

Reviewer #2, Report #1

We are very grateful for the reviewer's much valid requests. We have now addressed them here below in red.

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I thank the authors for addressing my comments. I feel this is back on track to publication and have only a few short requests.

Lines 605-7: My biggest remaining concern is these lines: " Furthermore, the SSW analysis for atm-only and the ensemble size test (Fig. S7 and Fig. S8 respectively) both show strong evidence of a robust signal for winter 3 despite the noisy polar vortex and the limited ensemble size." I disagree with "strong evidence" for reasons given by both reviewers previously, and request (as with other lines that have already been revised) that this be edited to "suggests" or similar.

Indeed we agree on the careful wording here in agreement with the revised part based on exactly that. Now lines 611-613 reads:

"Furthermore, the SSW analysis for *atm-only* and the ensemble size test (Fig. S7 and Fig. S8 respectively) both suggest the presence of a robust signal for winter 3 despite the noisy polar vortex and the limited ensemble size."

Line 30: "in the idealized forcing simulation with interactive ocean" is hard to understand, and really there's many simulations (i.e. an ensemble). I find "idealized forcing" here confusing and unneeded, as this isn't significantly more idealized than is usual in a GCM. "in simulations with interactive ocean temperatures" would maybe suffice.

We agree, this sentence now reads:

"We detect unusually high frequency of Sudden Stratospheric Warmings in the simulations with interactive ocean temperatures that calls for further exploration."

Line 417: "a least constrained forced response" to "a less constrained forced response"?

Correct, Line 418 now reads "less constrained".

Lines 418-9: "Therefore, only much larger ensembles may provide signals not encompassing the value of zero within uncertainty." This isn't clearly saying the main point, so could be rewritten to correct this. E.g. something along the lines of "This analysis suggests that larger ensembles would be needed to demonstrate high confidence in the SSW response (i.e. signals not encompassing the value of zero within uncertainty)".

Indeed we agree that this line is somewhat confusing. Now lines 419-421 reads:

"Accordingly, this analysis suggests that much larger ensembles are needed to confidently demonstrate the significance of the SSW response (i.e. to provide signals not encompassing the value of zero within uncertainty)."