

Interactive comment on “A crop yield change emulator for use in GCAM and similar models: Persephone v1.0” by Abigail Snyder et al.

Anonymous Referee #2

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The authors present a methodology, with an accompanying R package, to emulate changes in crop yield under global change scenarios. The functions produced by this framework can be introduced in other models such as GCAM, which can help to speed-up different types of simulations. The manuscript is well written and presents important results that merit publication in GMD. However, I have one major comment to this work.

Although I really liked the Bayesian approach proposed here, which is more robust than previous linear regression approaches, I had problems understanding the approach for modeling the standard deviation term. It seems that the approach yields negative values of σ_{CTW} , which is evident by the use of absolute values in equation 6. As far as I am concerned, standard deviation values can never be negative since theoretically they are the square root of the variance. The choice of prior distributions for modeling

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σ_{CTW} expressed in equation 5, explains the reason for the negative values. For the baseline case, $b_0 \sim N(0, 0.001)$ yields a distribution of standard deviations centered around zero, which I find difficult to understand.

Modeling prior distributions for the variance in Bayesian analysis is not trivial, and there are many analyses dealing with this problem (e.g. see papers by Andrew Gelman). Most controversies about this topic deal with the choice of the prior distribution for variance parameters and whether gamma, inverse gamma, or other distributions are appropriate choices. These distributions however, are always defined in the positive part of the real line \mathbb{R}^+ .

I suggest the authors to revise this part of the manuscript. If there is important information that I am missing regarding this issue, the authors should at least explain their choice of distribution and its interpretation.

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