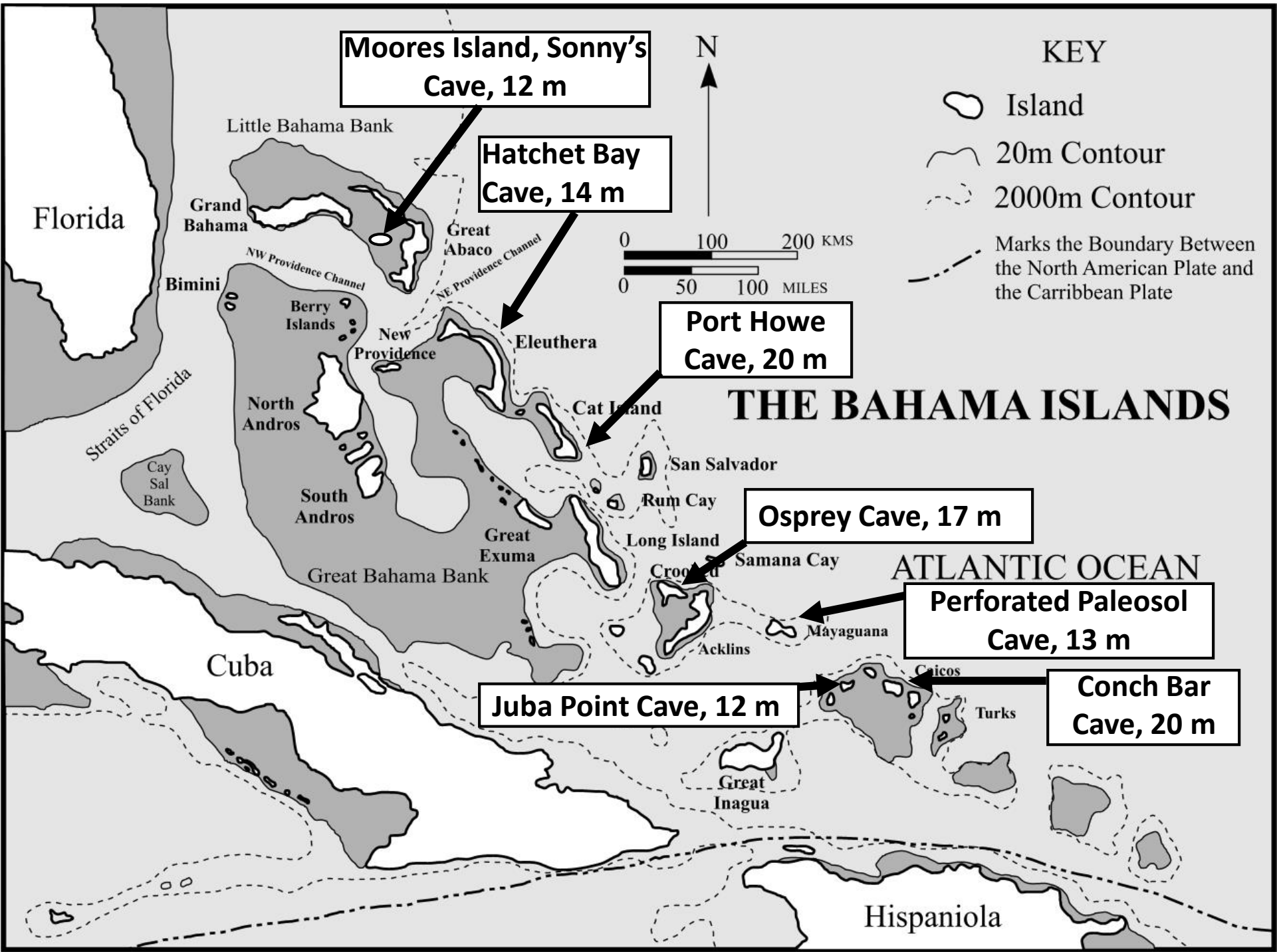
Cave documentation numbers 1977-2018



Flank Margin Caves with elevations over 7 m were found across the Bahamian Archipelago, including the Turks and Caicos



Airport no. 1 Cave, Eleuthera, 10 m



A classic *OOPS!* moment. If these high elevation caves are true sea-level indicators from earlier sea-level highstands, two major questions develop:



Misery Point Cave, Mayaguana

A classic *OOPS!* moment. If these high elevation caves are true sea-level indicators from earlier sea-level highstands, two major questions develop:

1. Where are the fossil corals from those earlier highstands?



Misery Point Cave, Mayaguana

A classic *OOPS!* moment. If these high elevation caves are true sea-level indicators from earlier sea-level highstands, two major questions develop:

- 1. Where are the fossil corals from those earlier highstands?**
- 2. Is the Bahamian subsidence rate accurate?**



