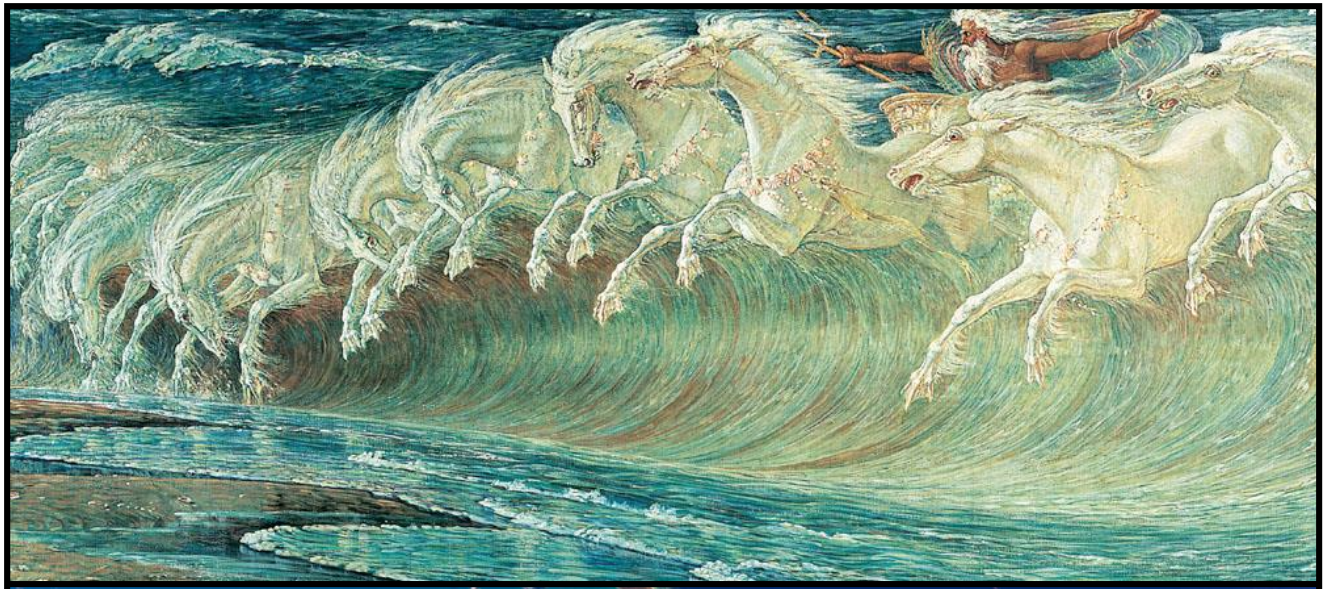
Comments on the Bahamian evidence for superstorms during the last interglacial

John E. Mylroie, Department of Geosciences, Mississippi State, MS 39762 mylroie@geosci.msstate.edu



2005 Brooks/Cole Thomson

NASA

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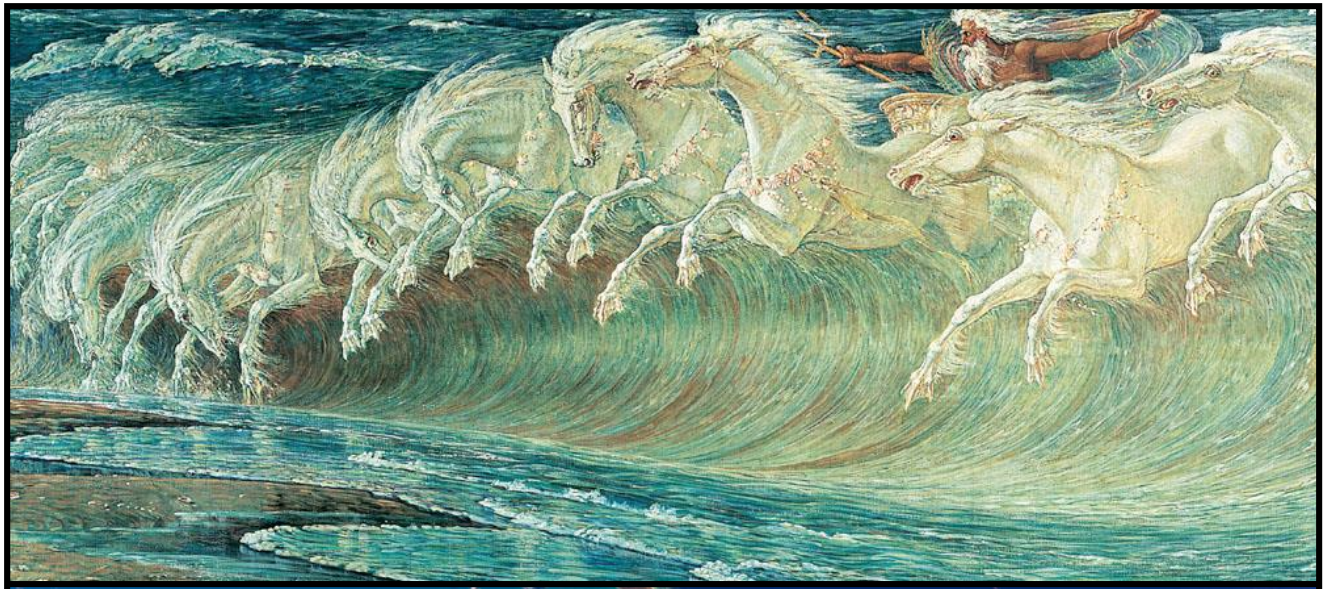

2005 Brooks/Cole Thomson

Myth

NASA

Reality

THE STORM IS UP, AND ALL IS ON THE HAZARD: IMPLICATIONS OF EXTREME STORM DEPOSITS IN THE BAHAMAS DURING THE LAST INTERGLACIAL

Tormey, B. R. 2015, GSA Abstracts With Programs, v. 47, no. 7, p. 360

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1. **Fenestral porosity exists at elevations up to 43 m in The Bahamas.**

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1. **Fenestral porosity exists at elevations up to 43 m in The Bahamas.**
2. **The fenestral porosity was produced by storm wave wash-over.**

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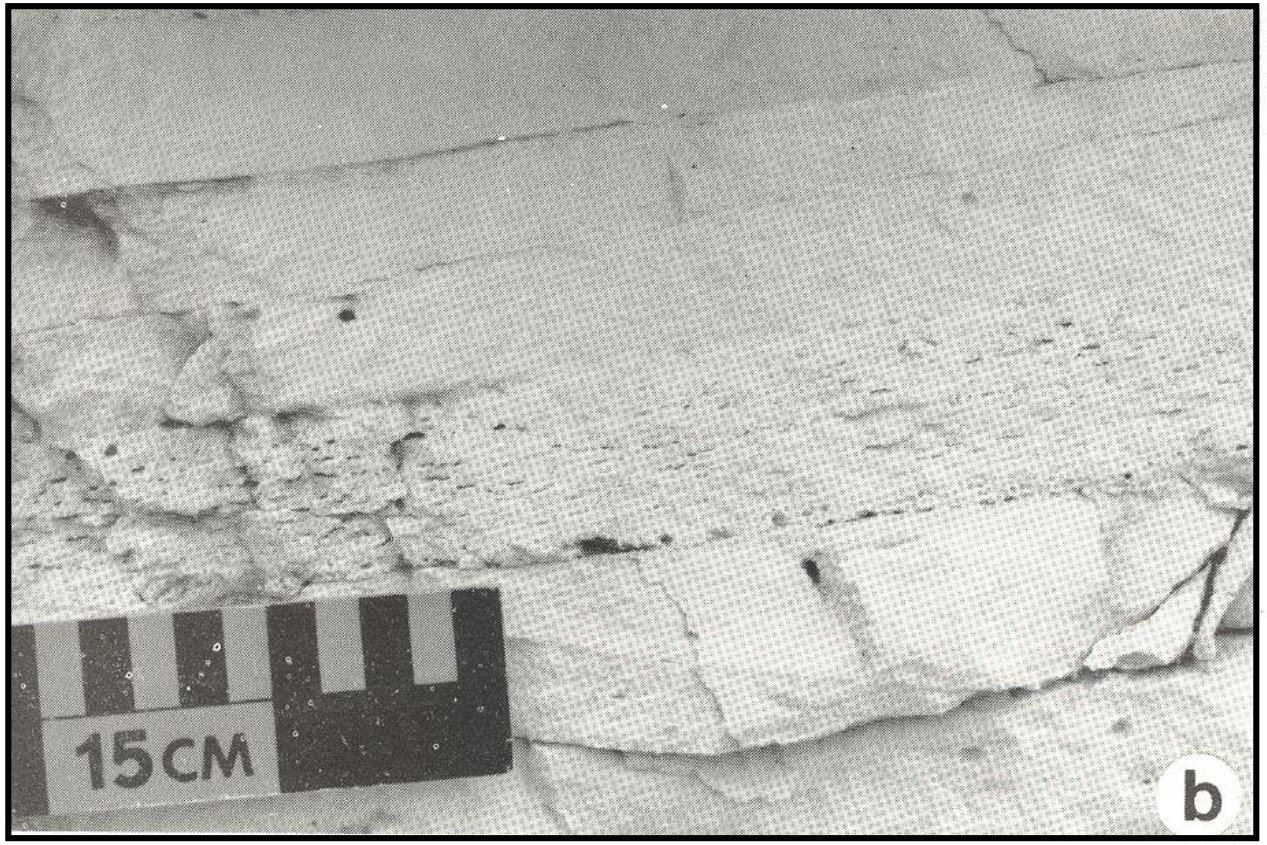
1. **Fenestral porosity exists at elevations up to 43 m in The Bahamas.**
2. **The fenestral porosity was produced by storm wave wash-over.**
3. **Scour and rip-ups [sic] exist, cross beds and root structures diminished.**

