

Interactive comment on “Field-warmed soil carbon changes imply high 21st century modeled uncertainty” by Katherine Todd-Brown et al.

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This is a very interesting study in which the newly-derived Q10 values from the Crowther et al. 2016 study are incorporated into a post-hoc simulation of 20 CMIP5 Earth system models. Surprisingly, better-constrained data does not reduce uncertainty in predicted soil organic carbon (SOC) values. Rather, predicted SOC stocks are considerably less in comparison, while retaining very large uncertainties. The study seems very well-done, relies on important new findings, uses an important suite of models, and provides important insights into both predicted SOC and model uncertainty. This paper is a logical outcome of the Crowther et al. 2016 study and will certainly be of interest to the Biogeosciences community.

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The authors provide a clear description of an assumption regarding metastable SOC stocks (Eqns 2-4), and how stock differences between two soils, or control and warming, can be used in the model. Authors also completely describe the implications of the (necessary) simplifying assumption of a one-pool model. These are both rather sticky subjects and the authors do an adequate job of addressing these concerns.

Specific comments P1 L22: unclear meaning P2 L20: probably could remove statement about a wide range of typical Q10s. P4 L3: replace with "an inverse with all positive entries" P4 L9: "constructed" P6 L8: are these shown? P8 L10: some edits needed P10 L22: unclear what you mean by "models should increase their variability"

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