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Interactive comment on "Risk and the Point of No Return for Climate Action" *by* Matthias Aengenheyster et al.

Anonymous Referee #1

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This paper provides a definition of a point of no return for avoiding specified temperature increases with a given likelihood. The authors develop a stochastic model to address this issue based on CO2 concentration and temperature simulated in the CMIP5 ensemble runs. The paper addresses the sensitivity of the point of no return to a number of factors and with a set of assumptions about rates of decarbonisation of the economy. The method and results are clear and the assumptions are well declared. I see no major issues with this paper and provide only minor comments below:

1. The authors assess temperature rises to 2100 only. For some scenarios the global mean temperature will continue to increase well after this date. Those cases should be acknowledged.

2. The authors note that 2K warming is commonly seen as a "safe threshold". It may

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be seen that way, but that is a value judgment subject to considerable uncertainty, and this should be acknowledged.

3. The assessment of delta T depends on the baseline period chosen. This point is addressed later in the report and is said to introduce a sensitivity to the PNR of up to 10 years. The new IPCC special report on warming of 1.5C and 2C indicates potentially large differences in delta T for different baseline choices. It would be nice to see the authors address this issue more explicitly to have confidence that their PNR sensitivity is as low as reported.

4. The authors use the concept of "negative emissions" in their simulations, but don't say much about the feasibility of negative emissions. Some elaboration would be helpful for the reader.

5. The trajectory of warming from the present point to exceeding the specified temperature threshold will not be smooth as it will include multidecadal scale internal variability. That implies that the threshold will not be exceeded at a single point in time, but only in some average sense. The degree to which this is an issue depends on how well the CMIP5 runs represent multidecadal internal variability and how one treats temporal variability and overshoot in relation to the threshold. The authors could provide some discussion of this issue in relation to their analysis.

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