Bain, R. J., 1985, Eolian Dune, Watling Roadcut. *In* Curran, H. A., ed., Pleistocene and Holocene carbonate environments on San Salvador Island, Bahamas - Guidebook for Geological Society of America, Orlando annual meeting field trip, p. 129-132.

Roger Bain, October 1985, discussing fenestral porosity, Watling Road Cut, San Salvador Island, Bahamas

Bain proposed that the fenestrae resulted from rainfall slurries, which would place them repeatedly in section, at a variety of elevations that need not correlate with each other.



Close up of fenestral porosity, Watling Roadcut, San Salvador Island, from Bain, R. J., 1985

Bain, R. J., 1985, Eolian Dune, Watling Roadcut. *In* Curran, H. A., ed., Pleistocene and Holocene carbonate environments on San Salvador Island, Bahamas - Guidebook for Geological Society of America, Orlando annual meeting field trip, p. 129-132.

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Bain, R.J., and Kindler, P., 1994, Irregular fenestrae in Bahamian eolianites: a rainstorm-induced origin: Journal of Sedimentary Research, v. 64, 140-146.

Problems with the storm surge hypothesis:

1. **To place storm run-up at 20, 30 or 40 m above MIS 5e sea level (+6m) requires inundating all lower elevations.**

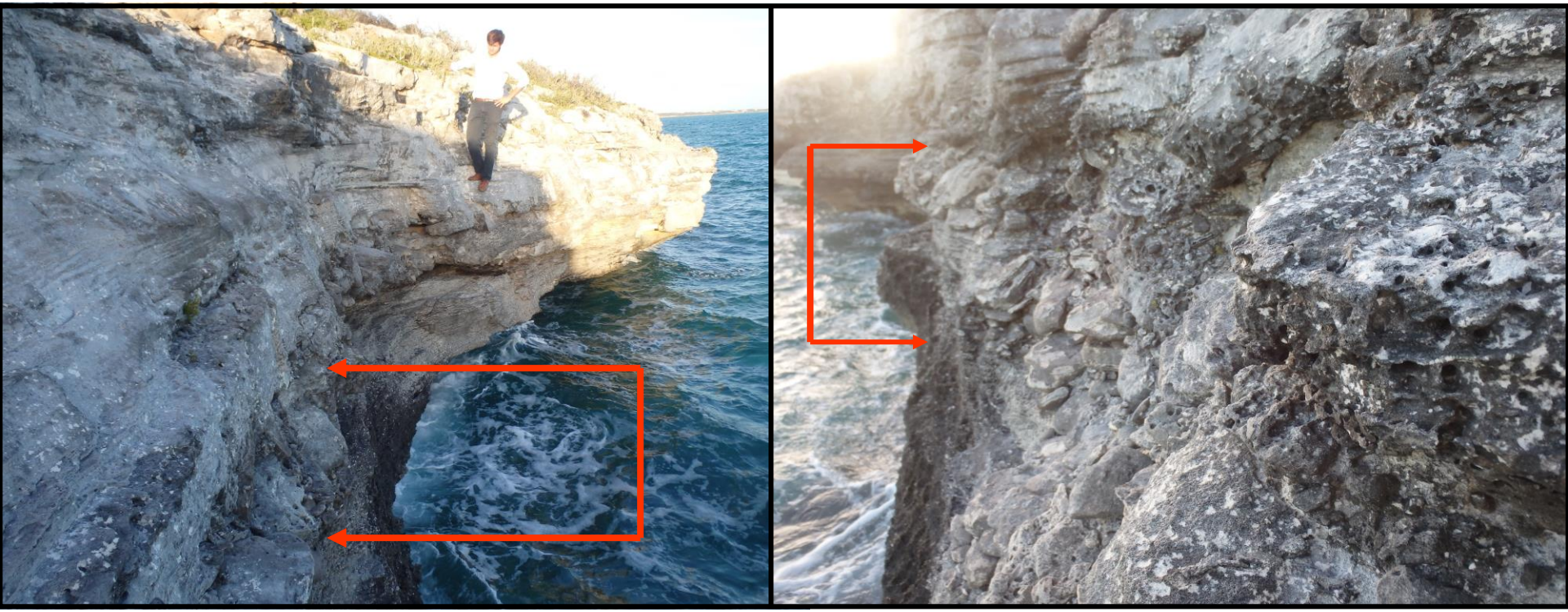
Storm run-up to 43 m (~140 ft) requires all lower elevations shown to be submerged, especially if proximal to the east coast.

Long Island Bahamas, Map Sheet 5, Lands & Surveys Department, Nassau, Bahamas, 1970

Problems with the storm surge hypothesis:

1. **To place storm run-up at 20, 30 or 40 m above MIS 5e sea level (+6m) requires inundating all lower elevations.**
2. **Such inundation should leave behind a tempestite record.**

Bahamian tempestites are rare, but consist of unsorted, rounded clasts, boulder size to sand size, with sharp contacts with underlying and overlying units.



West Harbour Bluff, southern shore, Providenciales, Turks and Caicos

In addition to containing rounded unsorted clasts of large size, Bahamian tempestites contain abundant marine shell material and corals.

