Response to anonymous Referee #2

The referee is thanked for the positive comments and many useful suggestions that helped to improve the manuscript. All the comments were addressed as detailed below.

The main changes in the revised manuscript include:

1. New Fig. 1 that compares the mean SSH of RecSL with AVISO and shows the locations of data and subregions.

2. Reorganization of the entire manuscript, so that validation/evaluation of the reconstruction against data comes first (new section 3.2) and precedes the discussion of mechanisms and basin-scale modes (new section (3.3).

3. Seven new references (1 of which was suggested by this reviewer) were added.

Response to specific comments:

4. Ref#2: *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.*
Response: Thank you for the kind words on our study.

5. Ref#2: *L57-58: Are there other studies that have investigated this question, then please give references, or is this study the first one?*
Response: We added here reference to a recent study by Gehrels et al. (2020), who to our knowledge is the only other study so far that used the Dangendorf et al.'s (2019) RecSL, in this case to study past sea-level rise hotspots along the western North Atlantic Ocean coasts and their relation to the North Atlantic Oscillation (NAO) and to Arctic ice melt.

6. Ref#2: *L100: How was the deseasonalisation performed?*
Response: This is quite straight forward and explained now (lines 104-108)- the mean annual cycle (averaged over time for each month of the year) was simply calculated and removed.

7. Ref#2: *L124: How was the gap treated? Did you fill it artificially or did you use analysis methods capabale of dealing with incomplete data?*
Response: It is explained now (lines 132-139) that the EMD analysis can easily handle uneven sampling intervals and data gaps. In fact, the impact of data gaps on EMD analysis of sea level records has been specifically tested in Ezer et al. (2016).

8. Ref#2: *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.
Response: While ci's represent individual EMD modes correctly in Eq. 1, however, we admit that the description of low pass filtered records (e.g., in Figs. 3, 7, 9 & 11) was confusing, as they actually represent the sum of low-frequency modes. This is now clarified in the text and in figure captions.

9. Ref#2: 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.*
Response: The reviewer is correct, and the text was changed accordingly. The figure in fact does not show acceleration, only SL change, though it is inferred that changes in SLR rates between one period to another means acceleration/deceleration.

10. Ref#2: *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.*
Response: The reviewer is correct, so the text now clarifies that sea level is rising everywhere, but at some locations or at some periods SLR is faster than at other locations or periods.

11. Ref#2: *L212-213, L257: Please provide more detail on how the significance test was performed.*
Response: Following also a similar question from Referee#1, more detailed information with a new reference to the statistical method used (Thiebaux and Zwiers, 1984) is now provided to explain how we estimate the degrees of freedom and confidence levels of correlations using EMD modes (lines 158-167).

12. Ref#2: *L228: Please give some reference to existing literature describing these connections, e.g., Sévellec and Fedorov, Journal of Climate, 2013*
Response: This reference and several others were added, as suggested by both referees.

13. Ref#2: *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.*
Response: This issue is now explained in more details (lines 110-117). It is true that this tide gauge is not completely independent from RecSL, however, the hybrid reconstruction has been validated thoroughly using random independent unassimilated sites (see supplementary material in Dangendorf et al., 2019) and there are so many tide gauge records along the U.S. East Coast that the inclusion/exclusion of a single site such as Sewells Point will have a negligible effect on the reconstructed fields.

14. Ref#2: Technical corrections…**Response:** All these typos and text corrections were fixed.

15. Ref#2: Fig. 5: trent -> trend, Fig. 7c: The labels on the x axis should be placed in the middle.
Response: The 2 figures were redrawn with those corrections (new Figs. 4 & 6).