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Interactive comment on "Climate change impacts model parameter sensitivity – What does this mean for calibration?" *by* Lieke Anna Melsen and Björn Guse

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We would like to thank the reviewer for the positive and constructive review. Here below we respond to the three points about framing and interpretation.

1) We are not entirely sure whether we agree with the reviewer on the unexpected motivation from calibration. Indeed computationally it is feasible to calibrate 30 parameters for simple models (as far as they are still simple with 30 parameters), but it is an ill-defined problem, for a given objective function only a limited number of parameters can be detected as dominant. Besides, the number of required model simulations to cover the entire parameter space in the same quality is increasing nonlinearly (see

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Guse et al., 2020, Vol. 65, Issue 7, HSJ). Therefore, calibration can/will be more successful with parameter prioritization based on sensitivity analysis. On the other hand, we agree that it is easy to resolve the issue raised by the reviewer; the results are relevant independent of presenting it in the calibration context. We propose to wait for the opinion of the other reviewer on the framing, and then re-evaluate the framing.

2) It is indeed interesting (and alarming!) that the models disagree on process changes. We will further strengthen the discussion on this part.

3) This study indeed relates to earlier work on time-varying sensitivity. We make a very short link to this work (line 288 on page 14), but will further strengthen this discussion. We perceive our work as a continuum across timescales; basically we test for the average effect on the climate time scale of time varying sensitivity (and as such should indeed be representative of changing processes).

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