West Harbour Bluff, southern shore, Providenciales, Turks and Caicos

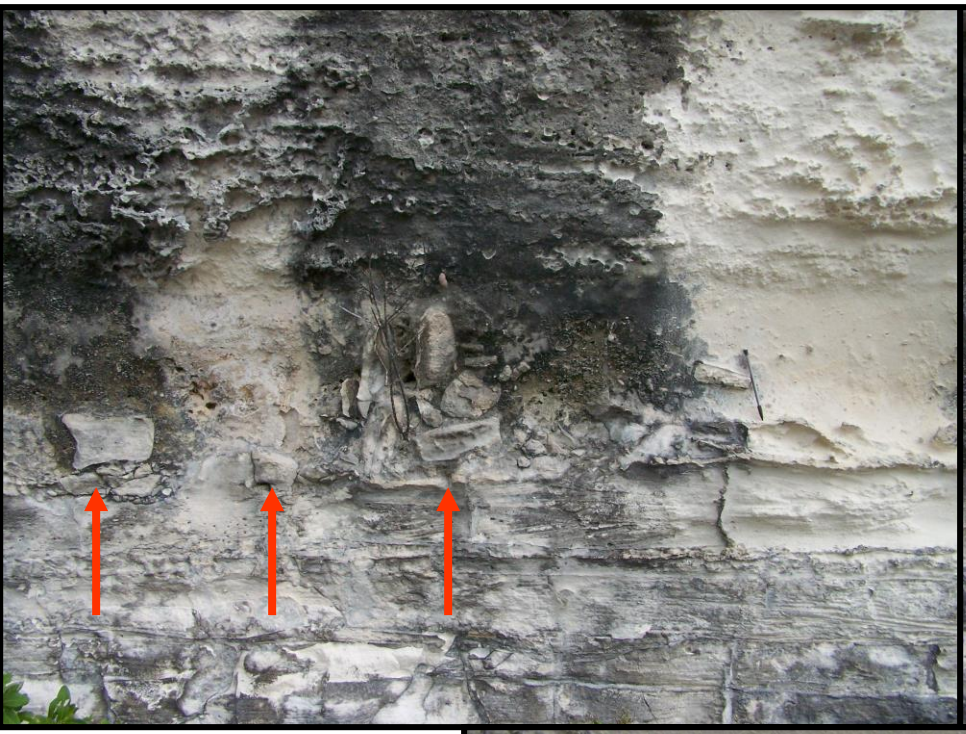
Flashlight 7 cm long for scale

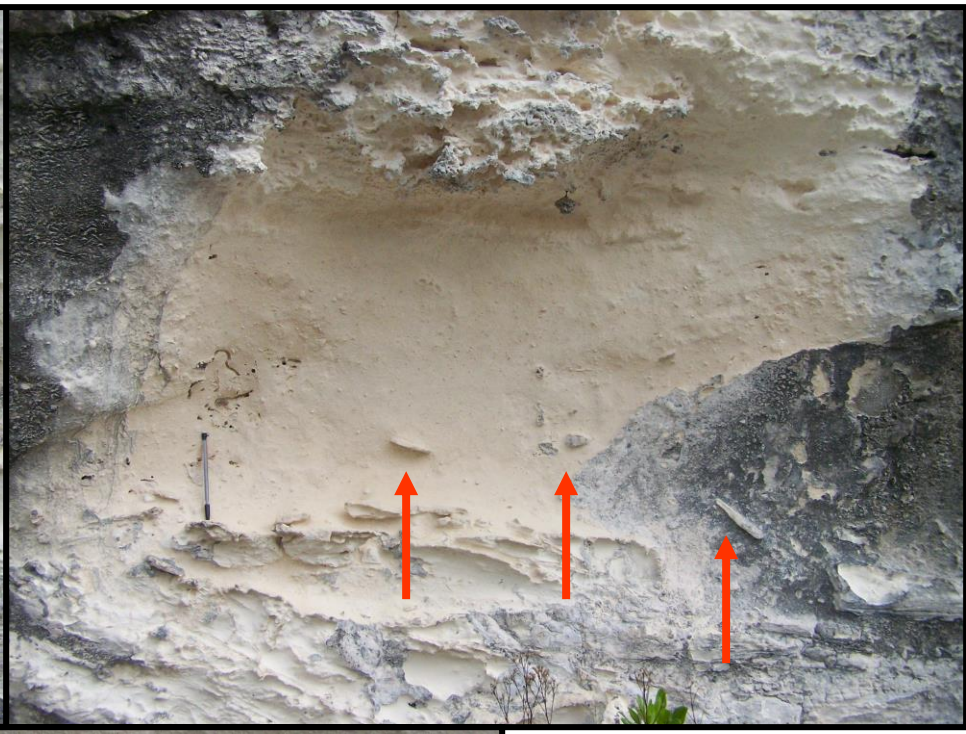
Tempestites should have a large footprint. The example at West Harbour Bluff wraps around Split Rock into Pirate's Cove, a distance of >1 km.

West Harbour Bluff Cave, western shore, Providenciales, Turks and Caicos

Flashlight 7 cm long for scale

Clasts, mis-interpreted as storm surge “rip-ups”, are the result of exposure surface weathering (red arrows) in a calcarenite protosol.





Fossil shell material here are land snails (orange arrows)

Twin Pines Road Cut, central Eleuthera

Transgressive-phase eolianites have bedding that is well-preserved with few vegemorphs.

North Point, Holocene, San Salvador Island

Regressive-phase eolianites have disrupted bedding high in the section, with well-developed vegemorphs

Crab Cay, Pleistocene, San Salvador island

Presence or absence of root traces is not a function of wash-over scouring, but of temporal position in a sea-level highstand cycle.

Another danger of climate change: Giant flying boulders?

Washington Post, November, 29, 2015, by science reporter Chris Mooney

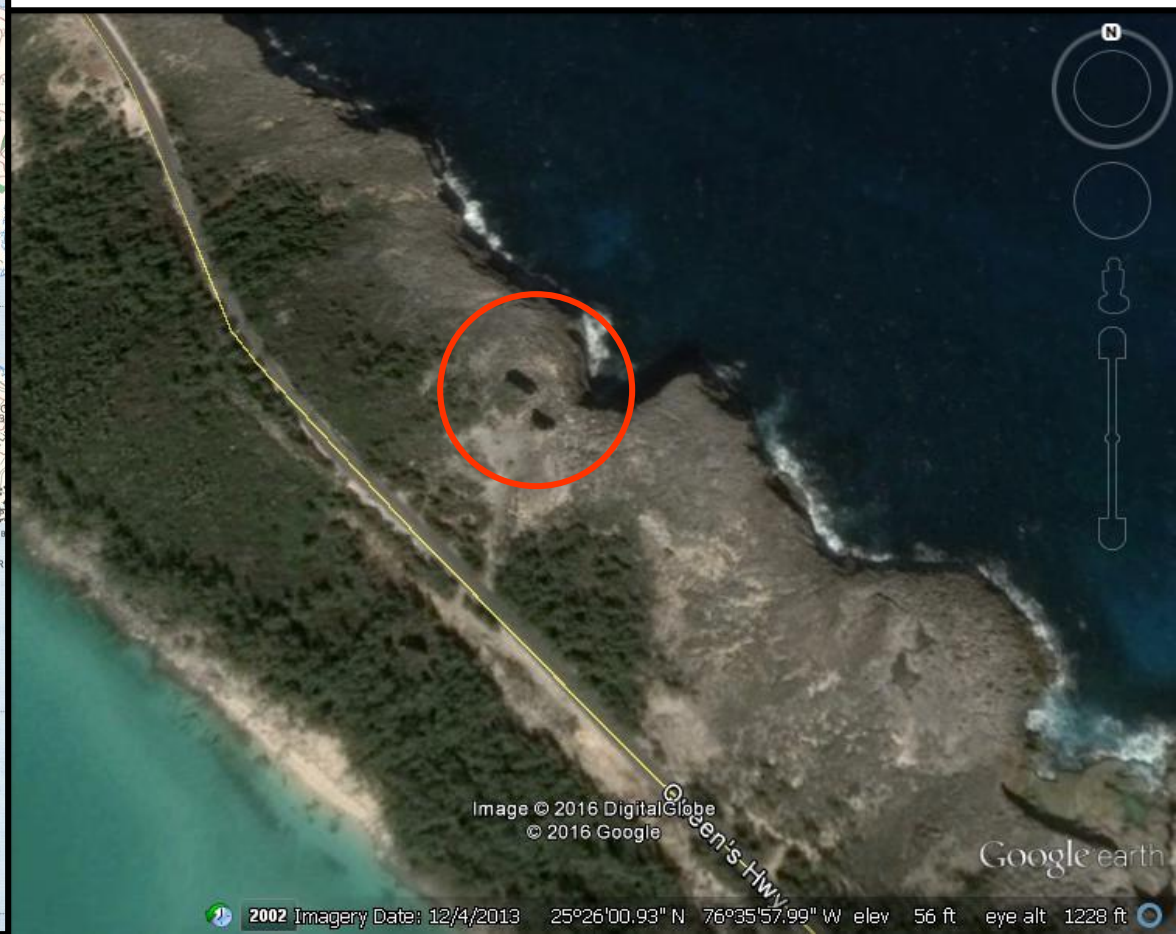
Another danger of climate change: Giant flying boulders?