Misery Point Cave, Mayaguana

Role of karst denudation on the accurate assessment of glacio-eustasy and tectonic uplift on carbonate coasts



JOHN E. MYLROIE* & JOAN R. MYLROIE

Department of Geosciences, Mississippi State University, Mississippi State, MS 39762, USA

**Correspondence: mylroie@geosci.msstate.edu*

*From: PARISE, M., GABROVSEK, F., KAUFMANN, G. & RAVBAR, N. (eds) *Advances in Karst Research: Theory, Fieldwork and Applications*. Geological Society, London, Special Publications, **466**, <https://doi.org/10.1144/SP466.2>*

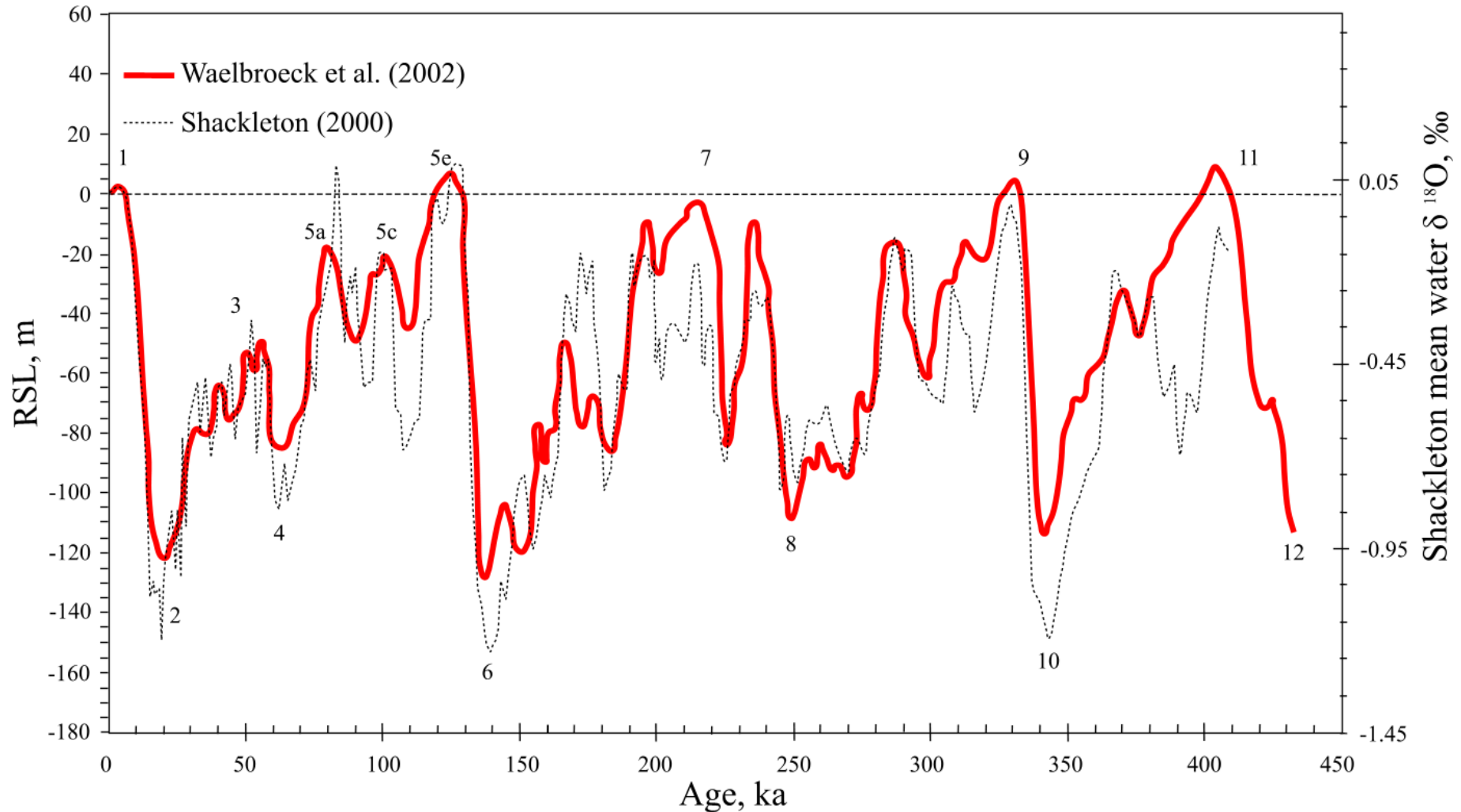
© 2017 The Author(s). Published by The Geological Society of London. All rights reserved.

