

1 **Response to reviewers' comments for "An assessment of equatorial Atlantic interannual**
2 **variability in OMIP simulations".**

3 We thank the Reviewer for their positive appreciation of our manuscript.

4 A few typos were corrected in the manuscript:

- 5 • In the table 3 of the revised manuscript, the OMIP2 ensemble equatorial thermocline
6 tilt in MAM should be 35.44 ± 5.61 m and not 35.44 ± 3.52 , this has been corrected.
- 7 • In the caption of Figure 2, "January 1987" has been corrected to "January 1988".
- 8 • The reference to Figure S3e in L248 was incorrect and it has been replaced with Figure
9 S2e.
- 10 • "As previously discussed, we also find increased interannual SST variability in MOM5-
11 LR-anom (Figure 8d) relative to MOM5-LR (Figure 8e)" L335-336 has been corrected
12 to "As previously discussed, we also find increased interannual SST variability in
13 MOM5-LR-anom (Figure 8e) relative to MOM5-LR (Figure 8d)" in the revised
14 manuscript.
- 15 • In the caption of Figure 9d, "MJJ" was corrected to "AMJ" as indicated by the Figure
16 9d label.

17 Please find our detailed responses below. The Reviewer comments are in black and our
18 answers in blue. **When line numbers are given, they refer to the revised manuscript with**
19 **track changes accepted.**

20 Following my suggestions and comments, the authors have significantly improved the
21 manuscript. I think the manuscript could be published as is, but I have some
22 recommendations that I would like to suggest to the authors:

- 23 1) I appreciate the effort the authors put into the development of the new sensitivity
24 experiment (MOM5-LR-anom). Nevertheless, I think that this new experiment should be
25 analyzed in comparison to the previous sensitivity experiment the authors conducted, i.e.,
26 MOM5-LR-wind. In my opinion, the revised manuscript fails to draw stronger conclusions on
27 the origin of the difference in interannual variability between OMIP1 and OMIP2. The weak
28 difference in interannual variability between MOM5-LR-wind and MOM5-LR-anom suggests

29 that it is controlled by the interannual anomalies in the wind, rather than the total wind,
30 depreciating the role of the climatological forcing.

31

32 We appreciate the Reviewer's suggestion. As indicated by the Reviewer in the previous round
33 of review, the MOM5-LR-wind sensitivity experiment was not ideal because of its crude setup.
34 In the revised manuscript, we have replaced it with MOM5-LR-anom, following the reviewer's
35 recommendation. Comparing MOM5-LR and MOM5-LR-anom clearly reveals that the greater
36 interannual variability in SST and SSH in MOM5-LR-anom is due to the interannual variability
37 in the CORE-II wind forcing. A comparison between MOM5-LR-anom and MOM5-LR-wind
38 would illustrate the impact of CORE-II interannual anomalies versus the total CORE-II winds
39 on interannual SSH and SST variability in the equatorial Atlantic. As the Reviewer noted, this
40 impact is minor and would necessitate additional figures and analysis. Therefore, we have
41 decided not to reintroduce the MOM5-LR-wind experiment into the revised manuscript.

42

43 2) I would appreciate if the authors could provide a small table summarizing the experiments:
44 name, associated wind forcing, and heat/water/river forcing. Something like:

45 OMIP1 – COAREII - COAREII

46 OMP2 – JRA-55 -JRA55

47 MOM5-LR – JRA55-JRA55

48 MOM5-LR-wind – COAREII – JRA55

49 MOM5-LR-anom – COAREIIclim+ JRA55anom – JRA55

50

51 We thank the Reviewer for the suggestion. We have included Table 2 in the revised
52 manuscript, which summarizes the various GFDL-MOM5 simulations used in this study.

53

54 Specific comments:

55

56 L95: Add a reference for the AVISO SSH product

57 We were unable to find a reference paper corresponding to the vDT2021 SLA product. The
58 only citation we found and used is: Copernicus Climate Change Service, Climate Data Store,
59 (2018): Sea level gridded data from satellite observations for the global ocean from 1993 to

60 present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). DOI:
61 10.24381/cds.4c328c78.

62

63 L111-112: The 1°x1° interpolation is already mentioned

64 Yes, this has already been mentioned for the OMIP models. However, we also indicate here
65 that the CMIP6 models were also interpolated on a 1° by 1 ° regular grid. We have added
66 “CMIP6” to the sentence. L113

67

68 Section 2.1.4: add the ref the Large and Yeager in this paragraph.

69 We have already cited this study in the previous section where we describe the OMIP models
70 and the CORE-II forcing.

71 L175: is it a seasonal cycle rather than monthly averages here?

72 That is correct, we have replaced “monthly climatology” by “seasonal cycle”. L176 and 178

73 L244: the figures show high correlation, instead of exhibit

74 Corrected as suggested by the Reviewer. L245

75 L365: Your results underscore the role of wind interannual anomalies, rather than total wind
76 (see my first general comment).

77 We agree with the Reviewer and have revised the sentence. It reads now: “This underscores
78 the critical role of interannual anomalies in the wind forcing in accurately simulating the
79 equatorial Atlantic interannual variability within ocean models.” L376-377

80

81 Section 6.1. I think that you could consider reordering the point stressed in the conclusions.

82 Wind could be discussed before SST and SSH?

83 We have reordered some of the key points in section 6.1. We now discuss the results of the
84 sensitivity experiments in the last two points.