Washington Post, November, 29, 2015, by science reporter Chris Mooney

The article argues that these large boulders, and nearby calcarenite chevrons are the depositional evidence of a MIS 5e superstorm, and a warning about present-day climate change.

Eleuthera, Bahamas, Map Sheet 4, Lands & Surveys Department, Nassau, Bahamas, 1970

There are 7 boulders (orange stars) described over an extent of a few kilometers, the most famous of which are the “Cow and Bull”.



The hypothesis is based on previous work:

Hearty, P. J., 1997, Boulder deposits from large waves during the last interglaciation on north Eleuthera Island, Bahamas: Quaternary Research, 48, 326-338.

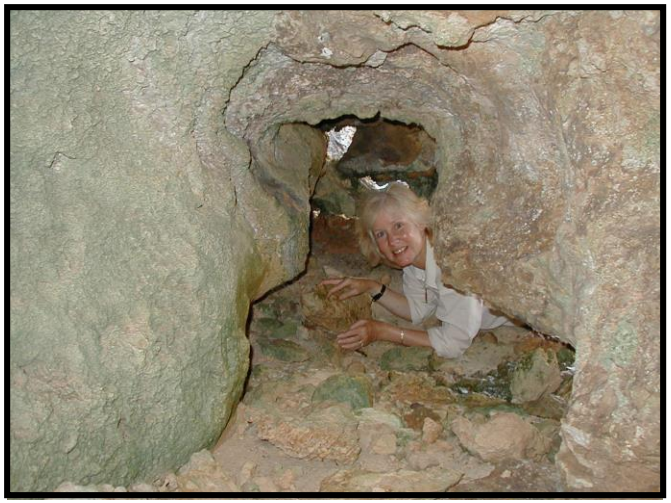
The Cow and Bull, Glass Window area, Eleuthera

The hypothesis is that amino acid racemization (AAR) dating suggests the boulders are older than the surface they rest on; and have bedding and pendulous calcite in pores indicating they are not in depositional position. The interpretation is therefore they must have been flung into position by a tsunami or superstorm.

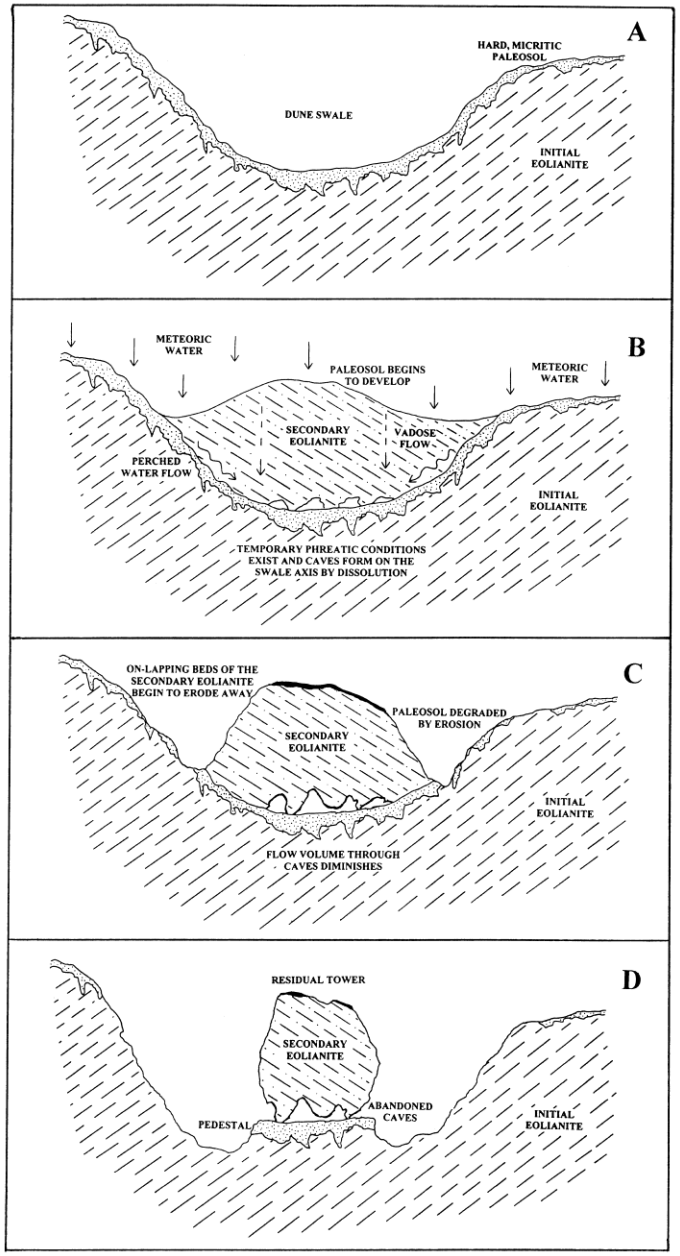
Alternative explanations have been offered:

1. The boulders are remnant tower karst

They are *karrentisch*, or "karst tables", sitting on an erosional pedestal (arrow).



All the boulders have caves developed at their base



Mylroie, 2008

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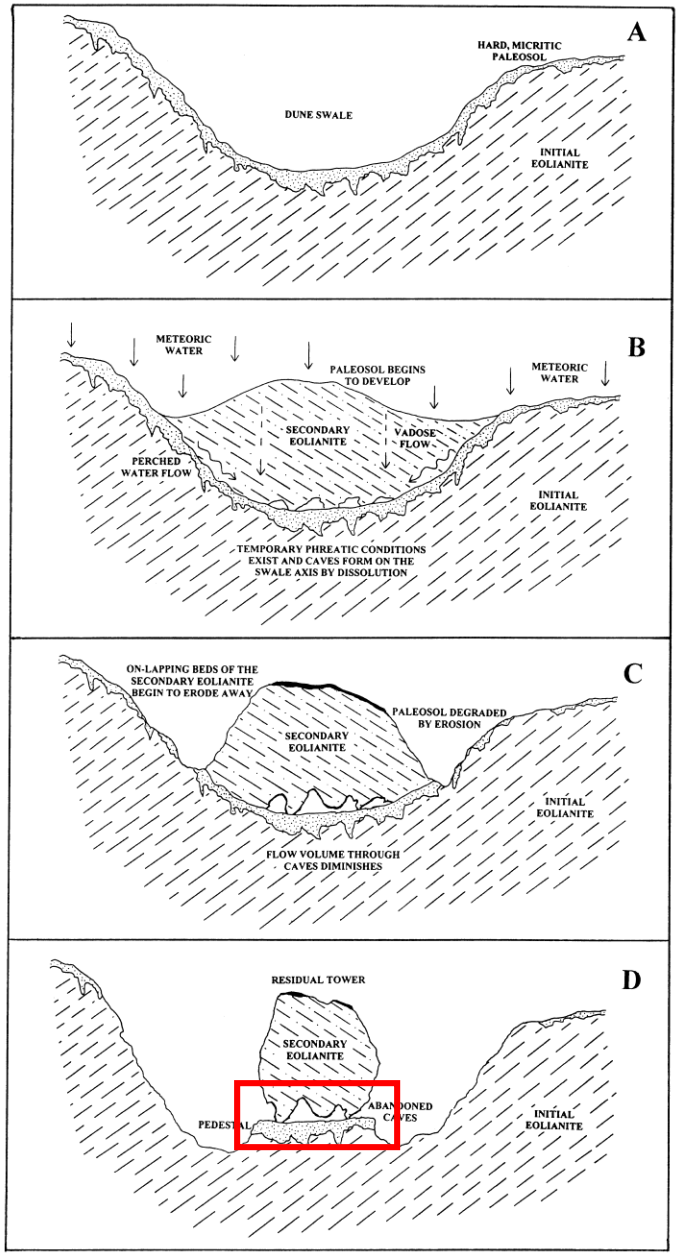
If the boulders have settled and rotated on their pedestals, then their bedding and pendulous calcite orientation can be explained.