For permissions: <http://www.geolsoc.org.uk/permissions>. Publishing disclaimer: www.geolsoc.org.uk/pub_ethics



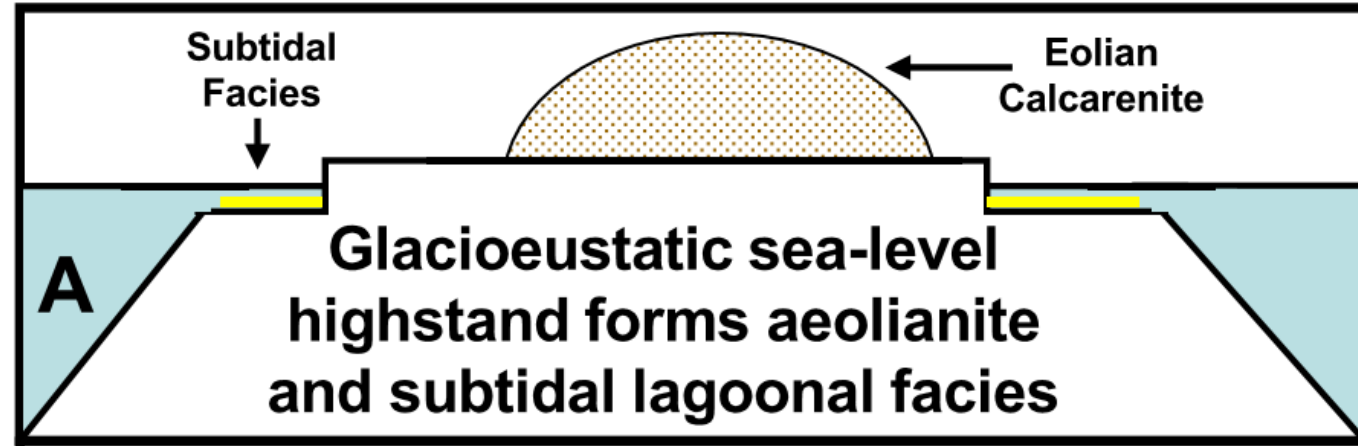
Eroded flowstone, Misery Point, Mayaguana

Carbonates are deposited on the Bahamian platform during sea-level highstands, 10% of the last half a million years; the other 90% of the time, karst denudation is occurring.

