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Interactive comment on "Is there warming in the pipeline? A multi-model analysis of the zero emission commitment from CO_2" *by* Andrew H. MacDougall et al.

Anonymous Referee #1

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Review of "Is there warming in the pipeline? A multi..." by A. H. MacDougall and co-authors.

In this model intercomparison the global mean temperature response following a cessure of CO2 emissions is investigated. This is a welcome addition to a literature mostly based on disparate evidence from single models. The study is mostly well conducted, and can in my opinion be published after the below mostly minor issues have been adressed.

Suggestions:

14, I would add "and simple theory"

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150, I would delete ", often called ...". I personally have never heard the expression "Gregory ECS"

153, Andrews et al. (2012) use years 1 to 150, not 20 to 140 as stated here

171-172, if the method is unbiased, how come nearly all models have negative ZEC at year zero in Figure 2b?

210, the way efficacy, or epsilon, is calculated it folds in state-dependence of feedbacks into the epsilon. Probably not an essential issue in this paper, since this parameter isn't important for ZEC, though worth a few words of mention

210, on the same theme, the study would benefit from a more up-to-date treatment of efficacy. In newer studies this is referred to as time-dependent feedback or pattern-effects.

218, delete 'of the models'

227-229, this sentence is confusing. Models may in addition exhibit cloud adjustments not taken into account in neither Myhre nor Etminan. Therefore models may well lay outside (and they do). I recommend deleting.

239-240, somewhat repetitive.

241, I believe the authors have mistaken MPI-ESM for Loveclim.

249-250, any reason we should pay attention to such awkward behaviour?

299-344, here I didn't understand why the authors refer to a diagnostic framework (Equation 4), and then don't use it? In particular if ZEC is non-zero, then climate change feedbacks (lambda) will affect the balance, and likewise if there is ocean heat uptake efficacy (non-unitary epsilon).

319, delete last instance of 'and'

Figure 8, I recommend using a different colour than blue for the outlier, in print it was

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hard to distinguish.

346-355, here I would like to see a statistical test that the slopes are actually non-zero. To me it seems rather random, for instance the slope in panel c would probably disappear if omitting the single high TCRE model.

361, use another word than 'Gregory ECS'

368, any reason to think that ZEC should be related to these quantities? In fact, I think it is great that it is not, since basic theory suggests it shouldn't.

400, the phrasing 'will be required', seems to suggest that sustaining a constant global temperature somehow is desirable. I suggest leaving it to others to decide this.

418-419, I didn't understand this sentence.

425, since we don't expect ZEC to be related to ECS, TCR and TCRE, why start the sentence like this?

430, I recommend amending: '... cannot be ruled out purely on the basis of models.'

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