Washington Post, 2015



Mylroie, 2008

Boulder Three has split, and the fragments rotated independently

Boulder Three, like all the boulders, has a cave at its base, and the boulder rests on small pinnacles

Alternative explanations have been offered:

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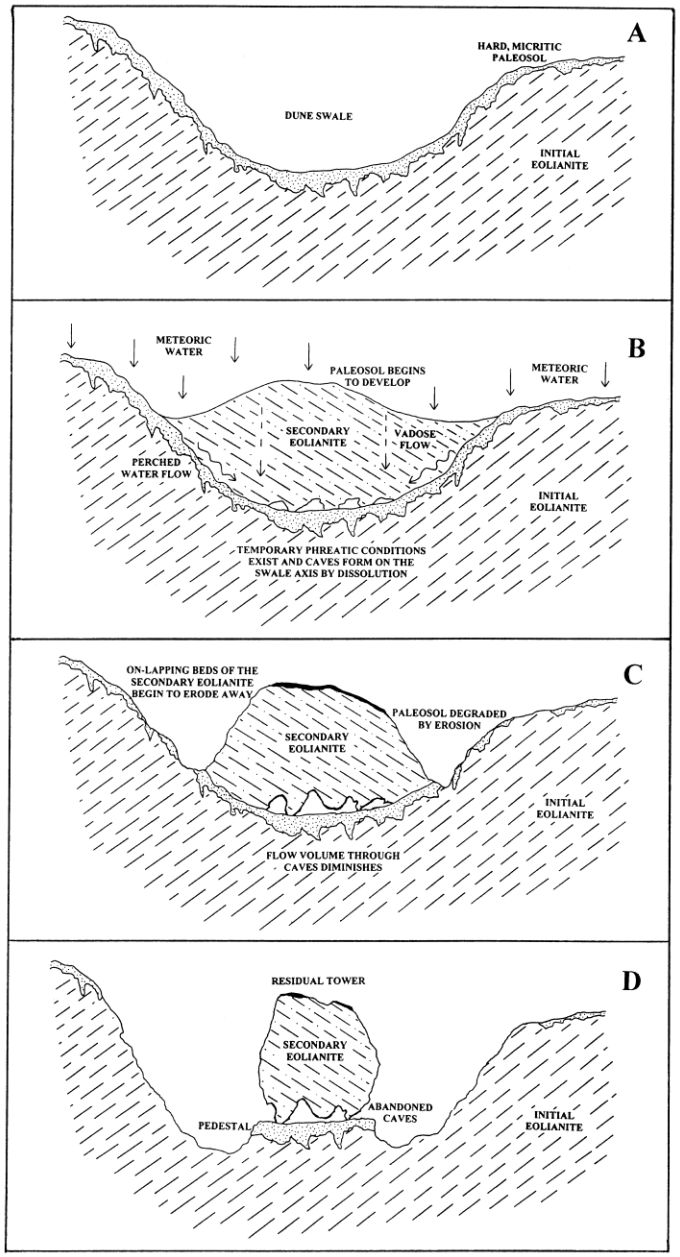
Boulder expression as an exposed tower means their temperature regime would promote faster AAR, giving a false age inversion.



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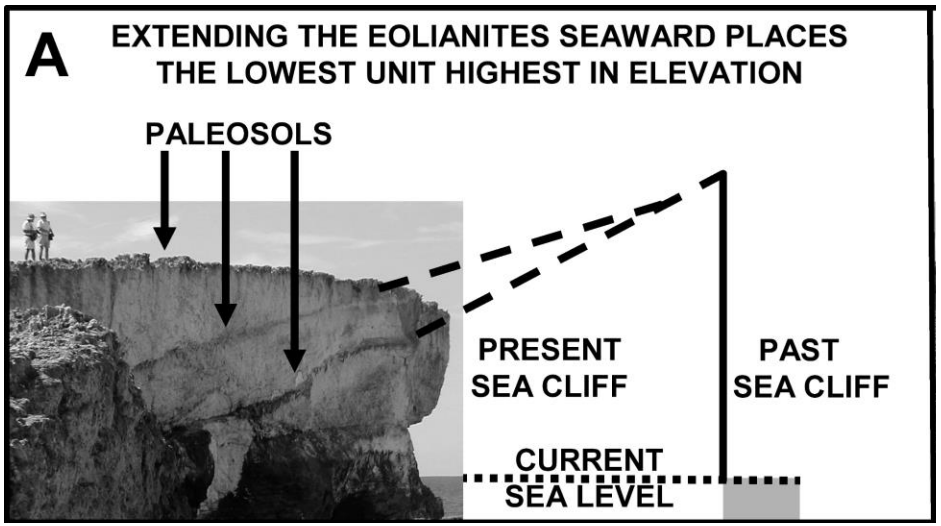

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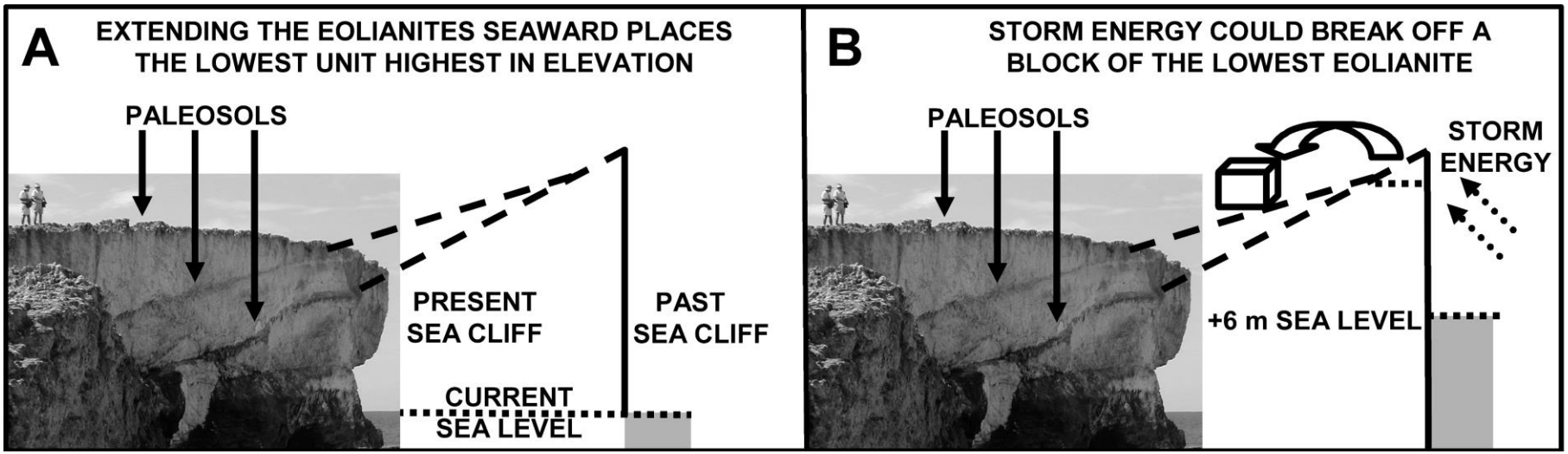