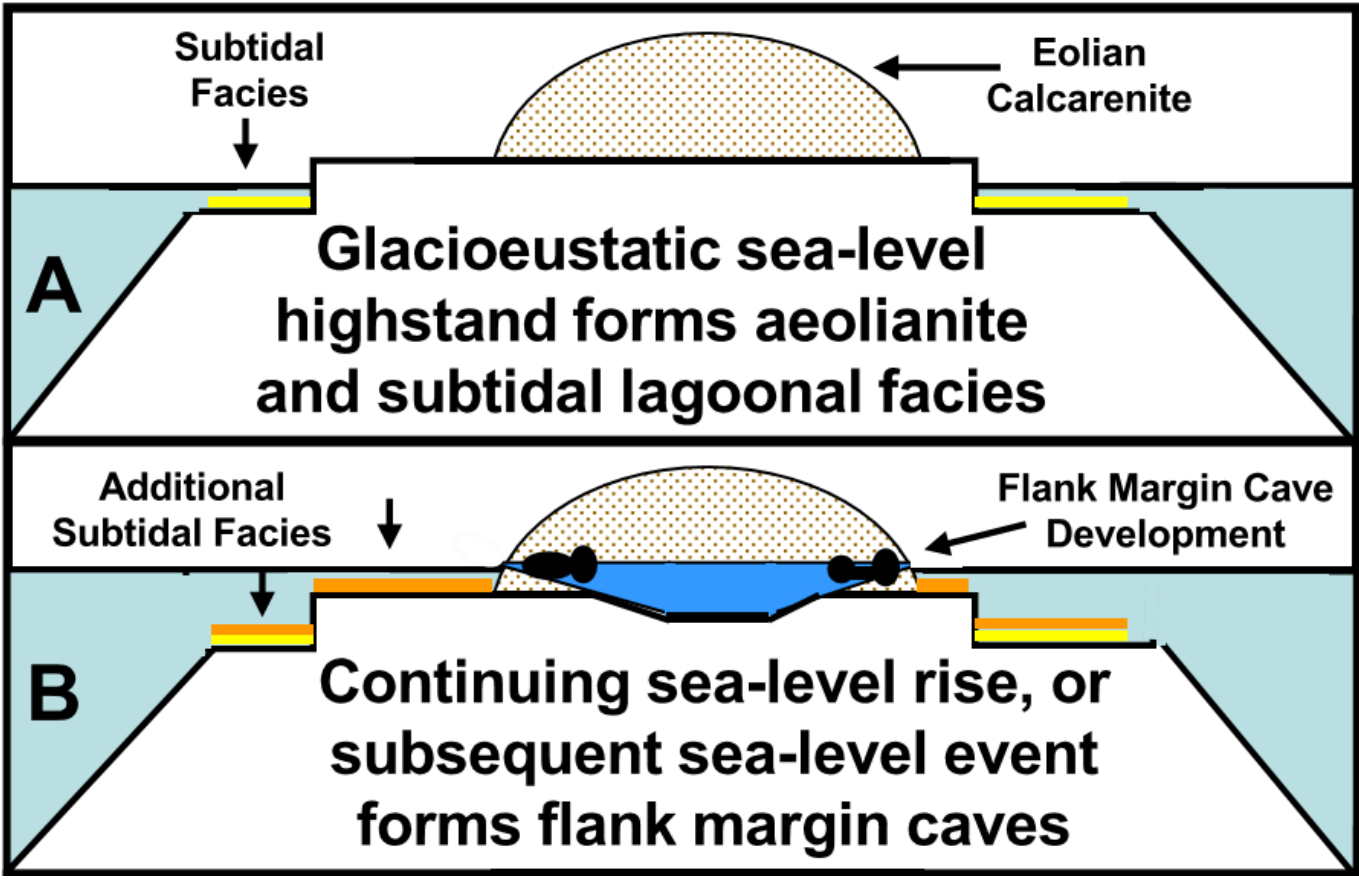


From Lascu, 2005

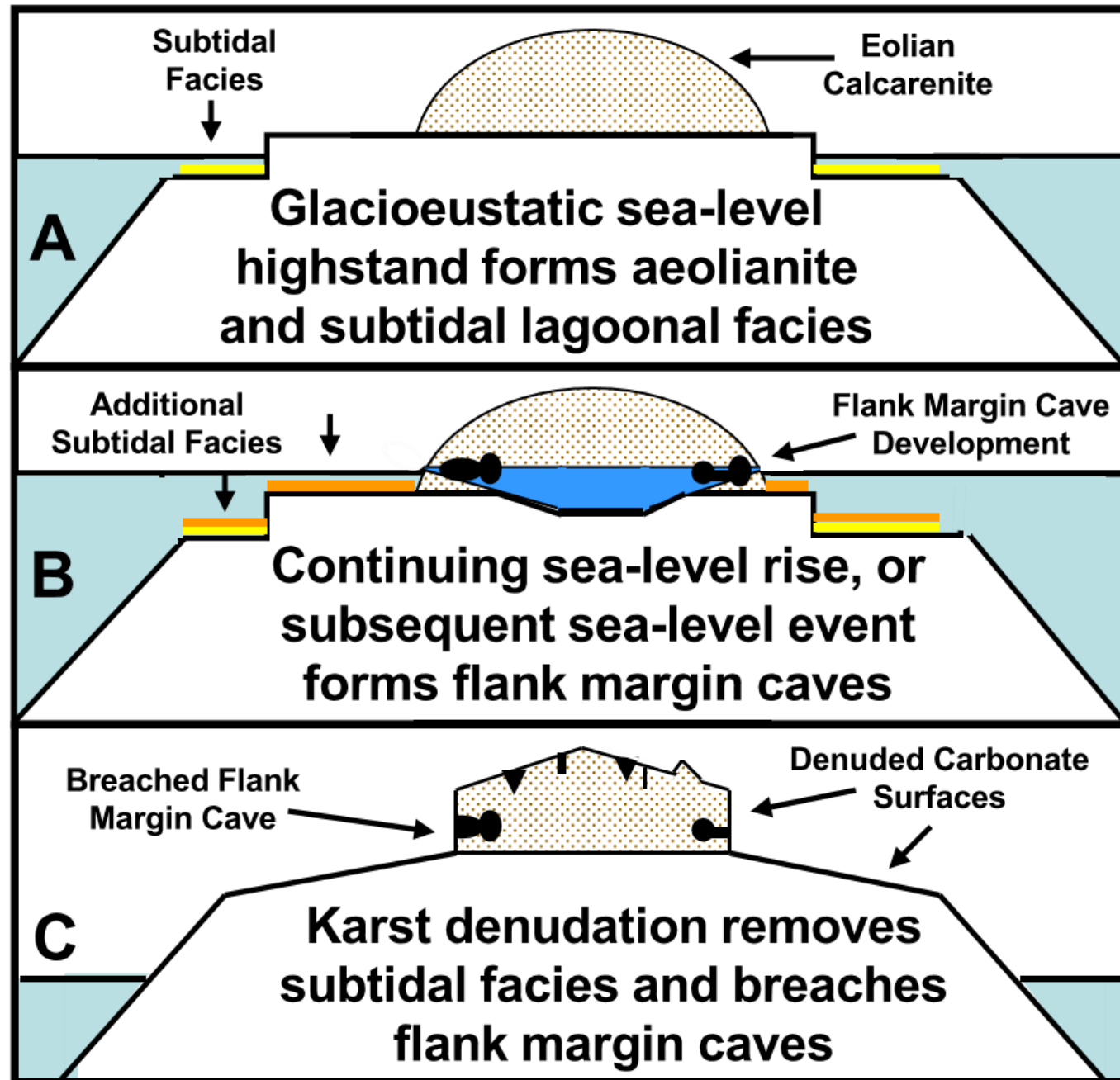
Karst denudation and sea-level indicator survival



