

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

Anonymous Referee #2

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The presented article uses the global gridded RecSL sea level reconstruction dataset. It illustrates that this dataset quite accurately represents decadal changes in two time series, the coastal sea level at Sewells Point (Chesapeake Bay) and the Gulf Stream strength for which independent reconstructions exist. This is a result that encourages the application of the dataset in regional long-term studies. I only suggest a few clarifications and corrections of minor flaws, which have no influence on the article's results.

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Specific suggestions:

L57-58: Are there other studies that have investigated this question, then please give references, or is this study the first one?

L100: How was the deseasonalisation performed?

L124: How was the gap treated? Did you fill it artificially or did you use analysis methods capable of dealing with incomplete data?

L133: Please check whether the c_i are actually cumulated sums of modes rather than the independent modes themselves. E.g., the red curve shown in Fig. 2b contains the low-frequency signal of the blue curve, so you probably show cumulated sums over the last (lowest-frequency) independent modes. In this case, c_1 will be the full signal, but your formula given in this line would be incorrect. Only the sum over the independent modes, not over their cumulative sums, will give the full signal. Please check.

L163: Sea level cannot accelerate, only sea level rise can. Also, your expression "accelerating over the entire period" is misleading, since within the period, both acceleration and deceleration exist.

L164: Fig. 1f does not show an acceleration. Please define how you calculate acceleration and show a corresponding figure.

L168: In contrast to this sentence, none of your figures indicate a sea level drop anywhere, since their color scales start at zero. Please clarify that.

L179: It is actually the 1970s-1980s only that show higher than average sea level.

L212-213, L257: Please provide more detail on how the significance test was performed, possibly in an online supplement.

L228: Please give some reference to existing literature describing these connections, e.g., Sévellec and Fedorov, Journal of Climate, 2013

L238: I assume the selected tide gauge station or any station in its close proximity did not contribute to the RecSL reconstruction used here, so it can serve as an independent validation site? Please explain this in the text.

Technical corrections:

L44, L45: minima -> minimum

L63: rely -> relies

L64: compared -> compare

L71: summery -> summary

L139: ensemble -> ensembles?

L192: course -> coarse

L193: and impact -> and the impact?

L214: indicated connection -> indicated a connection

L221-222: cannot indicate exact mechanism or cause-and-effect -> please rephrase

L241: course -> coarse

L252: made in Dangendorf et al. -> made by Dangendorf et al.

L314: course -> coarse

L357: increases -> increase

L363: shows similar downward trend -> shows a similar downward trend

Fig. 5: trent -> trend

Fig. 7c: The labels on the x axis should be placed in the middle of the vertical stripes.

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2020-22>, 2020.

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