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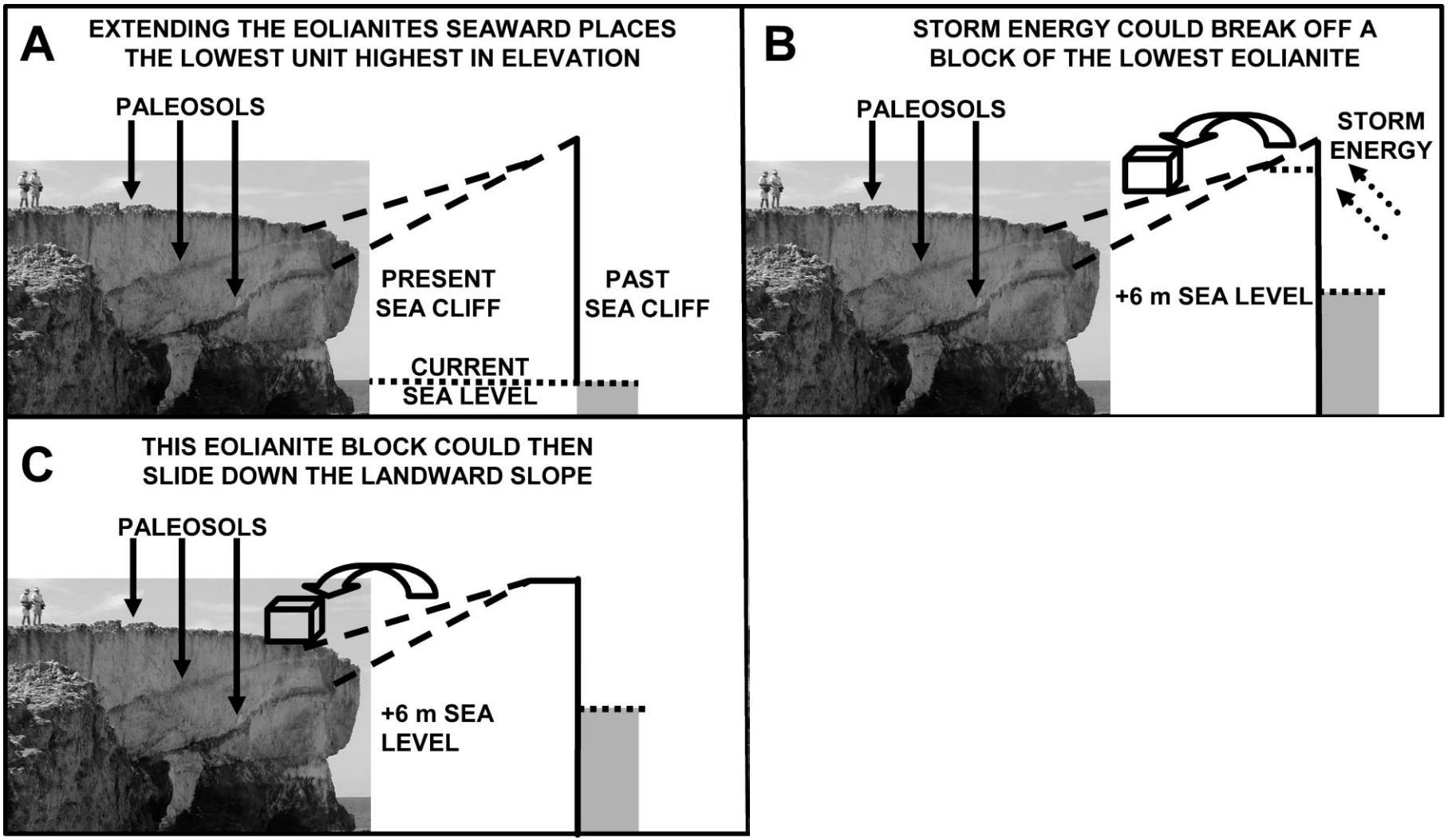

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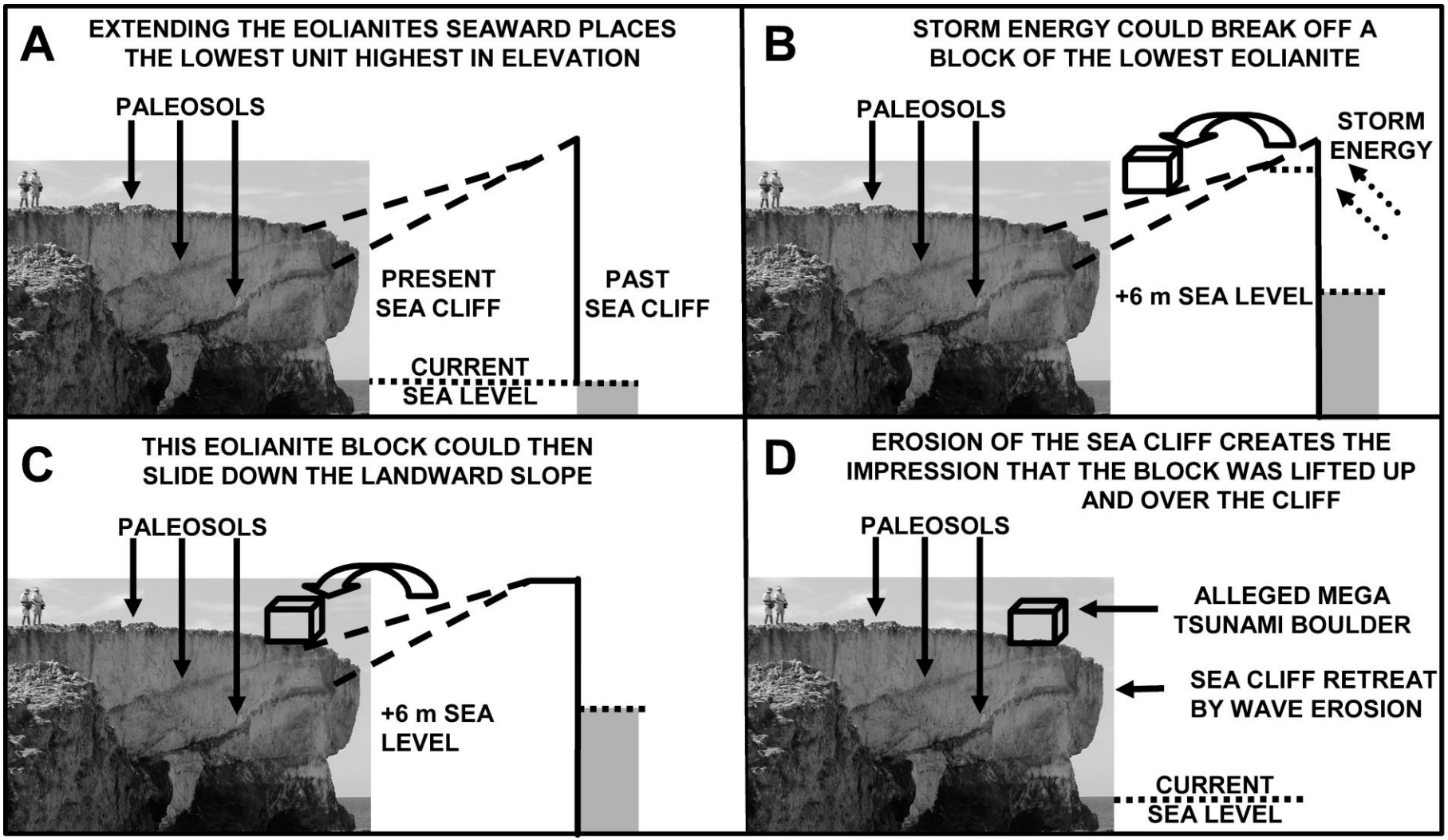
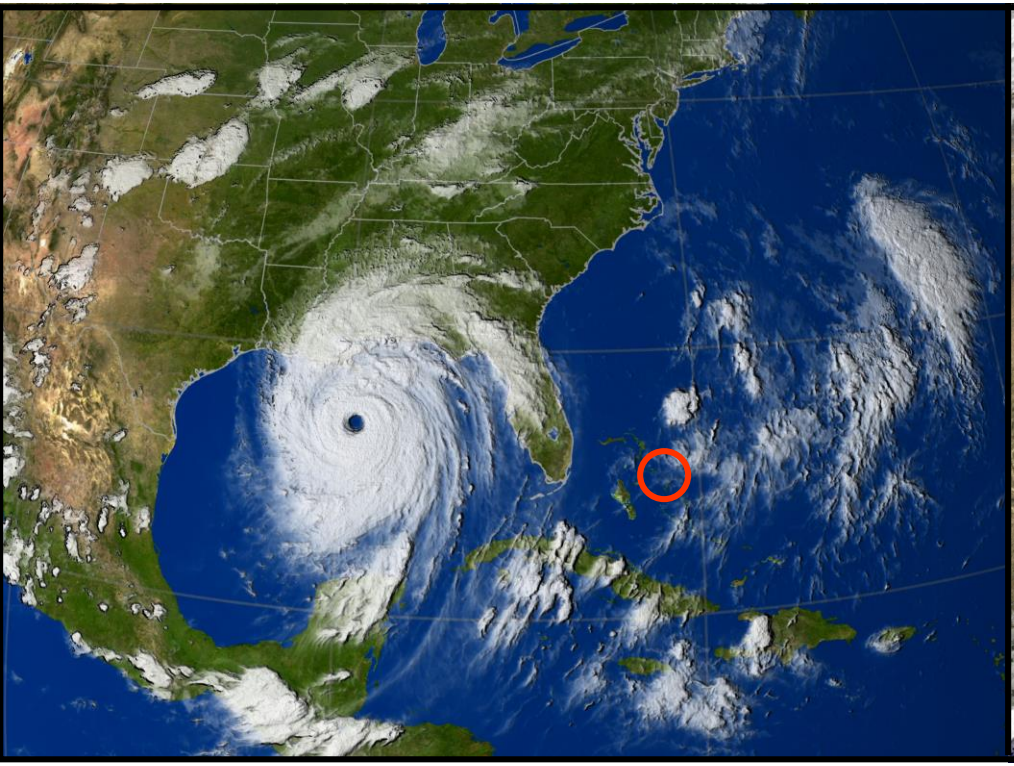