Karst denudation and sea-level indicator survival



Karst denudation and sea-level indicator survival

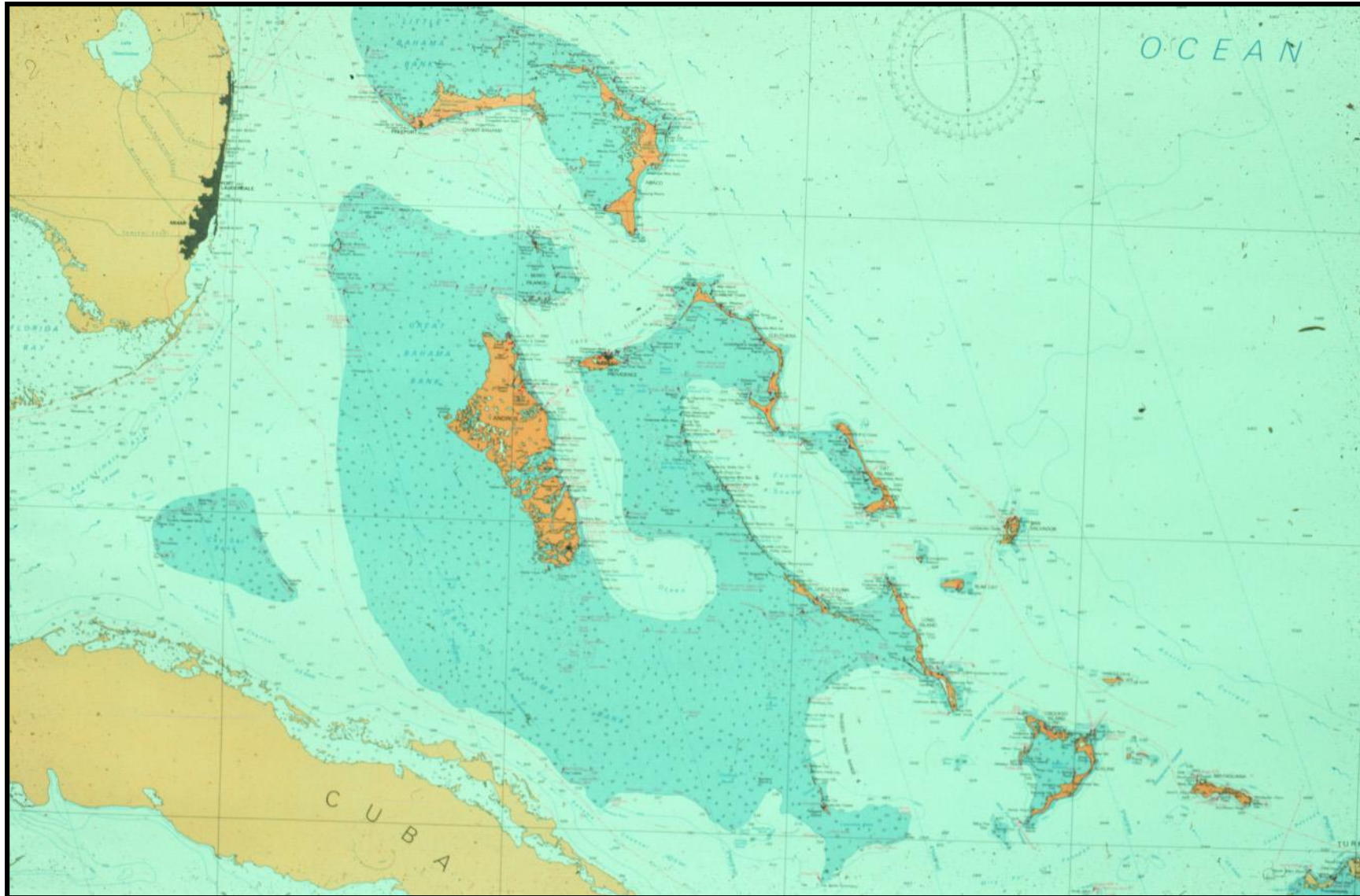


Flank Margin Caves, as subsurface features, show the effects of denudation; surface onlap and veneers of subtidal facies are removed by the same process.



