Ocean Science
Discussions

EGU

Interactive comment on "Global sea level reconstruction for 1900–2015 reveals regional variability in ocean dynamics and an unprecedented long weakening in the Gulf Stream flow since the 1990s" *by* Tal Ezer and Sonke Dangendorf

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This is an interesting study of temporal variations in the large-scale circulation and associated water level near the U.S. East Coast. Even though the spatial resolution of the reconstructions is comparably low and single coastal features and even quite large water bodies such as the Chesapeake Bay are not represented at all, the results seem to capture many interesting items described in other studies.

The analysis leads to several interesting points, including the observation that the changes to (the intensity of) Gulf Stream have clear temporal pattern of decrease: one event that happened half century ago and another during this millennium.

The conclusions draw a more dramatic picture than one can observe from the images. For example, lines 383–384 tell that "the recent weakening in the GS is unprecedented in its length during the 116 years of the reconstruction." This is of course true but Figure 3 makes clear that the initial level of the relevant proxy was much higher at the end of the 1990s than in 1960s and the recent weakening more resembles a relaxation of an intense stream back to (or just a little bit below) its usual (almost pre-industrial) level. I would even suggest to adjust the title accordingly.

I suggest to critically look at this and similar claims and to make sure to the reader that the results should not heat up the discussion of accelerating climate change.

Discussion of the acceleration of sea level rise seems to use slightly too much jargon. Acceleration, by definition, is the rate of change of speed. The presence of different rates of the increase in sea level during different time periods does not necessarily mean acceleration over any longer time interval. The description on lines 160–164 only confirms that the average rates are different. The change in rates may happen instantly. Thus, the claim that "there is clear acceleration of sea level over the entire period" is not really substantiated and should be reformulated.

I understand that almost everybody talks/writes today about acceleration of sea level rise but it is better to keep in mind the classic notions of such categories. A larger increase rate (=speed) does not necessarily mean acceleration (=change in speed). The same applies to formulations on line 335 where "larger acceleration" is, most probably, not really a good description of what has happened in the study area.

I agree with the comment of Referee #2 that, in general, the paper is not really well structured. The text should be divided into much shorter paragraphs. Doing so would also make easier to distinguish the results from conjectures.

I thus recommend publication with moderate revisions (mostly better structuring the text and separation of validation from implications and conjectures).

Minor and technical comments (the typos spotted by Referee 1 omitted in the list)

Usually en-dash is used to denote a range of years (e.g. 1900–2015) in Ocean Science

Abstract, line 2 from bottom; also line 55, line 81, line 248, line 370, line 378: use multiplication sign instead of letter "x"

Line 2: apparently should be "show acceleration of global sea level rise" or similar

Lines 16, 17 / line 28 / line 41 and in several occasions below: please unify the use of "U.S. East Coast" / "U.S. East coast" / "U.S. east coast"

Lines 109–111: unify capitalization of "1. The" etc.

Line 128 and in many occasions below: use italics (or better math mode) for mathematical symbols in text like $r(t)$

Line 298–299: the sentence "While these trends are small and not statistically significant, they do represent a potential acceleration in the slowdown of the FC if they are real", in essence, is an expression of wishful thinking. Either remove or make sure that this kind of conjecture cannot be made based on such very weak changes (in total less than 2%) that basically are at the border of detection.

Line 410: page numbers or article number missing

Line 421: check capitalization

Line 464: remove full stop after "Future"

Line 471: add full stop after "Res"

Line 483 & line 488: volume and page numbers (or article number) are missing

Line 544: page numbers or article number missing

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