Mylroie, 2008

The final problem involves the very small footprint of these boulders

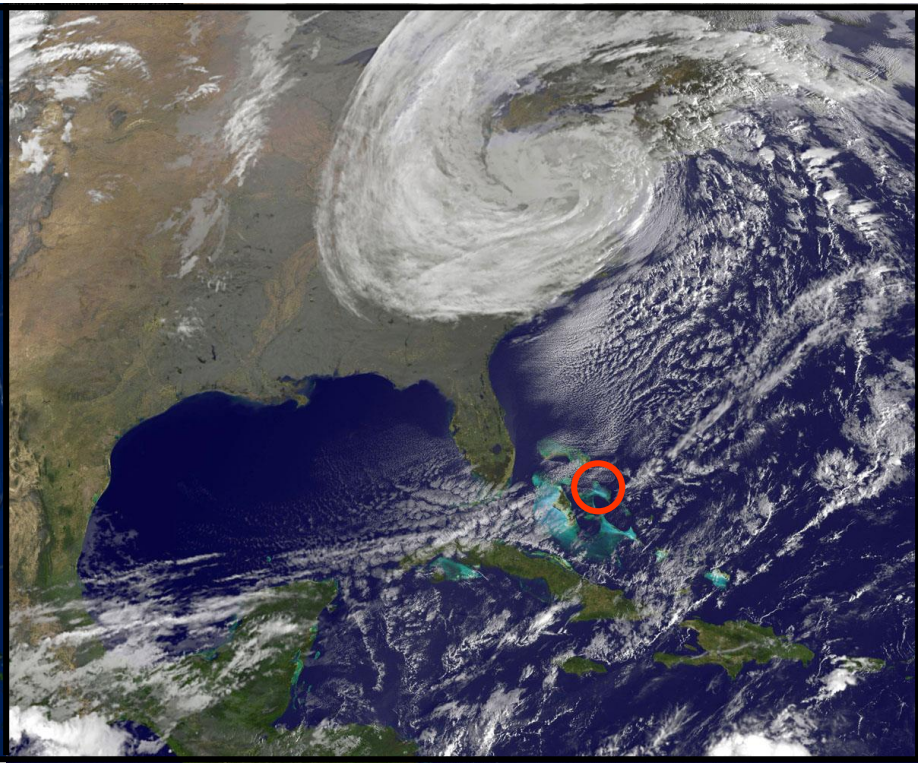
Intense hurricanes and superstorms have very large footprints. The entire straight-line size of Eleuthera is 125 km (red circles), the boulders are found in a footprint of only a few kilometers. No other boulders of this size are known elsewhere in The Bahamas.

Hurricane Katrina



pics-about-space.com

Superstorm Sandy



Livescience.com

Hurricane Joaquin, early October, 2015, category 4, the largest to hit the Bahamas since 1866 (Berg, 2016).

www.usatoday.com

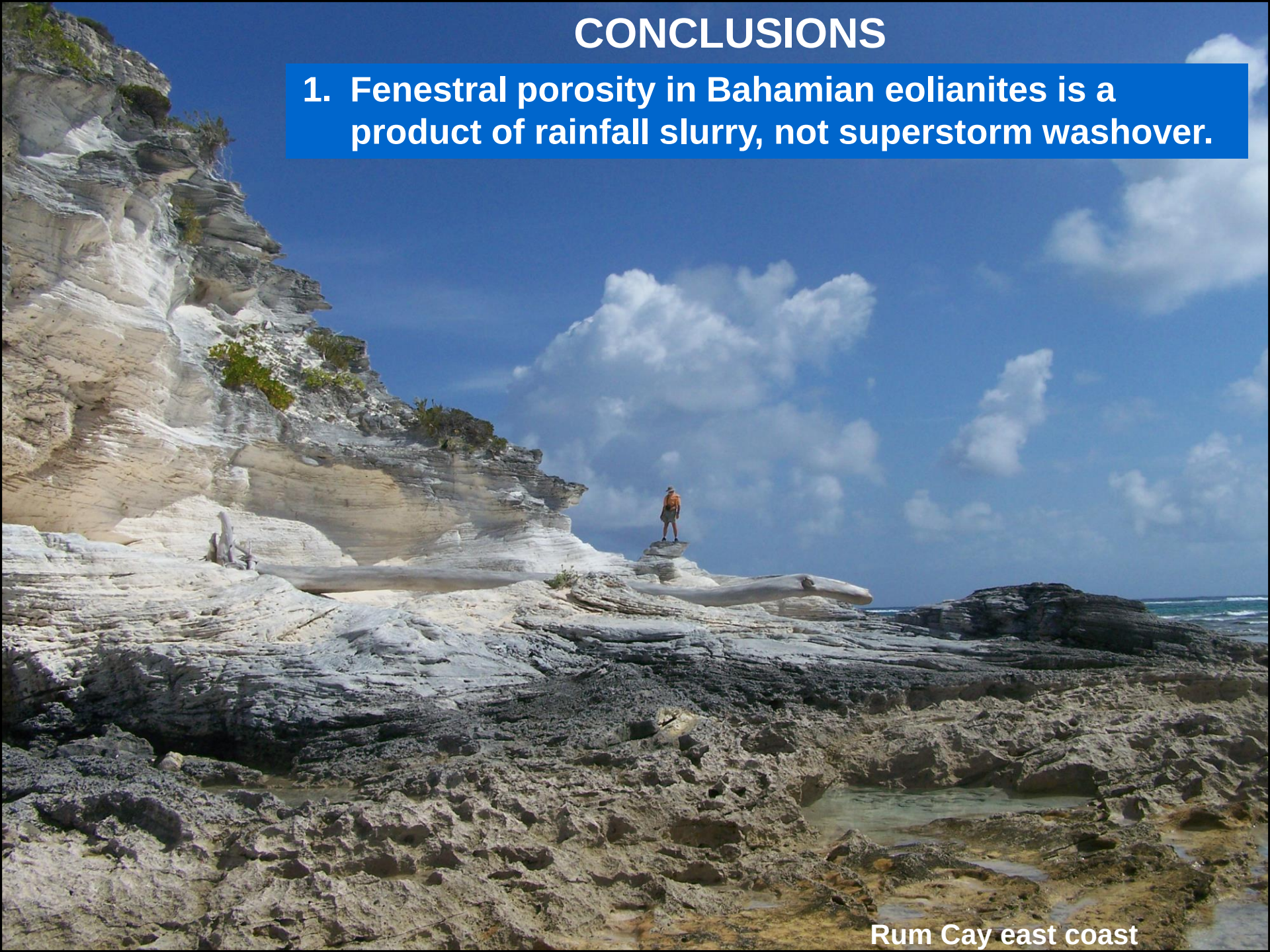
Hurricane Joaquin, early October, 2015, category 4, the largest to hit the Bahamas since 1866 (Berg, 2016).