Harry Oakes Cave, New Providence

Isostatic Subsidence of the Bahamas Platform



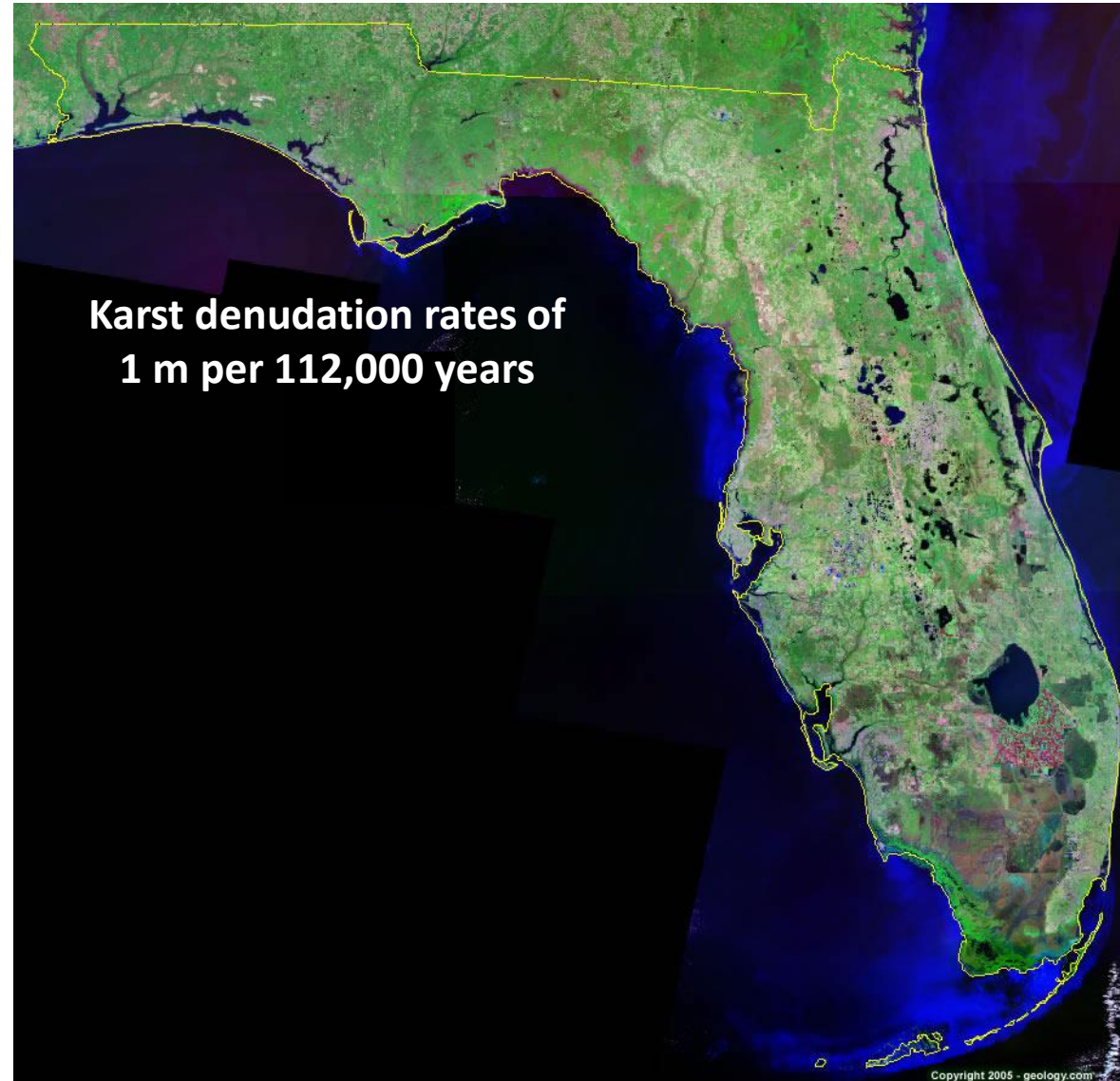
**Karst processes may also be responsible for the lack of subsidence,
or even isostatic uplift, of the Bahamian Platform**



