

Interactive comment on “Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming is highly dangerous” by J. Hansen et al.

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The paper offers a valuable new vision of mechanisms that could lead to accelerated sea level rise from an unabated buildup of greenhouse gases.

In assessing section 2.2 of the paper, I contacted geologists working on Atlantic and Caribbean formations possibly associated with large waves. Max Engel at the University of Koln pointed me to two papers that seem, at the very least, to deserve a mention in this section as alternative explanations for the chevrons and beached boulders at-

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tributed to extraordinary storm waves.

Here are the relevant papers, followed by an explanation of their relevance from Engel: “Chevrons” are not mega-tsunami deposits – A sedimentologic assessment,” *Geology*, May 2009, Joanne Bourgeois, University of Washington Robert Weiss, Texas A&M University (DOI: 10.1130/G25246A). Here’s a news release on this work.

“Late Quaternary sea-level position: Evidence from Bahamian carbonate deposition and dissolution cycles,” *Quaternary International*, May 2008, John E. Mylroie, Mississippi State University (DOI: 10.1016/j.quaint.2007.06.030).

Engel’s explanation:

Paul Hearty’s conclusions on MIS 5 [Marine Isotope Stage 5, the Eemian] mega-storms or tsunamis from the Bahamas never seemed convincing to me, even though I am not the one to criticize them since I have never been to Eleuthera myself. However, the conclusions are persistently being repeated. The chevrons have been demystified by Bourgeois and Weiss (2009) in their *Geology* paper. Based on the fact that these V-shaped ridges are forming behind the shallow outlets between the small islands where tidal or other currents reach their maximum sediment transport capacity, they seem to rather be related to long-term dynamics than to any type of mega-wave event.

These ridges are a classical feature in coastal geomorphology and we find similar ones along our East Frisian coastline in Germany. The concentrated currents – tidal influence is, however, more pronounced here than in the Caribbean – between barrier islands form so-called “Riffbögen” (shoals and subaqueous ridges) at both sides of the channel.

The origin of the giant boulders shown in the ACPD manuscript (and many other papers before) has convincingly been reconstructed by Mylroie (2008) as weathered remnants of a lithified dune deposit. Dating in Hearty (1997) was based on amino acid racemisation, which is a method rarely used in Quaternary Sciences and generally not accepted

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without verification by other methods.

There is a neat, simple drawing in the paper explaining boulder formation through chemical weathering.

To sum up, in my opinion, chapter 2.2 seems to represent a slightly one-sided perspective on geological evidence for Eemian mega-storms.

More background from New York Times Dot Earth blog: A Rocky First Review for a Climate Paper Warning of a Stormy Coastal Crisis <http://nyti.ms/1LG4JR9>

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 20059, 2015.