Huge footprint, no boulders produced; red dot, Cow and Bull.

www.usatoday.com

CONCLUSIONS

1. **Fenestral porosity in Bahamian eolianites is a product of rainfall slurry, not superstorm washover.**



Rum Cay east coast

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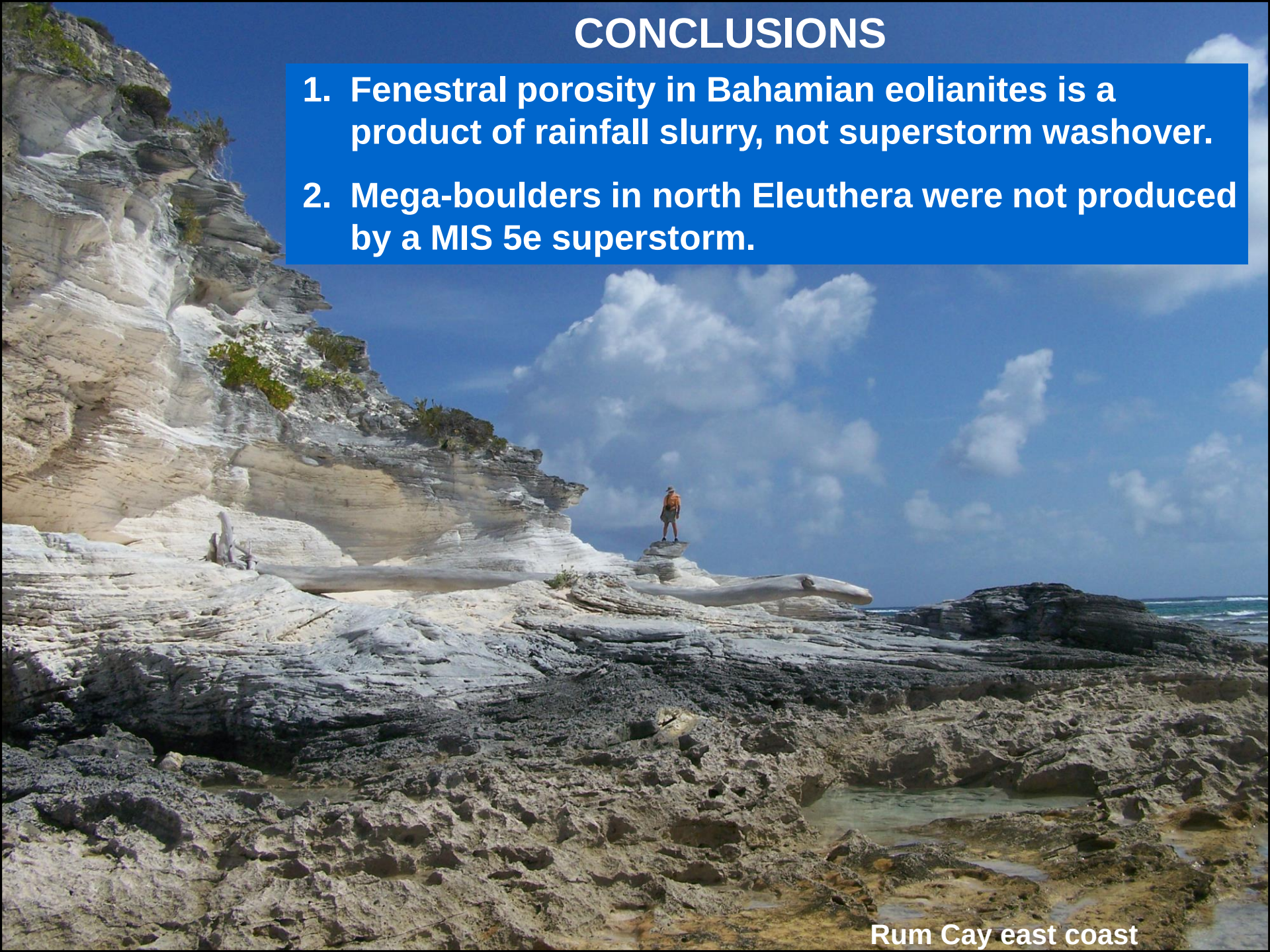

Rum Cay east coast

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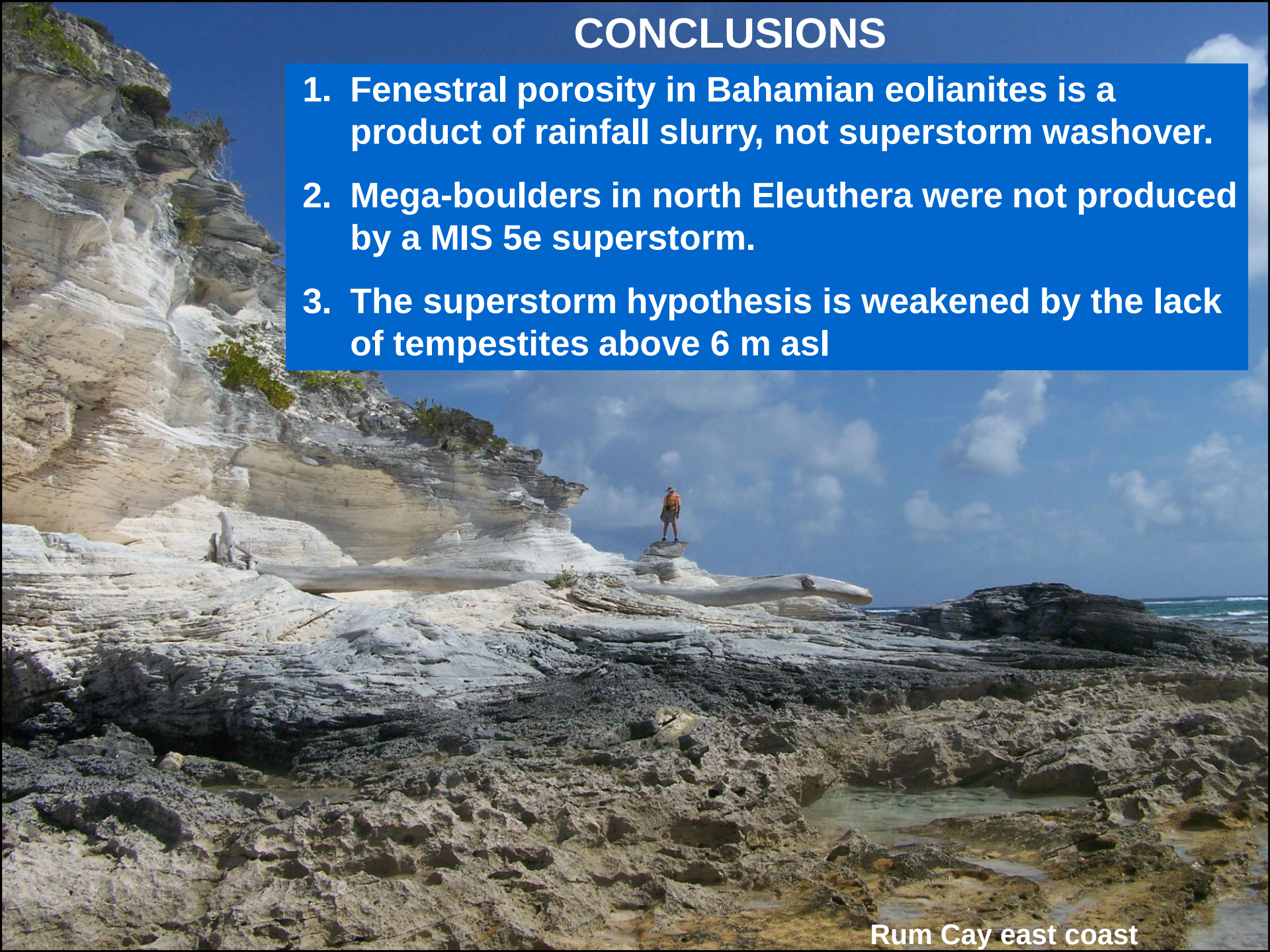
3. **The superstorm hypothesis is weakened by the lack of tempestites above 6 m asl**



Rum Cay east coast

QUESTIONS?

Queen's Bath
North Eleuthera

For the record, I fully believe climate change is happening; I just prefer good interpretations. My advice to students: "Don't buy coastal property".