Ten Bay Cave, Eleuthera

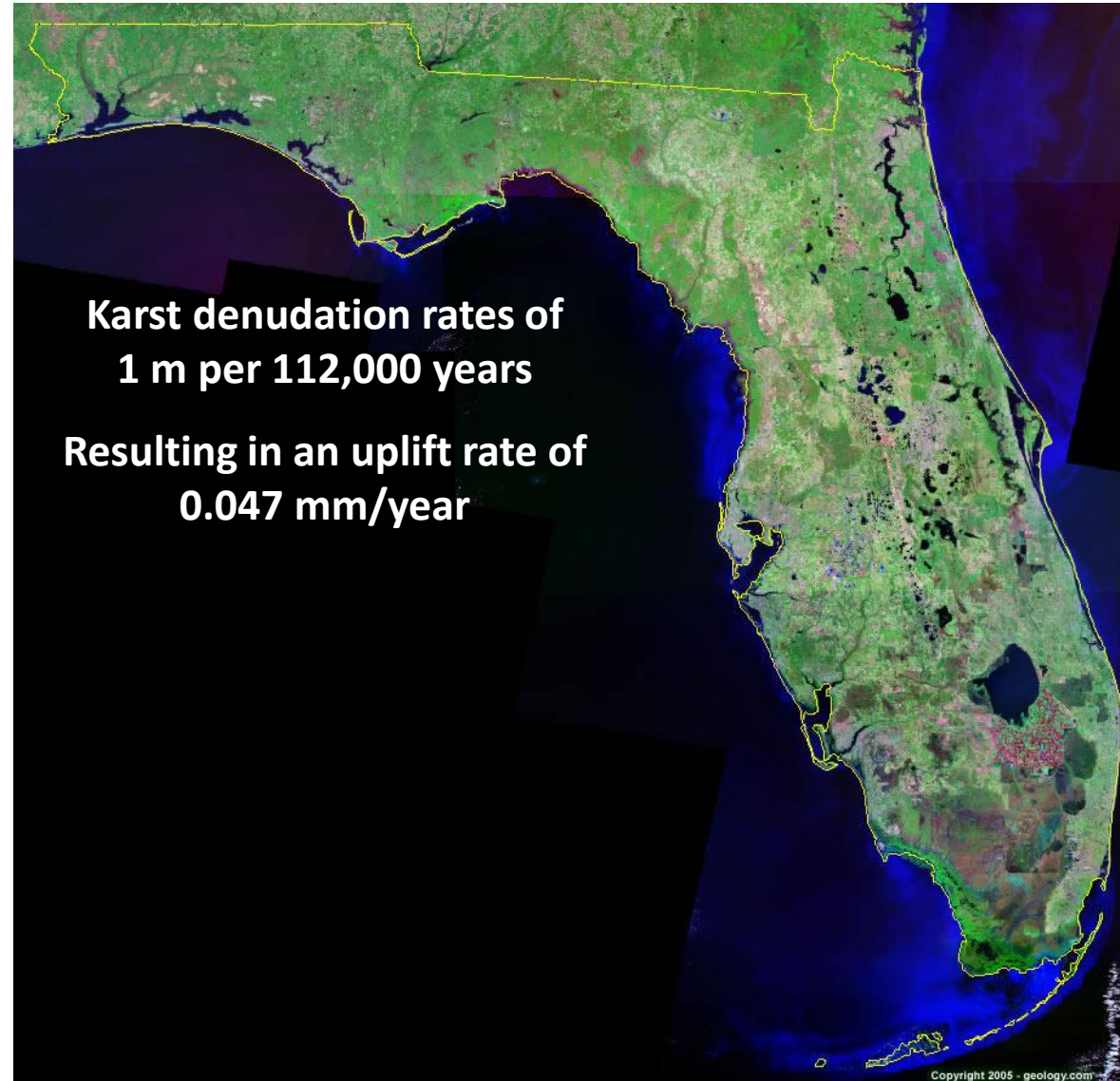
Isostatic uplift driven by karstification and sea-level oscillation: Modeling landscape evolution in north Florida

Adams, P., Opdyke, N.D., and Jaeger, J.M, 2010, *Geology* 38 no 6., p. 531-534.



Isostatic uplift driven by karstification and sea-level oscillation: Modeling landscape evolution in north Florida

Adams, P., Opdyke, N.D., and Jaeger, J.M, 2010, *Geology* 38 no 6., p. 531-534.



CONCLUSIONS:

1. Quaternary subtidal deposits in the Bahamas are a thin veneer and are removed by karst denudation



CONCLUSIONS:

1. Quaternary subtidal deposits in the Bahamas are a thin veneer and are removed by karst denudation
2. Only the most recent highstand deposits from MIS 5e survive today



CONCLUSIONS:

1. Quaternary subtidal deposits in the Bahamas are a thin veneer and are removed by karst denudation
2. Only the most recent highstand deposits from MIS 5e survive today
3. Flank Margin Caves withstand karst denudation and record all Quaternary sea-level events



CONCLUSIONS:

1. Quaternary subtidal deposits in the Bahamas are a thin veneer and are removed by karst denudation
2. Only the most recent highstand deposits from MIS 5e survive today
3. Flank Margin Caves withstand karst denudation and record all Quaternary sea-level events
4. Karst denudation results in isostatic stability, perhaps isostatic uplift of the Bahamian platform



CONCLUSIONS:

