

Interactive comment on “ESD Reviews: mechanisms, evidence, and impacts of climate tipping elements” by Seaver Wang and Zeke Hausfather

Anonymous Referee #2

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At first I was excited to read this paper as a review on current understanding of climate tipping elements and where the gaps in understanding lie and where the research community should focus their efforts. However, while the authors attempt to clear up some of the terminology around what a tipping element is, they actually end up creating more confusion which suggests the authors do not have a good understanding themselves. A tipping element is a physical component of the Earth system, which is characterized by a threshold over which it can transition into a different state under perturbations of the climate system (e.g. Lenton et al. 2008). Thus, rising air temperatures could push a component of the Earth system, i.e. the complete collapse of the west Antarctic ice sheet that will not recover once air temperatures return back

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to lower temperatures. Some of these tipping points could be reinforced by feedbacks, but feedbacks are not climate tipping elements. Thus, the entire way the introduction is written makes it clear that the authors do not fully understand the basic definition of climate tipping elements, climate tipping points or climate feedbacks. Based on the confusion terminology presented in the introduction, I decided not to continue reading this very lengthy paper. While a synthesis paper on our current understanding of which components of the Earth system are characterized by threshold behavior, and how close to a tipping point each of the elements are, the impacts of these tipping points, is worthwhile, yet I feel this paper fails to achieve that in its present form. I'm not sure what we learn from what is already presented in Lenton et al. 2008. If we updated some of the tipping elements discussed in that paper with more recent knowledge, that could be helpful but this paper fails to do that. Also this is an incredibly lengthy paper which feels more like a report rather than a synthesis paper. The format of Lenton et al. (2008) is much more appropriate, which at the time provided a critical view of our understanding of which Earth system components were likely to exhibit threshold behavior and what the realistic risks are and how policy can help.

I feel that the authors will have to completely redesign this paper before it can be considered in any journal.

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