1. Quaternary subtidal deposits in the Bahamas are a thin veneer and are removed by karst denudation
2. Only the most recent highstand deposits from MIS 5e survive today
3. Flank Margin Caves withstand karst denudation and record all Quaternary sea-level events
4. Karst denudation results in isostatic stability, perhaps isostatic uplift of the Bahamian platform
5. If uplift has occurred, Flank Margin Caves are not representing actual sea-level position at the time of their genesis



The highest point in the Bahamas is Mount Alvernia on Cat Island, at 62 m



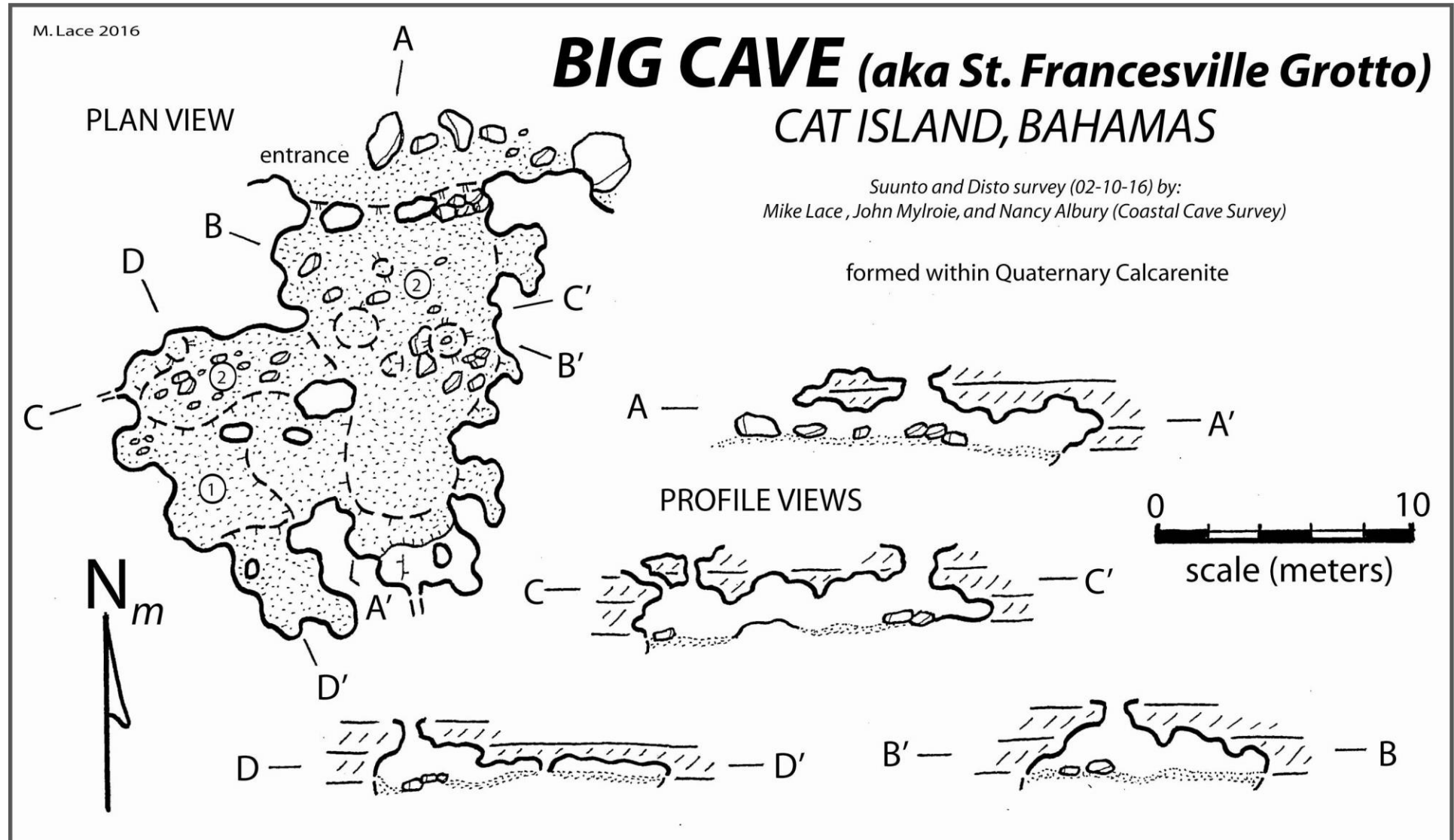
On an adjacent ridge, at 55 m elevation, is Big Cave, with dissolutional morphology consistent with flank margin origin.



The cave has a long historical record



It certainly looks like a flank margin cave



What is a flank margin cave doing at 55 m above sea level?



How do I feel about this cave ?





**I feel just fine,
thanks for asking!**

QUESTIONS?



Hamiltons Cave, Long Island